

EPPO Datasheet: *Erwinia amylovora*

Last updated: 2020-04-22

IDENTITY

Preferred name: *Erwinia amylovora*

Authority: (Burrill) Winslow, Broadhurst, Buchanan, Krumwiede, Rogers & Smith

Taxonomic position: Bacteria: Proteobacteria:

Gammaproteobacteria: Enterobacterales: Erwiniaceae

Other scientific names: *Bacillus amylovorus* (Burrill) Trevisan, *Bacterium amylovorum* (Burrill) Chester, *Erwinia amylovora* f. sp. *rubi* Starr, Cardona & Folsom, *Micrococcus amylovorus* Burrill

Common names: fire blight (US), fireblight (GB), twig blight of apple

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EPPO Categorization: A2 list

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EU Categorization: PZ Quarantine pest ((EU) 2019/2072 Annex III), RNQP ((EU) 2019/2072 Annex IV)

EPPO Code: ERWIAM



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HOSTS

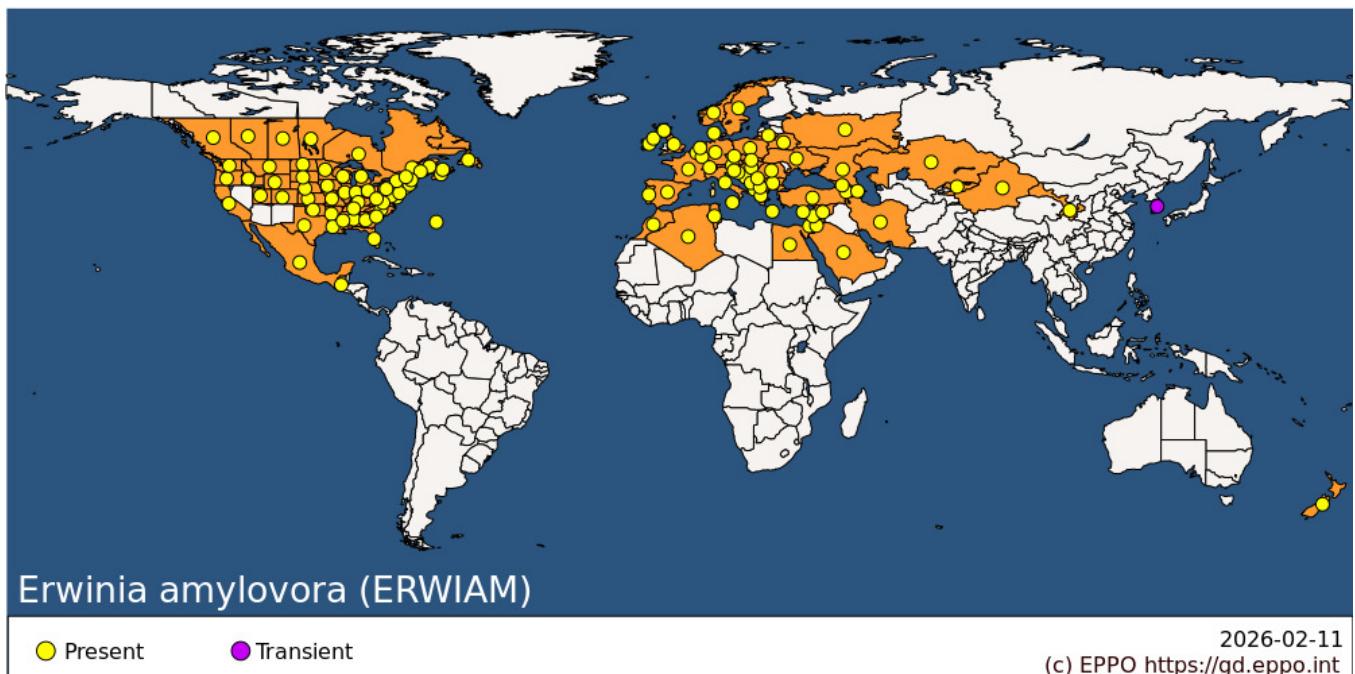
Fireblight, caused by *Erwinia amylovora*, specifically affects plants within the Rosaceae family, and more particularly those in the subfamily Maloideae which includes economically important pome fruit trees, such as apple (*Malus domestica*) and pear (*Pyrus communis*). The latter two being among the most consumed fruits in the world. A few hosts belonging to the subfamilies Rosoideae and Amygdaloideae can also be affected (Momol and Aldwinckle, 2000). Genera in the subfamily Spiraeoideae have been reported as hosts on the basis of artificial inoculation (van der Zwet and Keil, 1979), or occasionally being found infected (e.g. *Spiraea prunifolia*; Bastas and Sahin, 2014). Most strains of *E. amylovora* isolated from one host are also pathogenic on other hosts (Mohan and Thomson, 1996; Vanneste *et al.*, 2002). However, *Rubus* strains which have been isolated in North America are host specific; they are pathogenic on brambles but not on apple and pear (Starr *et al.*, 1951; Braun and Hildebrand, 2005). Strains of *E. amylovora* isolated from *Rubus* species in the United States are different from strains detected in other hosts (Starr *et al.*, 1951; Powney *et al.*, 2011). *E. amylovora* has occasionally been isolated from *Rosa canina* and *R. rugosa* (Bastas *et al.*, 2013; Vanneste *et al.*, 2002), but has not been reported causing fireblight in commercially cultivated roses.

Most of the plants specified in the list below are widely distributed in the EPPO region either as cultivated or as native wild plants. Wild *Pyrus* species (*P. amygdaliformis*, *P. syriaca*) play an important role as sources of inoculum in Southern Europe and in the Mediterranean area, because of their abundance in these areas. *Crataegus* (*C. laevigata*, *C. monogyna*) and ornamentals (*Pyracantha*, *Cotoneaster*, *Sorbus*) are important sources of inoculum for apple and pear trees in Europe.

Host list: *Amelanchier alnifolia*, *Amelanchier canadensis*, *Amelanchier laevis*, *Aronia melanocarpa*, *Chaenomeles japonica*, *Chaenomeles*, *Cotoneaster bullatus*, *Cotoneaster buxifolius*, *Cotoneaster dammeri*, *Cotoneaster horizontalis*, *Cotoneaster lacteus*, *Cotoneaster lucidus*, *Cotoneaster microphyllus*, *Cotoneaster moupinensis*, *Cotoneaster niger*, *Cotoneaster salicifolius*, *Cotoneaster x crispii*, *Cotoneaster x watereri*, *Cotoneaster*, *Crataegus laevigata*, *Crataegus monogyna*, *Crataegus pinnatifida*, *Crataegus x prunifolia*, *Crataegus*, *Cydonia oblonga*, *Eriobotrya japonica*, *Fragaria x ananassa*, *Malus baccata*, *Malus coronaria*, *Malus domestica*, *Malus floribunda*, *Malus*, *Mespilus germanica*, *Photinia davidiana*, *Prunus armeniaca*, *Prunus cerasifera*, *Prunus domestica*, *Prunus salicina*, *Pseudocydonia sinensis*, *Pyracantha coccinea*, *Pyracantha crenatoserrata*, *Pyracantha*, *Pyrus betulifolia*, *Pyrus bourgaeana*, *Pyrus communis*, *Pyrus elaeagnifolia*, *Pyrus pyraster*, *Pyrus pyrifolia*, *Pyrus spinosa*, *Pyrus ussuriensis*, *Pyrus x sinkiangensis*, *Pyrus*, *Rosa canina*, *Rosa rugosa*, *Rosa*, *Rubus fruticosus*, *Rubus idaeus*, *Sorbus alnifolia*

GEOGRAPHICAL DISTRIBUTION

Fireblight was first described in the USA in 1780 (Denning, 1794) and has then spread throughout the North American continent, New Zealand (since 1920), and Europe where the disease was first reported in England in 1957. Since then, it rapidly spread through Western Europe and the Middle East (Van der Zwet, 2002, 2006). On the African continent, fireblight was declared to be present for the first time in 1964 in Egypt. Currently, this disease has reached many parts of the world. However major pome production areas such as Asia, in particular China, and South America have not yet been infected.



EPPO Region: Albania, Algeria, Armenia, Austria, Azerbaijan, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czechia, Denmark, France (mainland), Georgia, Germany, Greece (mainland, Kriti), Hungary, Ireland, Israel, Italy (mainland, Sicilia), Jordan, Kazakhstan, Kyrgyzstan, Lithuania, Luxembourg, Montenegro, Morocco, Netherlands, North Macedonia, Norway, Poland, Portugal (mainland), Romania, Russian Federation (Central Russia, Southern Russia), Serbia, Slovakia, Slovenia, Spain (mainland), Sweden, Switzerland, Tunisia, Türkiye, Ukraine, United Kingdom (England, Northern Ireland, Scotland)

Africa: Algeria, Egypt, Morocco, Tunisia

Asia: China (Gansu, Xinjiang), Iran, Islamic Republic of, Israel, Jordan, Kazakhstan, Korea, Republic of, Kyrgyzstan, Lebanon, Saudi Arabia, Syrian Arab Republic

North America: Canada (Alberta, British Columbia, Manitoba, New Brunswick, Newfoundland, Nova Scotia, Ontario, Prince Edward Island, Québec, Saskatchewan), Mexico, United States of America (Alabama, Arkansas, California, Colorado, Connecticut, Delaware, Florida, Georgia, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, South Carolina, South Dakota, Tennessee, Texas, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, Wyoming)

Central America and Caribbean: Bermuda, Guatemala

Oceania: New Zealand

BIOLOGY

The fireblight pathogen overwinters exclusively in infected host plants. The bacterium spreads from active lesions via pollinating insects during the flowering period, birds, rain splashing, wind and contaminated pruning tools. It enters the host through natural openings (nectaries, stomata, hydaphodes) or accidental ones (wounds) during

flowering or shoot growth. The disease cycle has been fully illustrated by Beer, 1979; Paulin, 1996; Agrios, 2005; Khan *et al.*, 2012.

DETECTION AND IDENTIFICATION

Symptoms

All the above-ground parts of hosts can be infected by the pathogen. The most common and characteristic symptoms are:

- (a) Wilt and death of flower clusters. Some or all the blossoms of a cluster wilt and die. The dead blossoms become dry and dark-brown to black in colour. They usually remain attached to the plant.
- (b) Withering and death of shoots and twigs. Infected young succulent shoots and twigs wither, turn brown and in most cases the tip of the shoot bends in a characteristic way forming the symptom known as 'shepherd's crook'.
- (c) Leaf blight: infected leaves show either necrotic patches which start from the margin of the leaf blade or blackening of the petiole and leaf midrib depending on how the infection took place.
- (d) Fruit blight: infected fruits also turn brown to black, shrivel and, like the blossoms, remain attached to the spur, taking on a mummified appearance.
- (e) Limb and trunk blight: from the infected blossoms, shoots or fruits, the disease spreads through the spurs to larger twigs and branches causing cankers and then may continue into the scaffold limbs and the trunk. Cankers cause quick death of branches or the whole tree by girdling. The cankers are recognized, externally, because their surface is slightly sunken, varying in size and surrounded by irregular cracks in the bark. Internally the tissues of the cankered area show a slightly orangey red or brown discolouration which diffuses into the healthy tissues; they are often water-soaked in appearance.

In warm, wet conditions, a whitish mucoid bacterial ooze may exude from infected shoots, petioles, cankered bark and infected fruit and blossoms. The ooze from infected apple shoots may have a golden colour (for more details see Agrios, 2005; Janse, 2005).

Morphology

E. amylovora cells are Gram-negative. Colonies are domed, circular, mucoid on sucrose nutrient agar (mucoid on KB medium (Paulin and Samson, 1973); smooth large, pulvinate, light blue opalescent with craters on CCT medium (Ishimaru and Klos, 1984). The cell size is about 0.3 μm x 1–3 μm , they occur singly, in pairs and sometimes in short chains, and are motile by two to seven peritrichous flagella per cell (Paulin, 2000).

Detection and inspection methods

To detect the disease, it is necessary to make inspections during the growing season, when the symptoms are visible. The time of inspection depends on the kind of host to be inspected and on the geographical location. It is preferable to inspect from after flowering until late summer, when the symptoms are more obvious. During the winter, on dormant plants, disease detection is quite difficult because cankers are not always visible. Latent infection has been reported in woody tissues and is considered significant in disease development (Van der Zwet and Van Buskirk, 1984; EPPO, 2013).

Since the symptoms of fireblight may be confused with those caused by other diseases and there is a possibility of latent infection, detection should be confirmed by isolation and laboratory tests (Lelliott, 1968). For reliable and rapid identification of the pathogen, immunofluorescence (Paulin, 1981), dot-ELISA (Zutra *et al.*, 1986), nested PCR (Llop *et al.*, 2000), real-time PCR (Hinze *et al.*, 2016), LAMP (Bühlmann *et al.*, 2012; Moradi *et al.*, 2012). For more details see EPPO Standard PM 7/20. Support for the identification can be achieved by DNA barcoding and sequencing using the recA gene (Laala *et al.*, 2012).

PATHWAYS FOR MOVEMENT

Natural dispersal by insects or rain only disseminates *E. amylovora* locally. The fireblight pathogen is mainly transmitted over long distances by host plants which are latently infected or have undetectable cankers. *E. amylovora* can be endophytic in internal tissues of multiplication material, thus resulting in movement of the pathogen to bacterium free areas (McManus and Jones, 1995). Another important source of inoculum are ornamental hosts grown near the orchards (Thomson, 2000). Bacterial ooze on fruit containers was thought to be the means of the first introduction into Europe but the risk of transmission on fruit is considered insignificant in current trade practice (Robert and Sawyer, 2008). The way the disease has spread in the Mediterranean countries does not exclude the possibility that aerosols have played a significant role in the spread of the pathogen over long distances (Psallidas, 1990). Moreover, *E. amylovora* is spread through the use of non-disinfected pruning tools (Teviotdale *et al.*, 1991).

PEST SIGNIFICANCE

Economic impact

The fireblight pathogen causes considerable damage to susceptible hosts. It is not only destructive to the current year's crop but also extremely dangerous to the plants themselves. After favourable weather conditions during blooming, yield is considerably reduced and, in some cases to zero. The next year's productivity is also significantly affected because of the destruction of fruiting spurs. In susceptible hosts the infection spreads so rapidly through the tree that, once infected, trees cannot be saved, even by drastic and immediate surgery, and die within a short time after the first visual signs of infection. In some states of the USA and other countries, the cultivation of particularly susceptible varieties of pear has been largely abandoned because of the disease. Fireblight is a sporadic disease that can cause significant damage because it is necrogenic and progresses very rapidly. The economic impact is difficult to quantify because it depends on the intensity of the epidemic and a fireblight attack can have repercussions over several years. In the USA, crop losses and control costs have been estimated to be more than 100 million USD per year (Norelli *et al.*, 2003). In Switzerland, where the disease was first observed in 1989, the financial burden of control measures (from quarantine to diagnostics), together with compensation payments for destroyed plants, were estimated to be about 35 million EUR over a 14-year period, from 1989 to 2003 (Duffy *et al.*, 2005).

Control

Control of the disease is mainly based on prophylactic measures, which include elimination of inoculum reservoirs, particularly crop debris, weeds, and the use of certified seedlings as pathogen-free planting material. Crop surveillance and monitoring are necessary, as well as certification programs, to ensure the sanitary quality of the plants. Warning systems based mainly on climatic data have been developed for successful and economic control of the disease (Thomson *et al.*, 1982, Billing, 1984, 1990; Lightner and Steiner, 1990).

Current control methods are diverse, but each is of limited effectiveness. Any control method against this disease must be accompanied by measures aiming at reducing the bacterial inoculum, such as manual removal of infected shoots or even uprooting of trees. Chemical control can be applied as a precautionary measure, but it is not considered environmentally-friendly; for this reason, many studies are focussing on the identification of potential biological control agents, such as antagonistic microorganisms (Mikici?ski *et al.*, 2016; Ait Bahadou *et al.*, 2018). Other more recent approaches aim to modify the susceptibility of plants to the pathogen, for example by elicitation of the plant's natural defences (Wöhner *et al.*, 2017).

Phytosanitary risk

Fireblight is a major threat for the EPPO region, and *E. amylovora* has been included on the EPPO A2 list since 1975. It is also considered as a quarantine pest by COSAVE and IAPSC, and by numerous uninfested countries around the world (e.g. Australia, Japan). It presents a risk to the pear and apple industries, as well as to the nursery trade, since many ornamental species are susceptible hosts. The presence of fireblight in a country is a major constraint for export trade in plants for planting of fireblight hosts. For the Mediterranean region the risks are more serious because of the favourable climatic conditions for disease development and the existence of self-rooted wild

hosts. The damage that the disease has inflicted in the Mediterranean countries where it has occurred are very severe. Most of the susceptible pear cultivars (Passe Crassane, General Leclerc, Santa Maria, Williams and some local cultivars) have suffered severe losses and are tending to disappear (Psallidas, 1990). The damage the disease may inflict to Mediterranean ecosystems is difficult to predict.

PHYTOSANITARY MEASURES

E. amylovora is a regulated pest in most countries of the EPPO region. All countries, even those where the disease exists, have imposed restrictions on the introduction of susceptible host plants. All plant organs except seeds are considered as potential sources for disseminating the pathogen, but it is widely accepted that fruits present an insignificant risk in practice. There is no adequate chemical or other treatment for the elimination of the pathogen from plant material without destroying the plant tissues.

Van der Zwet *et al.* (1990) reported that apple fruits collected from apparently healthy trees or harvested a minimum of 100 cm from visible blight symptoms are free from *E. amylovora*, and thus incapable of disseminating the disease to areas or countries without fireblight. A subsequent study using a predictive model under different scenarios, also concluded that the risk of spreading *E. amylovora* to disease-free areas via commercial apple fruit was insignificant (Roberts and Swayer, 2008).

Because of the great importance of the disease, eradication is generally attempted in newly infested areas. However, once the disease has become established in orchards or on wild hosts, eradication measures have proved to be very costly and, in most areas, ineffective. In a few cases, isolated imported nursery plants have been found to be infected and have been destroyed soon enough to prevent establishment.

The most effective method for preventing or postponing the spread of *E. amylovora* into uninfested areas is to impose strict phytosanitary measures on imported host plant material and to maintain vigilance in orchards and nurseries. Countries at high risk may prohibit importation of host plants for planting. However, an exception can be made for importation during the winter months, in which case consignments should come from an area where *E. amylovora* does not occur, or from an area found free from the pest during the last growing season and where an official control campaign has minimized spread. To reduce the risk of spread in international trade, other countries (even those where *E. amylovora* occurs) are recommended to require area freedom or growing-season inspection.

REFERENCES

Agrios GN (2005) *Plant Pathology*. 5th eds. United States of America: University of Florida.

Ait Bahadoua SB, Ouijab A, Abdelkarim K, Tahiria A, Lahlalia R (2018) New potential bacterial antagonists for the biocontrol of fire blight disease (*Erwinia amylovora*) in Morocco *Microbial Pathogenesis* **117**, 7-15.

Bastas KK, Sahin F (2014) First report of fire blight caused by *Erwinia amylovora* on meadowsweet (*Spirea prunifolia*) in Turkey. *Plant Disease* **98**(1) p 153.

Bastas KK, Sahin F, Atasagun R (2013) First report of fire blight caused by *Erwinia amylovora* on rosehip (*Rosa canina*) in Turkey. *Plant Disease* **97**(12) p 1652.

Beer SV (1979) Fireblight inoculum: sources and dissemination. *EPPO Bulletin* **9**(1), 13-25.

Billing E (1984) Principles and applications of fireblight risk assessment. *Acta Horticulturae* **151**, 15-24.

Billing E (1990) Fireblight concepts and a revised approach to risk assessment. *Acta Horticulturae* **273**, 163-170.

Braun PG, Hildebrand PD (2005) Infection, carbohydrate utilization, and protein profiles of apple, pear, and raspberry isolates of *Erwinia amylovora*. *Canadian Journal of Plant Pathology* **27**(3), 338-346.

Bühlmann A, Pothier JF, Rezzonico F, Smits THM, Andreou M, Boonham N, Duffy B, Frey EJ (2013) *Erwinia amylovora* loop-mediated isothermal amplification (LAMP) assay for rapid pathogen detection and on-site diagnosis

of fire blight. *Journal of Microbiological Methods* **92**, 332–339.

Denning W (1794) On the decay of apple trees. In: (eds). *Transactions of the Society for the Promotion of Agriculture, Arts and Manufactures, instituted in the State of New York*. New York: Childs and Swaine, pp. 219-222.

Duffy B, Schärer HJ, Bünter M, Klay A, Hollinger E (2005) Regulatory measures against *Erwinia amylovora* in Switzerland. *EPPO Bulletin* **35**, 239-244.

EPPO (2013) EPPO Standards. Diagnostics. PM 7/20 (2) *Erwinia amylovora*. *EPPO Bulletin* **43**(1), 21-45.

Hauben L, Moore ERB, Vauterin L, Steenackers M, Mergaert J, Verdonck L, Swings J (1999) Validation of the publication of new names and new combinations previously effectively published outside the IJSB. List No. 68. *International Journal of Systematic Bacteriology* **49**, 1-3.

Hinze M, Köhl L, Kunz S, Weißhaupt S, Ernst M, Schmid A, Voegeler RT (2015) Real-time PCR detection of *Erwinia amylovora* on blossoms correlates with subsequent fire blight incidence. *Plant Pathology* **65**, 462–469.

Ishimaru C, Klos EJ (1984) New medium for detecting *Erwinia amylovora* and its use in epidemiological studies. *Phytopathology* **74**(11), 1342-1345.

Janse JD (2005) *Phytobacteriology: Principles and Practice*, CABI Publishing, Wallingford (GB).

Khan MA, Zhao Y, Korban SS (2012) Molecular mechanisms of pathogenesis and resistance to the bacterial pathogen *Erwinia amylovora*, causal agent of fire blight disease in Rosaceae. *Plant Molecular Biology Reporter* **30** (2),247-260.

Laala S, Manceau C, Valentini F, Kerkoud M, Kheddam M (2012) Fireblight survey and first characterization of *Erwinia amylovora* isolates from Algeria. *Journal of Plant Pathology* **94**(3), 693-696.

Lelliott RA (1968) The diagnosis of fireblight (*Erwinia amylovora*) and some diseases caused by *Pseudomonas syringae*. *EPPO Publications. Series A* **45**, 27-34.

Lightner GW, Steiner PW (1990) Computerization of blossom blight prediction model. *Acta Horticulturae* **273**, 171-184.

Llop P, Bonaterra A, Penalver J, López MM (2000) Development of a highly sensitive nested-PCR procedure using a single closed tube for detection of *Erwinia amylovora* in a symptomatic plant material. *Applied and Environmental Microbiology* **66**, 2071-2078.

McManus P, Jones A (1995) Detection of *Erwinia amylovora* by nested PCR and PCR-dot-blot and reverse blot hybridizations. *The American Phytopathological Society* **85**(5), 618-623.

Mikici?ski A, Sobiczewski P, Pu?awska J, Maciorowski R (2016) Control of fire blight (*Erwinia amylovora*) by a novel strain 49M of *Pseudomonas graminis* from the phyllosphere of apple. *European Journal of Plant Pathology European Journal of Plant Pathology* **145**, 265–276.

Mohan SK, Thomson SV (1996) An outbreak of fire blight in plums. *Acta Horticulturae* **411**, 73-76.

Momol MT, Aldwinckle HS (2000) Genetic diversity and host range of *Erwinia amylovora*. In: Vanneste JL (eds). *Fire Blight. The disease and its causative agent, Erwinia amylovora*. CABI Publishing, Wallingford (GB), pp 55-72.

Moradi A, Nasiri J, Abdollahi H, Almasi M (2012) Development and evaluation of a loop-mediated isothermal amplification assay for detection of *Erwinia amylovora* based on chromosomal DNA. *European Journal of Plant Pathology* **133**, 609-620.

Norelli JL, Jones AL, Aldwinckle HS (2003) Fire blight management in the twenty-first century: using new technologies that enhance host resistance in apple. *Plant Disease* **87**(7), 756–765.

Paulin JP (2000) *Erwinia amylovora*: General characteristics, biochemistry and serology. In: Vanneste, JL, ed. *Fire blight the disease and its causative agent, Erwinia amylovora*. Wallingford, UK: CABI Publishing, 87-115.

Paulin JP (1996) Control of fireblight in European pome fruits. *Outlook on Agriculture* **25**(1), 49-55.

Paulin JP (1981) Overwintering of *Erwinia amylovora*: sources of inoculum in spring. *Acta Horticulturae* **117**, 49-54.

Paulin JP, Sampson R (1973) Fireblight in France. II. Characters of the strains of *Erwinia amylovora* (Burrill) Winslow *et al.*, 1920, isolated from a Franco-Belgian focus. *Annales de Phytopathologie* **5**(4), 389-397.

Powney R, Smits THM, Sawbridge T, Frey B, Blom J, Frey JE, Plummer KM, Beer SV, Luck J, Duffy B, Rodoni B (2011) Genome sequence of an *Erwinia amylovora* strain with pathogenicity restricted to *Rubus*. *Plants Journal of Bacteriology* **193** (3), 785-786.

Psallidas PG (1990) Fireblight of pomaceous trees in Greece - Evolution of the disease and characteristics of the pathogen *Erwinia amylovora*. *Acta Horticulturae* **273**, 25-32.

Roberts RG, Sawyer AJ (2008) An updated pest risk assessment for spread of *Erwinia amylovora* and fire blight via commercial apple fruit. *Crop Protection* **27**(3-5), 362-368.

Starr M, Cardona C, Folsom D (1951) Bacterial fire blight of raspberry. *Phytopathology* **41**(10), 915-919.

Teviotdale B, Wiley M, Harper D (1991) How disinfectants compare in preventing transmission of fire blight. *California Agriculture* **45**(4), 21-23.

Thomson SV (2000) Integrated orchard and nursery management for the control of fire blight. In: Fire blight the disease and its causative agent, *Erwinia amylovora* (ed. by Vanneste JL). CABI, Wallingford (GB), pp 9-36.

Thomson SV, Schroth MN, Moller WJ, Reid MD (1982) A forecasting model for fireblight of pear. *Plant Disease* **66**, 576-577.

Van der Zwet T (2006) Present worldwide distribution of fire blight and closely related diseases. *Acta Horticulturae* **704**, 35-36.

Van der Zwet T (2002) Present worldwide distribution of fire blight. *Acta Horticulturae* **590**, 33-34.

Van der Zwet T, Keil HL (1979) Fireblight: a bacterial disease of rosaceous plants. *USDA Agriculture Handbook* No. 510.

Van der Zwet T, Thomson SV, Covey RP, Bonn WG (1990) Population of *Erwinia amylovora* on external and internal apple fruit tissues. *Plant Disease* **74**, 711-716.

Van der Zwet T, Van Buskirk PD (1984) Detection of endophytic and epiphytic *Erwinia amylovora* in various pear and apple tissues. *Acta Horticulturae* **151**, 69-75.

Vanneste JL, Vermeulen M, Lex S, Berger F (2002) Isolation of *Erwinia amylovora* from blighted plums (*Prunus domestica*) and potato roses (*Rosa rugosa*). *Acta Horticulturae* **590**, 89-94.

Winslow CE, Broadhurst J, Buchanan R, Krumwiede Jr C, Rogers L, Smith G (1920) The families and genera of the bacteria: final report of the committee of the Society of American Bacteriologists on characterization and classification of bacterial types. *Journal of Bacteriology* **5**(3), p 191.

Wöhner T, Richter K, Sundin GW, Zhao Y, Stockwell VO, Sellmann J (2017). Inoculation of *Malus* genotypes with a set of *Erwinia amylovora* strains indicates a gene-for-gene relationship between the effector gene eop1 and both *Malus floribunda* 821 and *Malus* 'Evereste'. *Plant Pathology* **67**, 938-947.

Zutra D, Shabi E, Lazarovits G (1986) Fireblight on pear, a new disease in Israel. *Plant Disease* **70**, 1071-1073.

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Datasheet history

This datasheet was first published in the EPPO Bulletin in 1983 and revised in the two editions of 'Quarantine Pests for Europe' in 1992 and 1997, as well as in 2020. It is now maintained in an electronic format in the EPPO Global Database. The sections on 'Identity', 'Hosts', and 'Geographical distribution' are automatically updated from the database. For other sections, the date of last revision is indicated on the right.

CABI/EPPO (1992/1997) Quarantine Pests for Europe (1st and 2nd edition). CABI, Wallingford (GB).

EPPO (1983) Data sheets on quarantine organisms No. 52, *Erwinia amylovora*. *Bulletin OEPP/EPPO Bulletin* **13** (1).



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