Are *Phytophthora* species associated with declining *Eucalyptus rudis* in the south-west of Western Australia?

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Background to *Eucalyptus rudis*

Background to *Eucalyptus rudis* ecology and decline aetiology

- Endemic to the south west of Western Australia along rivers and on floodplains & wetlands
- An important keystone species in riparian ecosystems
- Water logging and salinity tolerant

Factors indicating involvement of *Phytophthora* in decline

- Typical canopy decline
- Rot of fine feeder roots
- Grows on wet sites
- Surrounded by *P. cinnamomomi* infested forests
- Member of Myrtaceae family
Study objectives

• Determine if *Phytophthora* species are associated with *E. rudis*,
• Test their pathogenicity on *E. rudis* seedlings
• Determine if nutrients, insecticides or phosphite can mitigate decline
Sampling sites in Western Australia
Percentage recoveries of *Phytophthora* species isolated from 10 riparian systems

<table>
<thead>
<tr>
<th>Site recovery</th>
<th>P.cinnamomi</th>
<th>P.multivora</th>
<th>P.lateriticola</th>
<th>Unknown</th>
<th>Total P.sp recovery</th>
</tr>
</thead>
<tbody>
<tr>
<td>20%</td>
<td>60%</td>
<td>30%</td>
<td>20%</td>
<td></td>
<td>80%</td>
</tr>
</tbody>
</table>

More than 1 species was recovered from 3 of the 10 riparian systems
P. lateriticola

Oogonia

Sporangia

P. multivora
Blackwood River
Pathogenicity of *Phytophthora* species on *E. rudis* seedlings under glasshouse conditions

- Preliminary test of pathogen pathogenicity on apples
- Under bark inoculation of stems of *E. rudis* seedlings under glasshouse conditions
- Soil infestation of 6-month old *E. rudis* seedlings under glasshouse conditions
Tree health assessments

- Trees in North Lake area were assessed for health using Digital Multi-spectral Imagery (DMSI) and confirmed using on-ground crown health assessments
- Assessed: crown size, canopy density, branch death & epicormic growth
- Also assessed nutrients in some trees

Unhealthy: 17
Mod healthy: 35
Healthy: 70
Digital Multi-Spectral Imagery
**Treatment of diseased trees in Beeliar Regional Park:**

**Aim:** To determine if different treatments can reverse decline in *E. rudis*

<table>
<thead>
<tr>
<th>Treatment</th>
<th>№ of Trees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>30</td>
</tr>
<tr>
<td>Liquid Phosphite</td>
<td>30</td>
</tr>
<tr>
<td>Phosphite capsule</td>
<td>30</td>
</tr>
<tr>
<td>Insecticide capsule</td>
<td>26</td>
</tr>
<tr>
<td>Complete nutrient capsule</td>
<td>25</td>
</tr>
</tbody>
</table>

Total: 141

Trees rated for Crown Health and by Digital Multi-spectral Imagery
Summary

- *Phytophthora* species are almost consistently associated with *E. rudis* decline.
- Other biotic and abiotic factors are also likely to contribute to the decline syndrome.
- Trials under way to develop management options.
- Identification of other *Phytophthora* spp.
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