Phytophthora ramorum and P. kernoviae – European perspective

Joan Webber
Forest Research, UK
Covering.....

- Update on situation in Europe
- Focus on situation in Britain
- Changing issues in Britain
  - Spread to Scotland
  - Vaccinium heathland affected
  - Affected trees beyond southern England
  - Eradication efforts
  - Phosphite treatment of Magnolia
Phytophthora ramorum in Europe since 1990’s but only formally named and reported in 2002

In 2003 Pr was reported from about 11 countries

Mainly a nursery problem – main hosts Rhododendron, Viburnum, Camellia & Pieris

Germany, Netherlands, Belgium, France, Italy, Poland, Sweden, Czech Republic, Spain, Ireland, UK

In 2003, infected trees reported from Netherlands and England
Countries reporting Pr in 2003
RAPRA database

- Positive in nurseries
- Negative
- No report
- Positive in public green/woodlands

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Countries reporting Pr in 2007

- Positive in nurseries
- Negative
- No report
- Positive in public green/woodlands

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Results from EU Plant Health

398 outbreaks

UK 97

Germany 55

France 44

Denmark 34

Spain 34

Ireland 26

Netherlands 24

Finland 22

Slovenia 20

Belgium 20

Portugal 8

Latvia 6

Estonia 3

Poland 2

Sweden 2

Lithuania 1
- *P. ramorum* sporadic but widespread
- Another *Phytophthora* pathogen discovered in England in Nov 2003 – *P. kernoviae*
- Distinct species, not related to *P. ramorum*
- BUT like Pr, it attacks leaves and stems of rhododendron
- Like Pr it causes lethal bleeding cankers on beech
- March 2006 reported in NZ
Defining factors for both diseases on trees in UK

- Susceptible tree species
- Climate
- Epidemiologically key host
  ‘sporulating’ foliar host
  - Rhododendron, northern Europe
  - Both a valued garden plant and an invasive
Suitability of the UK climate for *Phytophthora ramorum* and *P. kernoviae*
Association with *Rhododendron*
Bleeding lesions on beech

Inoculum from rhododendrons
Woodland

SW England *P. kernoviae* sites
# Trees with Pr/Pk bleeding lesions

<table>
<thead>
<tr>
<th>Tree</th>
<th>P. ramorum</th>
<th>P. kernoviae</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fagus sylvatica</td>
<td>9</td>
<td>58</td>
</tr>
<tr>
<td>Quercus cerris</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>Q. robur/petraea</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Q. acuta/falcata/rubra</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Nothofagus obliqua</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Acer pseudoplatanus</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Aesculus hippocastanum</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Castanea sativa</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Liriodendron tulipifera</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Schima sp.</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>26</strong></td>
<td><strong>61</strong></td>
</tr>
</tbody>
</table>
## Trees with *Pr/Pk* foliar infections

<table>
<thead>
<tr>
<th>Tree</th>
<th><em>P. ramorum</em></th>
<th><em>P. kernoviae</em></th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Quercus ilex</em></td>
<td>25</td>
<td>5</td>
</tr>
<tr>
<td><em>Quercus cerris</em></td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td><em>Castanea sativa</em></td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td><em>Michelia doltsopa</em></td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td><em>Magnolia</em> spp.</td>
<td>9</td>
<td>18</td>
</tr>
<tr>
<td><em>Acer laevigatum</em></td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td><em>Castanopsis</em> sp.</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td><em>Eucalyptus</em> sp.</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td><em>Cinnamomum camphora</em></td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td><em>Drimys winterii</em></td>
<td>7</td>
<td>14</td>
</tr>
<tr>
<td><em>Podocarpus salignum</em></td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td><em>Liriodendron tulipifera</em></td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>58</strong></td>
<td><strong>41</strong></td>
</tr>
</tbody>
</table>
- *P. ramorum* found for the first time in Scotland outside nurseries (at least four gardens, with wide range of ornamental plants with foliar infections)

- *P. kernoviae* found in Scotland in two locations on rhododendron
- *P. ramorum* infected trees outside southern (particularly south west) England
  - North England, midlands
  - N. Ireland
- *P. kernoviae* infection in heathland and woodland without rhododendron host
Wider Environment

SW England Pr and Pk
P. kernoviae on Vaccinium myrtillus outbreaks
Clearance for disease management

- Persistence in litter/soil layers for at least 3 years for Pk
- Sprouts from rhododendron stumps need chemical treatment
- Rhododendron seed bank to sustain pathogens
Treating infected Magnolia
Treating infected Magnolia

- Agrifos treatment of infected saplings and ornamental magnolias
- Both *P. kernoviae* and *P. ramorum* infected mature trees
- Must be deciduous species varieties
- Results indicate can be successful in protecting new foliage
- Some phytotoxicity
- Can only be effective if main sources of inoculum are eliminated
- RAPRA website (http://rapra.csl.gov.uk)
- Colleagues at Forest Research
  - Clive Brasier, Anna Brown, Sandra Denman
  - Susan Kirk and Joan Rose
- Colleagues based in Cornwall
  - Ben Jones (Forestry Commission)
  - Ian Sanders and Ann Payne (PHSI)