



**EUROPEAN AND MEDITERRANEAN PLANT PROTECTION
ORGANIZATION**
**ORGANISATION EUROPEENNE ET MEDITERRANEENNE POUR LA
PROTECTION DES PLANTES**

12-17929
WPPR Point 7.4

Report of an Express Pest Risk Analysis for *Pseudomonas syringae* pv. *actinidiae*

This summary presents the main features of a pest risk analysis which has been conducted on the pest, according to the draft version of the EPPO Express PRA scheme and following the Decision support scheme for quarantine pests (PM 5/3(5)) for the spread and management sections.

Pests: *Pseudomonas syringae* pv. *actinidiae*

PRA area: EPPO region

Assessors: Expert Working group for PRA for *Pseudomonas syringae* pv. *actinidiae*

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The risk management part was reviewed by the Panel on Phytosanitary Measures on 2011-11-15.

STAGE 1: INITIATION

Reason for doing PRA:

Bacterial canker of kiwifruit caused by *Pseudomonas syringae* pv. *actinidiae* was first noticed in the EPPO region in central Italy in 1992, where it remained sporadic and with no economic incidence during 16 years. In 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* was an emerging pathogen in the Mediterranean region, the EPPO Secretariat decided to add it to the EPPO Alert List in 2009. In 2010 it was reported in France, Portugal, New Zealand and Chile; in 2011 in Spain, Switzerland, Turkey and Australia. The Working Party on Phytosanitary Regulations in June 2011 considered that an express PRA should be conducted.

Taxonomic position of pest:

Bacteria; Proteobacteria; Gammaproteobacteria; Pseudomonadales; Pseudomonadaceae; *Pseudomonas*; *Pseudomonas syringae* complex, genomospecies 8.

Population characteristics:

Until now four different *Pseudomonas syringae* pv. *actinidiae* populations can be characterised based on aggressiveness, genomic fingerprinting, 16SrDNA or ITS sequencing, MLST analysis, production of toxins, presence of certain genes (see Appendix 1 of doc 12-17928). From these four populations, two have been detected so far in the EPPO region and they differ in aggressiveness.

STAGE 2: PEST RISK ASSESSMENT

PROBABILITY OF INTRODUCTION

Entry

Geographical distribution:
(see PRA record for references)

EPPO region: France, Italy, Portugal, Spain, Switzerland, Turkey.
South America: Chile
Asia: China, Japan, Korea Republic
Oceania: New Zealand, Australia

Comment on distribution

P. syringae pv. *actinidiae* was originally described in Japan (Shizuoka prefecture Takikawa 1989) where it is widespread but its area of origin has not been ascertained.

Major host plants:
(see PRA record for references)

Actinidia species: *A. deliciosa*, *A. chinensis*, *A. arguta*, and *A. kolomikta* are reported as hosts

Which pathway(s) is the pest likely to be introduced on:

- **Plants for planting (excluding seeds) & Tissue culture.**

Plants for planting of *Actinidia* spp. are the main pathway for long distance spread and are suspected to be at the origin of the outbreaks in several EPPO countries.

- **Pollen**

Pollen transmission has not been demonstrated so far but the possibility that infected pollen could spread the disease cannot be excluded and more research is needed (EPPO, 2011). Studies on pollen transmission are in progress in Emilia Romagna (Finelli, Italian NPPO, pers. comm., 2011). The EWG considered that although evidence is lacking on such transmission, the involvement of pollen in *P. syringae* pv. *actinidiae* transmission should not be excluded and measures should be identified.

- **Natural spread, e.g. intrinsic spread, wind, water, animals (including pollinators)**

Data on the epidemiology of the disease is lacking but like other Pseudomonads bacteria spread is ensured by heavy rain, strong winds and animals (Balestra, 2010b). Natural spread is considered to happen mostly within or between orchards. For entry into new areas in the EPPO region (e.g. Greece, Israel) natural spread has not been considered as a likely pathway.

- **Fruits**

Although the bacterium can be detected in experimentally contaminated fruits (macerated fruit material spiked with *P. syringae* pv. *actinidiae*), there was no evidence of natural infection of fruits until recently. Nevertheless, the question of fruit transmission was discussed at the meeting and the EWG considered that even if fruit infection could be demonstrated, the risk of transmission of the bacterium with commercial fruits to kiwi orchard was as insignificant as evaluated by Roberts & Sawyer (2007) for *Erwinia amylovora* for commercial apple fruits.

Establishment

Plants at risk in the PRA area:

Actinidia species are present in the EPPO region. The main countries producing kiwifruits are Italy (23800 ha), Turkey (20000 ha), Greece (5086 ha), France (4035 ha), Portugal (1405 ha), and Spain (1200 ha).

Climatic similarity of present distribution with PRA area (or parts thereof):

Based on the distribution of climates that occur in the European Union, their presence in other parts of the EPPO region and the locations of outbreaks, it can be concluded that climatic conditions in the EPPO region are favourable for the pest in most if not all areas where kiwifruit is grown. A Climatic predictive study was performed in France (Reynaud, 2011 – see Appendix 3 of the Express PRA 12-17928) using the CLIMEX predictive climatic tool.

This study indicates that *P. syringae* pv. *actinidiae* could establish in

most countries where *Actinidia* species are grown, especially in areas with a maritime influence.

Characteristics (other than climatic) of the PRA area that would favour establishment:

No other characteristics identified in the Express PRA.

Which part of the PRA area is the area of potential establishment:

Areas where kiwifruits are grown in the EPPO region.

POTENTIAL ECONOMIC CONSEQUENCES

How much economic impact does the pest have in its present distribution:

In the countries of the region where the pest is present the disease is reported with a high incidence. In Italy, 4 years after the first reports several orchards show up to 80-90 % incidence on kiwi yellow cultivars. With an incidence of 40% 2/3 of the fruit harvest can be lost. In France disease incidence in the field ranged from few isolated plants up to 30% of infected plants for *A. deliciosa*.

There are no curative treatments available (antibiotic treatments are not authorized in most EPPO countries).

Describe damage to potential hosts in PRA area:

P. syringae pv. *actinidiae* causes brown discolouration of buds, dark brown angular spots surrounded or not by a yellow halo on leaves during spring, flower necrosis and blight, twig wilting and die-back, reddening of the lenticels, cankers with white to reddish (oxidation) exudate on canes, leaders or trunks during late winter, fruit collapse (due to blockage of vessels in the canes). Severely infected vines die.

The most conspicuous symptom is the red-rusty exudation which covers bark tissues on trunks and canes. Also, the presence of white exudates, often abundant, during winter is very typical of the disease. Removal of the bark usually reveals a brown discoloration of the external vascular tissues and reddening of the tissues beneath lenticels (details on symptoms depending on the season are given on the [EPPO Website](#) click on the hyperlink).

How much economic impact would the pest have in the PRA area:

For the few EPPO kiwifruit producing countries where the pest is not present, impact is likely to be very high for the producers and similar to what is described *e.g.* in Italy and France.

Actinidia sp. orchards have so far not necessitated regular sprays with plant protection products. The occurrence of the pest has consequently an impact on producers. In addition prophylactic measures should be implemented in the orchard to prevent infection. In non-EPPO countries, antibiotics are used but this is banned in most EPPO countries. A change in irrigation system from overhead irrigation to drip irrigation will have financial consequences for farmers.

CONCLUSIONS OF PEST RISK ASSESSMENT

Summarize the major factors that influence the acceptability of the risk from this pest:

Plants for planting have been demonstrated to be the main pathway for spread within the region. Impact in kiwi orchard is high.

Estimate the probability of entry:

The pest has already entered the PRA area; the risk is thus high. Plants for planting represent the main pathway of entry to new areas as suggested in recent outbreak situations.

Estimate the probability of establishment:

The pest has already established in part of the PRA area. Climatic conditions are suitable in areas where kiwifruit orchards are grown; the risk is thus very high in these areas.

Estimate the probability of spread:

The overall probability of spread is estimated as very likely. Plants for planting of *Actinidia* spp. are the main pathway for long distance spread

and are suspected to be at the origin of the outbreaks in different EPPO countries. Data on the epidemiology of the disease is lacking but like other Pseudomonads, spread is ensured by plants for planting (except seeds), heavy rain, strong winds and animals (Balestra, 2010b). Spread within and between orchards can also be ensured through pruning equipment. The role of pollen in disease spread needs to be further investigated.

Estimate the economic impact: potential In the countries of the region where the pest is present the disease has a high economic impact the same impact is expected in other parts of the region where *Actinidia* sp is grown. (see section “How much economic impact does the pest have in its present distribution” and “How much economic impact would the pest have in the PRA area”)

Degree of uncertainty The epidemiology needs to be better understood to identify the contribution of pathways such as pollen and bees to the overall risk presented by this pathogen.
Other aspects of uncertainty include:
- Length of survival of *P. syringae* pv. *actinidiae* on the plants.
- Distribution of the bacteria in the plant.

OVERALL CONCLUSIONS The pest has a high economic impact and further spread with plants for planting should be avoided. Measures should be implemented to contain the pest and eradicate it where this is still feasible.

STAGE 3: PEST RISK MANAGEMENT

IDENTIFICATION OF THE PATHWAYS

Pathways studied in the pest risk management

- Plants for planting (except seeds and tissue culture)
- Pollen
- Tissue culture

IDENTIFICATION OF POSSIBLE MEASURES

Possible measures for pathways

For details on measures to establish and maintain pest-free areas and pest-free places of production, see questions 7.17 and 7.21 in Appendix 5 of the full text of the Express PRA, doc 12-17928

| | |
|---|---|
| Pathway 1: Plants for planting (except seeds and tissue culture) | Pest-free area |
| | Pest-free place of production * + specific handling/packing methods |
| | Import under special permit and post entry quarantine |
| Pathway 2: Pollen | Pest-free place of production (|
| | Pest-free area |
| Pathway 3: Tissue culture | Tissue culture produced from mother plants produced in a pest free place of production or pest-free area (for conditions see pathway 1) |

* It should be noted that PFPP can only be maintained if stringent measures as described in the detailed management part of the Express PRA are implemented.

Other recommendations:

Surveys should be conducted in all kiwifruit growing countries.

Uncertainties

- Size of the buffer zone necessary to establish Pest-free areas and Pest-free places of production (lack of data specific of *P. syringae* pv. *actinidiae*)

It should be noted that, as for PRAs performed for other pests, measures have been determined based on the experience with other plant pathogenic bacteria.

References (See references in the Express PRA, doc 12-17928).