

- provide spray bottles with 70% methylated spirits in water to disinfect tools while working
- install footwear cleaning stations (footbaths with quaternary ammonium based disinfectant or spray bottles with 70% methylated spirits in water to disinfect shoes & tools)

#### 4 Inform all staff, contractors & visitors

- Install interpretive signage
- Provide information for planning activities to staff and contractors. Include information and maps developed during the risk assessment
- Provide brochures and information to visitors
- Encourage visitor participation to monitor sites

**DON'T BE A CARRIER  
START OUT CLEAN  
AND STAY CLEAN**



#### 5 Treat infections

Attempts to eradicate *Phytophthora* from infected areas have largely been unsuccessful. Treating with the fungicide Phosphonate (Phosphite) boosts the plant's natural defences and research has shown that it increases the resistance of susceptible plants to *Phytophthora* Dieback but it does not kill the pathogen. Infected plants remain a reservoir of the pathogen, even after they die.

Treatments with Phosphonate are most effective during the active growth months, generally spring and summer. This fungicide is manufactured by a number of companies and widely available. Spraying provides one to two years protection. Spray when at least two rain-free days are forecast and there is little or no wind.

##### Treatment instructions

- Follow safety instructions on the fungicide label: wear protective clothing and spray downwind
- Equipment needed: a clean backpack sprayer, a surfactant, Phosphonate solution and water
- To make 10 litres of spraying solution:  
Using 20% Phosphonate solution, mix 25 mL surfactant and 250 mL phosphonate, and fill with water.

Keep mixture well mixed while spraying, soaking the plants and ensuring all surfaces are wet.

You may need to apply for a permit for off-label use of the fungicide.

**KEEP IT OUT  
LIMIT THE SPREAD  
REDUCE THE IMPACT**

**MUD  
STICKS**

#### There are only three management objectives for *Phytophthora* Dieback

- Keep areas free of infection
- Reduce the spread of infection
- Manage infected sites

#### Contacts and further information

Web sites have information on susceptible and resistant plants, and details on how to assess your site for *Phytophthora*, alter work practices and apply treatments.

Botanic Gardens Trust Sydney

[www.rbg Syd.nsw.gov.au/plant\\_info/pests\\_diseases](http://www.rbg Syd.nsw.gov.au/plant_info/pests_diseases)

Commonwealth Government

[www.environment.gov.au/biodiversity/invasive\\_diseases/phytophthora-cinnamomi.html](http://www.environment.gov.au/biodiversity/invasive_diseases/phytophthora-cinnamomi.html)

Centre for *Phytophthora* Science & Management

[www.cpsm.murdoch.edu.au/](http://www.cpsm.murdoch.edu.au/)

NSW Statement of Intent for infection of native plants by *Phytophthora cinnamomi*.

[www.threatenedspecies.environment.nsw.gov.au/tsprofile/threat\\_profile.aspx?id=20026](http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/threat_profile.aspx?id=20026)

##### For more information please contact

Plant Disease Diagnostic Unit  
Royal Botanic Gardens Sydney  
Mrs Macquaries Road  
Sydney NSW 2000

**Phone** (02) 9231 8138 or 9231 8189

**Fax** (02) 9241 1135

**Email** [pddu@rbgsyd.nsw.gov.au](mailto:pddu@rbgsyd.nsw.gov.au)

**STAMP OUT**  
the spread of  
**Phytophthora  
Dieback**

*Phytophthora* (pronounced fy-TOFF-thora) is a silent killer in our midst with the potential to have devastating impacts on ecosystems. It is a water mould that survives in water, soil and plant roots and kills plants by attacking and rotting their roots.

**Use the five strategies in this brochure to help you protect your bushland.**

**PROTECT YOUR ENVIRONMENT IS PERMANENT**

This disease kills plants and infection is permanent.

#### We can help by

- Keeping it out
- Limiting the spread and
- Reducing the impact, using
  - Hygiene
  - Quarantine and
  - Treatment of infected plants

*Phytophthora* is spread naturally in water and via infected roots, and faster and further by humans moving contaminated soil or plant material. It can remain dormant for long periods during dry weather and is virtually impossible to remove from infected areas.

#### So limit its spread by managing water and soil movement.

Phytophthora Dieback attacks many native plants and it also has the potential to have a significant impact on nursery, horticulture, floriculture, tourism, mining and forestry industries.

This killer can also impact on native animals, including marsupials, birds, reptiles and insects, by reducing or eliminating vegetation they rely on for survival.



## 1 Understand Phytophthora Dieback

Phytophthora Dieback attacks plants where you can't see it occurring, at the roots. It travels in water and along root systems and is spread in contaminated soil.

#### What you can see above ground is

- wilting, yellowing and dieback of the plant
- quick death of susceptible\* plants
- greater loss of plants during dry weather
- decline in diversity of natural ecosystems
- change in vegetation structure
- loss of animals dependent on those plants for food and shelter
- change in the functions of ecosystems.

Even plants that are not highly susceptible will succumb during long periods of dry weather. The loss of root mass limits the amount of water and nutrients a plant can absorb, leaving it susceptible to insect attack, plant diseases and drought stress.

The spores of *Phytophthora* can persist indefinitely in an area protected in the roots of plants, even those that are not susceptible to Phytophthora Dieback. Disease depends on three essential components: plant host, environment and the pathogen.

*Phytophthora* occurs in areas with rainfall greater than 500 mm per annum. It is most active when the soil is moist and warm. It can also survive for long periods in plant tissue and soil during dry soil conditions.

#### Favourable soil conditions for the disease are

- warm moist conditions between 15–30°C
- poor drainage and/or open textured soil
- soil low in nutrients and organic matter

#### The only effective ways to combat Phytophthora Dieback are by

- preventing introduction — keep it out
- limiting the spread
- reducing the impact of the disease.

Assess the risk of disease for the site and use data from the assessment to set up an appropriate management plan. Include a site monitoring program and routines to evaluate effectiveness.

For a list of resistant and susceptible native plants, see [www.environment.gov.au/biodiversity/invasive/publications/pubs/appendix4.pdf](http://www.environment.gov.au/biodiversity/invasive/publications/pubs/appendix4.pdf)

## 2 Assess for risk of disease

Record data from the site assessment in a way that it can be used to monitor changes in vegetation over time.

#### Assess the risk on a yearly cycle.

#### a) Define climatic risk

*Phytophthora* is likely to be present in warm moist conditions between 15–30°C with rainfall greater than 500 mm a year.

#### b) Gather information and quantify risk

Quantify the risk across your site, using information from a survey, and mapping:

- vegetation, noting known susceptible\* plant species and recording conservation values. Include here any historical changes. Over time a list of 'plants at risk' in your area will be developed
- plant health, including any changes
- soil type, taking into account texture, amount of organic matter, pH and drainage
- movement of water across the landscape
- results of soil analysis for *Phytophthora*
- proximity to infected areas
- proximity to high levels of human activity.

#### c) Soil sampling

As all spores and structures of *Phytophthora* are microscopic, only laboratory analysis of soil is definitive.

#### The Botanic Gardens website has more details

[www.rbg Syd.nsw.gov.au/plant\\_info/pests\\_diseases](http://www.rbg Syd.nsw.gov.au/plant_info/pests_diseases)

#### Sampling soil for laboratory analysis

- select an appropriate site, based on disease symptoms
- use disinfected sampling tools (70% methylated spirits), to ensure you don't spread the disease while sampling
- scrape back organic layer above fine roots of plant
- dig 3–4 holes around plant 10–15 cm deep
- take a small hand trowel of soil and fine roots from each hole, collecting around two cups per plant
- mix in a plastic bag, seal and label well and clearly
- record GPS location
- do not refrigerate.

#### d) Develop a reassessment and monitoring program

Establish a program to reassess sites and monitor changes in risk, including updating maps. Stay informed, and review work practices and education programs. Monitor these for effectiveness and alter where needed.

## 3 Adjust work practices to reflect risk

Human activities cause the most significant, rapid and widespread distribution of Phytophthora Dieback. Any activity that moves soil, water or plant material, or alters the natural movement of water, could spread the disease.

Soil can be moved **inadvertently** or **deliberately**.

**Examples of inadvertent movement of soil** or plant material during work or recreation are by:

- footwear, clothing, backpacks, tent pegs, walking sticks
- companion and work animals (dogs, cats, horses)
- stock movement
- tools and equipment
- machinery and vehicles, including off road driving, motorbikes & bicycles or soil in the foot area of vehicles

Work activities likely to create movement of soil, water and plant material include:

- road & track construction
- earth moving
- controlling water movement
- mulching
- revegetation
- bush regeneration
- plant propagation
- forestry
- pest and weed management
- fire fighting activities

#### Minimise the spread to unaffected areas by controlling the movement of soil, plant material and water by:

- **planning and modifying activities and work practices**
  - develop management plans, work protocols and contracts to manage risk of Phytophthora Dieback
  - avoid activities when soil is wet and muddy
  - control water runoff, including from roads & tracks
  - maintain roads & tracks regularly to control water movement and reduce pooling
- **controlling access**
  - provide designated parking facilities
  - install, label & use roads, tracks or boardwalks
  - introduce quarantine areas and buffer zones (fencing, barriers)
- **adopting hygiene procedures**
  - ensure shoes, tyres and equipment are free of soil at the start and end of an activity
  - install cleaning bays/wash-down areas for vehicles and machinery