

### Mini data sheet on *Phytophthora kernoviae*

*Phytophthora kernoviae* was added to the EPPO A2 List in 2013. 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 2005-deleted in 2013).

#### *Phytophthora kernoviae*

**Why:** In late autumn 2003, during surveys on *Phytophthora ramorum*, an unknown *Phytophthora* species was isolated in Cornwall (GB) from rhododendrons showing leaf and stem necrosis in a woodland area near a commercial nursery. The same pathogen was isolated at another site from a large bleeding canker on a mature *Fagus sylvatica* and from nearby rhododendrons with foliar necrosis and shoot dieback symptoms. The pathogen was initially referred to as *Phytophthora* taxon C and then described as a new species called *Phytophthora kernoviae* (from 'Kernow', the Cornish noun for Cornwall - Brasier *et al.*, 2005). It is morphologically distinct from other known *Phytophthora* species. In phylogenetic studies (comparison of ITS rDNA sequences), its closest relative was *P. boehmeriae*. It is hypothesized that it could be an exotic species of recent introduction.

#### **Where:**

**EPPO region:** Ireland (first found in 2008), United Kingdom (England, Wales and Scotland).  
**Oceania:** New Zealand (North Island). It was first identified in 2006 in Northland, in 2 samples (soil and *Annona* sp.). However, when collections and earlier studies of *Phytophthora* species were revisited, it was found that *P. kernoviae* was already occurring in the 1960s. At present, *P. kernoviae* has been detected in several sites (in soil samples) on the North Island (Northland, Auckland, Taupo areas) but without causing severe damage. In the UK, *P. kernoviae* has been found at several sites (69 sites found between October 2003 and December 2008) in England, Wales and Scotland (few isolated cases reported in 2008, in Argyll and the Isle of Arran). Most findings have been made on rhododendrons in small areas of woodland in Cornwall, but there have also been limited findings on rhododendron bushes in South Wales and Devon, and on commercial nurseries in the North West of England (1 site in Cheshire, now eradicated) and in Cornwall (2 sites). Rhododendrons are probably the most commonly affected plants but *P. kernoviae* has been found on many other species belonging to the families Aquifoliaceae, Araliaceae, Ericaceae, Fagaceae, Magnoliaceae, Podocarpaceae, Proteaceae, Rosaceae and Winteraceae. Eradication measures are being taken in UK (*P. kernoviae* is there a 'notifiable pest'). In the nursery found contaminated, all infected plants have been destroyed and the outbreak is considered eradicated. In infected woodlands, rhododendrons are eliminated to contain the disease.

**On which plants:** Mainly *Rhododendron* spp. (notably *R. ponticum* - Ericaceae) but also found on other plant species: *Drimys winteri* (Winteraceae), *Fagus sylvatica* (Fagaceae), *Gevuina avellana* (Proteaceae), *Hedera helix* (Araliaceae), *Ilex aquifolium* (Aquifoliaceae), *Liriodendron tulipifera* (Magnoliaceae), *Magnolia* spp. (Magnoliaceae), *Michelia doltsopa* (Magnoliaceae), *Pieris formosa* (Ericaceae), *Quercus ilex* (Fagaceae), *Quercus robur* (Fagaceae), *Umbellularia californica* (Lauraceae), *Vaccinium myrtillus* (Ericaceae). Full host range is not known and needs to be further investigated. For example, studies are currently being done on the susceptibility of heathland species in the UK.

**Damage:** As for *P. ramorum*, two different types of symptoms are observed: bleeding cankers and leaf lesions.

On *F. sylvatica*, *Q. robur* and *L. tulipifera*, bark necrosis and bleeding lesions are observed. Lesions often develop into sunken and bleeding cankers (gummy brown to black ooze). Cankers size can range from a few centimetres to large lesions (> 3 m).

On *Rhododendron*, shoot dieback, foliar necrosis and wilting are observed. In severe infection, bush may be killed. Similar foliar necrotic lesions are observed on other ornamental host species. Leaf and shoot dieback are observed on *Q. ilex*.

Symptoms can be viewed on Internet: <http://www.defra.gov.uk/planth/pkernovii3.htm>

**Dissemination:** Caduceus sporangia (containing zoospores) can most probably be spread locally by water splash or in airborne mist droplets. Under suitable conditions, asexual reproduction takes place and new sporangia are being produced. Oospores (sexual reproduction) have been produced by *P. kernoviae* in the laboratory but have not been observed in naturally infected plants. Chlamydospores (ensuring survival under adverse conditions) have never been observed nor in the laboratory or in the field. Further studies are still needed on the biology and epidemiology of *P. kernoviae*. Long distance spread can be ensured by movement of infected plants of rhododendron, beech and other hosts (it is thought that isolated occurrences of *P. kernoviae* in south Wales and Cheshire may reflect its further spread via plant trade). *P. kernoviae* is apparently not a root pathogen, but it can be isolated from soil. Movements of soil (or litter and plant debris) could probably spread the disease.

**Pathway:** Plants for planting, cut branches, soil, wood? (apparently no sporulation has been observed on mature bark lesions).

**Possible risks:** In the EPPO region, *F. sylvatica* is an important forest tree, also planted for amenity purposes. Rhododendrons are commonly grown as ornamentals in parks and gardens, although *R. ponticum* is considered as an invasive plant in woodlands (EPPO list of invasive alien plants). *Q. ilex* is more important for the Mediterranean area. The other ornamental species which are hosts of the pathogen are also valuable trees or shrubs. *P. kernoviae* appears more virulent on some hosts than *P. ramorum*. It has killed some established *R. ponticum* and apparently caused lethal cankers on *F. sylvatica*. So far, control measures are essentially based on the destruction of infected plants, and in particular of rhododendrons in infected woodlands. More studies are needed on possible control measures. Finally, from a more fundamental point of view, the potential risk of lateral transfer of genes from other *Phytophthora* needs to be further investigated. Like *P. ramorum*, *P. kernoviae* represents a risk to both the forestry and nursery industries.

#### Source(s)

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Brasier CM, Beales PA, Kirk SA, Denman S, Rose J (2005) *Phytophthora kernoviae* sp. nov., an invasive pathogen causing bleeding stem lesions on forest trees and foliar necrosis of ornamentals in Britain. Mycological Research 109(8), 853-859.

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NPPO of Ireland (2010-07)

INTERNET

DEFRA website.

*Phytophthora kernoviae*. A new threat to our trees and woodlands. <http://www.defra.gov.uk/planth/pestnote/kern.pdf>

Revised Summary Pest Risk Analysis for *Phytophthora kernoviae* (2008). <http://www.defra.gov.uk/planth/prp/pker.pdf>

Host plants of *P. kernoviae*. <http://www.defra.gov.uk/planth/kernovii/kernhost.pdf>

*P. kernoviae* - Latest findings (2005-09). <http://www.defra.gov.uk/planth/pkernovii2.htm>

*Phytophthora kernoviae* outbreaks in England and Wales (2008-12-11). <http://www.defra.gov.uk/planth/pkernovii2.htm>

Forestry Commission website.

*Phytophthora kernoviae*. <http://www.forestry.gov.uk/forestry/infd-66jlgb>

BBA website.

BBA factsheet (in German) by Dr S. Werres. [http://www.bba.de/inst/g/pkernoviae/p\\_kernoviae.pdf](http://www.bba.de/inst/g/pkernoviae/p_kernoviae.pdf)

New Zealand - Ministry of Agriculture and Forestry. Biosecurity New Zealand investigates new fungus in Northland (Press Release 2006-03-24). <http://www.maf.govt.nz/mafnet/press/240306fungus.htm>  
NAPPO Pest Alert System. *Phytophthora kernoviae* found for the first time in New Zealand. <http://www.pestalert.org/viewNewsAlert.cfm?naid=16>

EPPO RS 2005/164, 2006/060, 2008/186, 2009/069, 2010/148, 2012/193

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