www.defra.gov.uk

Consultation on future management of risks from *Phytophthora ramorum* and *Phytophthora kernoviae*

July 2008

Forestry Commission

Llywodraeth Cynulliad Cymru
Welsh Assembly Government

defra
Department for Environment Food and Rural Affairs

Department for Environment, Food and Rural Affairs
Nobel House
17 Smith Square
London SW1P 3JR
Telephone 020 7238 6000
Website: www.defra.gov.uk

Forestry Commission
Silvan House
231 Corstorphine Road
Edinburgh EH12 7AT
Telephone 0131 334 0303
Website: www.forestry.gov.uk

Information about this publication and further copies are available from:

Defra,
Plant Health,
Ground Floor,
Foss House,
Peasholme Green,
York,
YO1 7PX

Tel: 01904 455182

This document is available on the Defra and Forestry Commission websites:

www.defra.gov.uk/corporate/consult/phytophthora-ram-kern/

http://www.forestry.gov.uk/website/fchomepages.nsf/hp/GBWT

Jointly published by the Department for Environment, Food and Rural Affairs and the Forestry Commission – 15 July 2008

Summary

- Contributions are invited towards a review of the future management of risks from *Phytophthora ramorum* and *Phytophthora kernoviae.*
- Comments are also sought on what would be an appropriate minimum EU control level for these diseases.
- The review is important to ensure that we adopt the appropriate approach towards these diseases in the future.
- Written views are requested on the key issues and a consultation meeting is offered to discuss the issue as a whole.
- Views are also invited on the assumptions and data included in a partial Impact Assessment on the proposal.
- The deadline for comments is 10 October 2008.
- The diseases have the potential to impact upon a wide cross section of people and organisations and we will be interested to receive comments from anyone with an interest. Views would be welcome particularly from commercial growers and traders of plant material, owners and managers of woodland, and those responsible for historic and public gardens.

Purpose

1. This paper seeks your views on how we should manage the risks from two fungus-like pathogens of plants. Their scientific names are *Phytophthora ramorum*, first confirmed in Great Britain in May 2002, and *Phytophthora kernoviae*, first discovered in October 2003. Both are thought to have arrived in GB within the last ten to twenty years and there is evidence that they both have the ability to kill trees in GB, have the potential to kill native heathland species and cause serious disease on some garden shrubs. The current policy towards the diseases is one of containment and eradication, on a precautionary basis whilst more evidence is gathered as to the extent of their likely impact. However, after executing this policy since the first confirmations, both diseases are continuing to spread, albeit slowly and mainly in the southern and western part of GB. This review, which extends to England, Scotland and Wales, examines the historic and current situation and proposes options for management of these pathogens in the future. Comments are sought on the options for future management and on any particular circumstances that may need further consideration. Ministers will consider all responses to arrive at conclusions on future policy towards *P. ramorum* and *P. kernoviae*.

2. Defra and the Forestry Commission share responsibility for managing the diseases in England. The Scottish Government and the Welsh Assembly Government share responsibility with the Forestry Commission in their respective areas. Defra is responsible for implementing policy in Wales under a concordat with the Assembly Government. This paper has been prepared jointly by Defra, the Forestry Commission and the Welsh Assembly Government Department for Rural Affairs and Heritage. Responses will be considered by the relevant devolved authority and the interdepartmental Programme Board first set up in 2003. The Programme Board includes officials from Defra, the Forestry Commission and the Devolved Administrations, except Northern Ireland. It is advised by a number of sub committees, including an Industry Liaison Group. The Scottish Government is consulting separately, their consultation paper can be found on their website at: www.scotland.gov.uk.

Background

History of the diseases in Great Britain

3. In 2000, Forestry Commission scientists highlighted the similarity between a pathogen which had been causing leaf blotches and dieback of rhododendron nursery stock in The Netherlands and Germany since the early 1990s, and a pathogen which had been causing sudden death of oak trees on the Pacific west coast of the USA (California and subsequently Oregon), over the same period. An early assessment (September 2000) suggested a potential risk to European trees, but with a significant margin of uncertainty. The climates of the Pacific west coast and GB are not identical, the plant communities and species of trees affected are different, and although the pathogen was found to be of the same species, there are differences between the European and North American pathogen populations.

4. GB and EU plant health services were alerted to the threat, and surveys began in GB in the summer of 2001 and in the EU the following year. In February 2002 the pathogen (by then with a formal name – *Phytophthora ramorum*) was found on a viburnum at a nursery in Sussex. GB took emergency measures, destroying the infected and adjacent plants, banning imports from affected areas of the USA, and requiring movement of susceptible nursery stock i.e. rhododendron (other than *R. simsii)*, and viburnum, to be notified. These measures were notified to the EU Standing Committee on Plant Health, which agreed EU-wide emergency measures in November 2002, based largely on GB's action, which are still in place.

5. Import controls have been introduced on all susceptible plants from the USA. Within the EU, rhododendrons (other than *R. simsii*), viburnums and (since 2004) camellias can only be moved from nurseries which have been officially inspected and found free from the disease, or where appropriate eradication measures have been taken. Consignments of these plants must be accompanied by plant passports (used already in the EU to manage risks from a number of other plant pests and diseases). This aims to ensure that plants moved in trade are free of the pathogen; if symptoms develop after movement, the infection can be traced back to the originating nursery and follow-up inspections carried out at sites which have received plants from the same batch.

6. The principal reason for these measures was a potential risk to woodlands and other habitats, as shown by the experience in California. In February 2003 an interdepartmental *Phytophthora ramorum* Programme Board was formed with representatives from Defra, Forestry Commission and the then Scottish Executive, together with their scientific support agencies. The Board has been advised by a liaison group of trade association representatives and an annual forum of interested parties. This Board has been responsible for co-ordinating action against *P. ramorum* and commissioning associated research. Experiments with inoculation of freshly cut logs in contained conditions suggested that some European tree species were indeed at risk; beech and other Fagaceae are considered most at risk based on experimentation and on natural findings in the USA, the UK and the Netherlands.

7. At about the same time as the first findings of *P. ramorum* on trees, a new pathogen was found on rhododendrons and beech trees at a site in Cornwall. This pathogen,

which was eventually given the name *Phytophthora kernoviae*, is quite distinct from *P. ramorum*, but seems to behave in a similar fashion and to pose similar risks. Some of the differences are set out at paragraph 18. *P. kernoviae* is only reported from GB and New Zealand and its origin is as yet unknown. Reports from New Zealand suggest that *P. kernoviae* has been present there since the 1950s. Following its discovery here, the renamed *Phytophthora* Programme Board took on responsibility for co-ordinating action and commissioning research against *P. kernoviae*.

Outbreaks

8. By the end of January 2008 *P. ramorum* had been identified 576 times on 488 different nursery or garden centre sites in England and Wales. At some sites there have been repeated outbreaks. At 464 of the outbreaks, the site has been found clear following eradication action. Controls are still in place at 112 sites. In gardens and woodland there had been 217 outbreaks at 198 sites, of which 65 had been eradicated leaving 152 ongoing cases, most of which are subject to containment measures**.**

***Phytophthora ramorum* – Outbreaks in England & Wales (April 2002 – January 2008)**

	Total	**Eradicated**	**Ongoing**
Nurseries & garden centres	576 (488 sites) of which 43 are Plant Passporting Nurseries and 15 of these are re-introductions	464	112
Managed/unmanaged land	217 (198 sites)	65	152
All sites	793 (686 sites)	529	264

9. From 2002, when *P. ramorum* was first discovered in horticultural plants moving in trade in Scotland, until January 2008 there have been 35 outbreaks of *P. ramorum* on 24 different Scottish nursery or garden centre sites. There have been 7 findings in total on managed/unmanaged sites. Three were landscaped sites which were cleared following eradication action. Controls are still in place at 4 established garden sites. The Scottish Government liaises closely with Defra and the Forestry Commission in the development of strategies to combat the problem.

***Phytophthora ramorum*- Outbreaks in Scotland (April 2002 - January 2008)**

	Total	**Eradicated**	**Ongoing**
Nurseries & garden centres	35 (24 sites) of which 12 are Plant Passporting Nurseries and 10 of these are re-introductions	34	1
Managed/unmanaged land	7(7 sites)	3	4
All sites	42 (31 sites)	37	5

10. The equivalent figures for *P. kernoviae* are three nursery outbreaks in England, two have been eradicated, one is ongoing, and 52 woodland or garden outbreaks in England and Wales, one of which has been found completely clear of infection, and good progress has been made towards eradication at a number of other sites.

***Phytophthora kernoviae* – Outbreaks in England & Wales (October 2003 – January 2008)**

	Total	**Eradicated**	**Ongoing**
Nurseries & garden centres	3 (3 sites)[1]	2	1
Managed/ unmanaged land	52 (52 sites)	1	51
All sites	55 (55 sites)	3	52

[1] In May 2008 a further nursery site was found infected and the ongoing infection in the table was eradicated the figures in June 2008 are 4 Total, 3 Eradicated and 1 Ongoing

11. The first finding of *P. kernoviae* in Scotland was confirmed in January 2008 on managed/unmanaged land. Eradication action has commenced.

***Phytophthora kernoviae* – Outbreaks in Scotland (October 2003 – January 2008)**

	Total	**Eradicated**	**Ongoing**
Nurseries and garden centres	0 (0 sites)	0	0
Managed/ unmanaged land	1 (1 sites)	0	1
All sites	1 (1 sites)	0	1

12. To date (June 2008), despite the containment and eradication activity 86 trees have developed bleeding cankers caused by infection with *P. ramorum* and *P. kernoviae* (26 *P. ramorum* and 60 *P. kernoviae*). On some unmanaged sites tree infection has occurred very quickly with up to 24% of beech trees in one particular wood becoming infected with *P. kernoviae* prior to rhododendron clearance.

Numbers and types of trees infected with *Phytophthora ramorum* (October 2003 - January 2008)

Trees with *P. ramorum* bleeding cankers			
Tree Species	**Common Name**	**No.**	**Dead/felled[1]**
Acer pseudoplantus	Sycamore	1	0
Aesculus hippocastanum	Horse chestnut	1	1
Castanea sativa	Sweet chestnut	1	0
Fagus sylvatica	European beech	8	2

Nothofagus obliqua	Roble beech	3	3
Quercus acuta	Japanese evergreen oak	1	0
Quercus cerris	Turkey oak	6	1
Quercus petraea	Sessile oak	1	0
Quercus falcata	Southern red oak	1	1
Schima argentea	Schima	2	1
Cinnamomum camphora	Camphor tree	1	1
Total[2]		**26**	**10**

[1] There isn't a policy of cutting down infected trees. However, landowners often decide to remove infected trees prior to death.
[2] Does not include single tree diagnosed in Northern Ireland (red oak) which would bring the total to 27

Numbers and types of trees infected with *Phytophthora kernoviae* (October 2003 - January 2008)

Trees with *P. kernoviae* bleeding cankers			
Tree Species	**Common Name**	**No.**	**Dead/felled**
Fagus sylvatica	European beech	56	8
Liriodendron tulipifera	Tulip tree	1	1
Quercus robur	Common oak	2	0
Total		**59**	**9**

13. In December 2007 *P. kernoviae* was confirmed on bilberry (*Vaccinium myrtillus)* at a woodland site in Cornwall and in February 2008 in open heathland in Cornwall.

Biology and potential spread

14. Summaries of the biology and science for each pathogen are provided at Annexes A and B. More detailed information can be found in the datasheet for *P. ramorum* and the Pest Risk Analysis for *P. kernoviae* which can be viewed and downloaded from www.defra.gov.uk/planth/pra/sudd.pdf (*P. ramorum*) and www.defra.gov.uk/planth/pra/forest.pdf (*P. kernoviae*). Differences in biology, hosts, distribution and impact for both pathogens are given at paragraph 18.

15. Both pathogens cause bleeding bark cankers on certain tree hosts, especially in the family Fagaceae (e.g. beech and oak); these cankers can girdle and kill affected trees. Both pathogens also cause leaf blights or dieback on a wide range of shrub hosts and also some trees; these foliar hosts are responsible for producing inoculum which can infect the stems of susceptible trees. In GB, trees with bleeding bark cankers have to date all been in close proximity to infected rhododendron, particularly *Rhododendron ponticum*. Spores produced on foliar hosts are principally dispersed over short distances by rain-splash. Both pathogens may also be transferred in soil or debris attached to footwear or vehicles; they can also be found in water-courses or ponds at outbreak sites, though the epidemiological significance of this for transmitting the diseases to plants or trees is not yet known. The main means of long-distance spread is by the movement of infected plants. Both pathogens are considered to be of exotic origin and introduced to

GB on imported plants. Both pathogens can persist for significant periods of time (years) in soil and plant debris.

16. In addition to host factors, disease development and spread for both pathogens is favoured by mild and wet climates; areas most at risk are in the west of GB. Climate change may alter disease spread and development and change the areas at risk. In order to determine the areas most suitable for *P. ramorum* in GB, two key approaches have been made. Firstly, the match index facility in CLIMEX, a computer programme designed to predict potential disease distributions based on climate, was used to compare the climates in California and Oregon where tree mortality caused by *P. ramorum* occurs, with the climate in GB. The greatest similarities were found with south-western England. Secondly, the climatic component of a ranking system developed by US scientist Ross Meentemeyer (University of North Carolina at Charlotte) specifically to predict potential *P. ramorum* distribution in California was applied to GB climatic conditions. The highest rank was given to areas of greatest rainfall in south-western and western GB. These techniques have proven very useful in prioritising areas of GB for surveillance and testing.

17. With climate change, computer models predict that the GB climate will become hotter and drier in summer and warmer and wetter in winter. Any long-term change in climate will potentially affect the distribution and severity of diseases caused by *P. ramorum* and *P. kernoviae* but this will also be influenced by local conditions related to host(s), environment and topography.

18. This table shows some of the main differences observed to date between *Phytophthora ramorum* and *Phytophthora kernoviae***.**

	P. ramorum	***P. kernoviae***
Worldwide distribution	Europe, N America	England, Wales, Scotland, New Zealand
Distribution in GB	In nurseries: widespread but at low incidence. Outside nurseries: at a range of isolated sites with a concentration in the south and west of GB.	In nurseries: only 3 nursery findings to January 2008. Outside nurseries: widespread in Cornwall and locally present in south Wales and western Scotland.
Shrub host range	Very wide – more than 100 tree/shrub/herbaceous host species recorded. Most European findings on rhododendron, viburnum and camellia	Relatively narrow, with around 15 tree/shrub hosts recorded. Most findings on rhododendron.
Tree host range	Several genera, especially in the family Fagaceae (e.g. beech, oaks, chestnuts).	Fewer tree genera. Most findings on beech, magnolia and *Drimys*.
Heathland host range	Some species highly susceptible in experiments. No natural hosts to date.	Some species highly susceptible in experiments. *Vaccinium myrtillus* (bilberry) now known as a natural host in woodland and heathland.
Main means of spread	Local spread: primarily by rain-splash/wind-driven rain. Long-distance spread: movement of infected plants; possibly by contaminated soil/debris.	Local spread: primarily by rain-splash/wind-driven rain. Long distance spread: potential for movement in infected plants (limited in the nursery trade); possibly by

		contaminated soil/debris.
Longevity in soil	Several years. Forms chlamydospores which may favour longevity.	At least up to 2-3 years. No chlamydospores formed; oospores rarely observed but may favour longevity.
Statutory position	EU emergency measures.	National measures using the general powers in Plant Health legislation, and a statutory management zone in an area of Cornwall. General EU obligation to prevent spread to other Member States.
Potential for change	Out-breeding pathogen, with potential to generate variation if sexual reproduction occurs.	In-breeding pathogen with little variation.

19. It is accepted that both *P. ramorum* and *P. kernoviae* have the potential to spread more widely in the GB environment. The current official control measures have limited the geographic spread in the wider environment. Early identification of the pathogens has allowed GB control authorities to take a proactive approach applying containment and eradication controls before an anticipated exponential increase of infection sites.

20. Current evidence suggests that *P. kernoviae* is more aggressive towards trees than *P. ramorum*. This may be due to the speed with which the symptoms of each disease become apparent in trees, or it may be related to the very heavy levels of infection on understorey *R. ponticum* in woodlands where trees have been infected by *P. kernoviae*. Tree infection has been managed at both *P. ramorum and P. kernoviae* sites by removal of infected rhododendron. Forest Research has indicated that tree infection would continue on sites where infected rhododendron is not cleared. The generic model of disease spread which is available as an annex to the Impact Assessment accompanying this consultation shows that diseases left uncontrolled normally follow a pattern of lag phase (little noticeable spread as they establish and spread locally), followed by exponential growth and then a plateau or reduction once host material diminishes or environmental conditions become unfavourable for the pathogen. This pattern has occurred in Marin County, California. The annex cites the case of another *Phytophthora (Phytophthora alni)* which was first found killing alders in the UK in 1993. Surveys of the disease undertaken in 1995 in England and Wales, indicated that around 5% of riparian alder trees were infected by *P. alni* but the disease had probably been present for 20 – 30 years but remained undetected until 1993. With no intervention against this disease it is now estimated that at least 20% of all riparian alders have been damaged or killed by *P. alni*. Action against the diseases caused by *P. ramorum* and *P. kernoviae* whilst still in the lag phase is likely to restrict infection of susceptible species such as beech to low percentages.

21 Although currently less aggressive towards trees, *P. ramorum*'s presence throughout much of Europe and third countries within the nursery trade, poses a greater threat of disease re introduction. In contrast, the distribution of *P. kernoviae* focused mainly in the south and west of Great Britain may be more easily contained and potentially eradicated.

Current inspection regime

22. Since the identification of *P. ramorum* an annual survey of all premises which trade in susceptible plants has been undertaken. Wholesale nurseries have been subject to a minimum of two visits per year. An initial comprehensive survey of parks, gardens and woodlands has been followed by an annual targeted survey of approximately 900 sites. For any site, whether trade, park, garden or woodland, where infection has been identified, additional visits and appropriate measures have been undertaken to contain and eradicate the disease.

Measures at outbreak sites

23. There is no fungicidal treatment which will reliably kill established infections on plants. Some treatments may help to protect plants from infection, or reduce symptoms. This may be helpful in slowing disease development and spread, but may also mask infection, making it more difficult to determine whether a nursery is, in fact, pathogen-free. It is for this reason that there is currently a ban on applying fungicides to plants which are under official hold in nurseries where infection has been found.

24. The main means of control, both on nurseries and in gardens and woodland sites, has been destruction of infected plants:

- On nurseries, susceptible plants within 2m are destroyed and susceptible plants of the same lot or within 10m of the finding are held for 3 months of active growth and inspected at least twice before release. The level of findings (of *P. ramorum*) on GB nursery stock moving in trade has fallen since the introduction of the EU measures (from 3% in 2004 to 1% in 2007).

- At a selected number of woodland gardens and areas of semi-managed or unmanaged woodland, clearance of all *R. ponticum*, whether infected or not, has proved effective at reducing inoculum levels and appears to have prevented further infection of trees on those sites.

25. *R. ponticum* is considered to be an invasive non-native weed species in GB. It is found both in open and woodland situations, particularly on acid soils, and mainly, but not exclusively in the west of GB. Although some people regard the mass of purple flowers in spring as attractive, *R. ponticum* will normally become very dominant, forming a dense impenetrable barrier which shades out all other vegetation. It has limited value for shelter and game cover and its removal can have significant beneficial effects on biodiversity and wildlife, and on the appearance of woodland, allowing trees and other vegetation to re-colonise which has beneficial consequences for wildlife. Land managers and conservation organisations put a lot of resources into the removal of *R. ponticum,* often with financial support through, for example, the Forestry Commission's Grant Schemes and it now seems likely that this removal will also provide a very high degree of protection to trees against *P. ramorum* and *P. kernoviae.* However, it is vitally important that the initial removal and destruction of the *R. ponticum* is only the first part of the process. The cut stumps must be treated with chemical (e.g. glyphosate) to prevent regrowth and any rhododendron regrowth that does appear, as well as seedlings, must also be chemically

treated. It has to be noted, however, that this is an expensive and time-consuming process which may span a period of at least three years.

26. So far almost all of the trees which have been found to have bleeding cankers in GB have either been in direct contact with heavily infected *R. ponticum* or, within a few metres of it.

Native heathland

27. Bilberry (*Vaccinium myrtillus)* is native to heaths, moors and acidic woodlands and forms an integral component of native heathland. It is commonly found throughout the British Isles and can become locally dominant in England towards the southeast. *Vaccinium myrtillus* was identified as susceptible to both *Phytophthora* species in laboratory experiments by the Central Science Laboratory in 2006 and was found infected with *P. kernoviae* in woodland in Cornwall in December 2007 and in open heathland in February 2008. The UK has 20% of the world's lowland heath and approximately 75% of the total resource of upland heath. The Government has a Public Service Agreement target for 95% of the area of Sites of Special Scientific Interest (SSSI) in England to be in 'good condition' by 2010. Much of the heathland resource is notified as SSSI and these habitats form a significant proportion of the total SSSI area. Whilst the potential for the spread of *P. kernoviae* on open heathland is not known, if significant areas become infected or need to be destroyed as part of control measures there is a risk that this could impact on the achievement of the target. Work is currently underway to identify appropriate control measures in heathland environments.

The *P. kernoviae* management zone

28. *P. kernoviae* was found to be sufficiently widespread in one area of Cornwall, south east of Redruth, that statutory measures were put in place at the end of 2004 to prohibit the removal of host plants, or parts of host plants (such as cut foliage for decoration) from a designated area without an inspection and written authorisation. The Order also provides powers to close public footpaths to enable eradicatory measures to be undertaken.

Policy on risk and responsibility sharing

29. For many years the general policy for statutory action against serious plant pests and diseases has been that government pays for risk analysis, research, surveys and monitoring inspections. The costs of measures at outbreak sites, including destruction of affected plants, fall to the grower, landowner or occupier. Statutory powers are available under the Plant Health Act 1967 to require landowners and occupiers to carry out eradication work at their own expense or, in default of that, for government officials to do the work themselves or hire contractors to carry out the work. The cost of this work may be recovered from the landowner or occupier as a civil debt under the Plant Health legislation. The government acknowledges the efforts which have been made by the nursery stock industry, and the costs which have been incurred by individual growers, to try to bring these pathogens under control and to avoid further spread.

30. The risks posed to the environment by trade in *P. ramorum* susceptible host plants were not known before 2001. In recognition of these special factors, in 2004

the government offered a sum of £200,000 to start a hardship fund for the growers who had been most affected. In the event the offer was not taken up primarily because the industry was unable to agree a mechanism for raising the necessary matching funding. Industry did however come up with proposals for wider risk sharing and this work evolved into a joint Government/industry funded study undertaken by Imperial Consulting Ltd into options for cost and responsibility sharing in relation to plant pests and diseases. See: www.defra.gov.uk/planth/costsharing/costsharing.pdf. Government is considering with the other study partners on how best to take this work forward.

31. In certain woodlands in England and Wales affected by either disease, owners and occupiers do not have resources to carry out the necessary eradication work. However, where the removal of *R. ponticum,* infected or otherwise, can be shown to bring improvements to the general wellbeing of the woodland, and the other criteria in the Forestry Commission's Grant Schemes are met, this work can be part-funded through this mechanism. To assist with the removal of infected *R. ponticum* additional core funding has been provided by both Defra and the Forestry Commission and this is paid out using the Grant Schemes in England and Wales as the delivery vehicle. As described above this also brings other landscape and biodiversity benefits as well as eliminating these diseases and making the woodland less susceptible to reinfection. There have been no outbreaks in woodlands in Scotland.

32. EU legislation requires Member States to take specific measures to stop the introduction of *P. ramorum* on imports, and also its spread within the Community. Those measures are due for review during 2008, after the report of an EU research project which is producing a European Pest Risk Analysis for the pathogen. The review of measures will be considered by the EC's Standing Committee on Plant Health, and the UK's line in those discussions will be informed by the outcome of this consultation. The EU legislation is a constraint – we cannot unilaterally relax the measures on imports, or on movement of nursery stock, although there is flexibility available to Member States on management of outbreaks. In relation to *P. kernoviae* there are no specific EU measures, but like any Member State with a new disease problem, we have to report to the European Commission and the other Member States the measures which we are taking to prevent its spread and protect other countries. The European Commission may, if it deems it necessary for the purpose of protecting the rest of the Community, seek to introduce regulatory provisions by proposing measures to the Standing Committee on Plant Health. At the present time there is no indication that any such proposals are planned. An FVO mission visited the UK in April 2008 to evaluate the controls on both *Phytophthora ramorum* and *Phytophthora kernoviae.* Their report has not yet been published but will be available during the consultation at: http://ec.europa.eu/food/fvo/ir_search_en.cfm

Issues for consideration

33. Defra, the Forestry Commission and the devolved administrations in Scotland and Wales are now considering how to manage *P. ramorum* and *P. kernoviae* in the future. We are consulting to seek the views of the public and interested parties in England and Wales on a range of options. The options under consideration are:

- Option 1: Meet EU minimum requirements on control of *P. ramorum* and remove all controls against *P. kernoviae,* other than maintaining a ban on the movement of infected plants to other countries. Though not included in the cost benefit analysis, this option recognises that the minimum EU control levels of *P. ramorum* are under review and invites comments on where future levels should be set.

- Option 2:Increased activity, aimed at reducing the level of inoculum to epidemiologically insignificant levels; by removal of infected sporulating hosts in woodlands and the wider environment; combined with enhanced containment and eradication measures in infected gardens and nursery sites, as well as the identification and control of any new outbreaks.

Each option is examined in detail in the Impact Assessment document annexed to this paper.

34. You are invited to make comments on the options set out in the Impact Assessment and to suggest alternatives. Although not an exhaustive list, some of the issues on which we would hope to receive specific comments are:

i) Under option 1 clearance of infected *R. ponticum,* for *P. ramorum* and *P. kernoviae* control, would cease. What implications for the wider environment do you perceive from this policy?

ii) The current level of EU minimum controls is due to be reviewed by EC Standing Committee on Plant Health. What do you think are appropriate levels of controls for *P. ramorum* and *P. kernoviae* both on nurseries and in the wider environment*?* How should these levels be reflected in EU law*?*

iii) Would option 1 pose any other impacts which are not considered in the Impact Assessment? If so what are they and how might they be addressed?

iv) Option 1 identifies that trade in host material may be affected, how would a ban on exports and limits to other trade of host material impact on British Horticulture?

v) Option 2 will involve enforced clearance of *R. ponticum* from gardens and woodland where infection is found.

   a. Should enforced clearance of infected sporulating hosts be applied in all cases?

   b. Should infected plants of historic significance be regarded differently from other sporulating hosts? If so how?

vi) Option 2 offers the opportunity to reduce inoculum levels to epidemiologically insignificant levels. How do you perceive the risk that the diseases may continue to spread regardless of increased activity?

vii) Are the measures described under option 2 sufficient to reduce the disease inoculum to epidemiologically insignificant levels? Would you suggest any alternative or additional measures?

viii) Would option 2 pose any other impacts which are not considered in the Impact Assessment? If so what are they and how might they be addressed?

ix) Which of the proposed options do you favour? Please give your reasons for your preference, if possible explaining why you do not favour the alternatives.

x) Please explain whether you think that separate policy approaches should be adopted for each disease or should the same policy be applied to both?

xi) Should measures continue to be taken to prevent these pathogens moving on nursery stock within GB/EU?

xii) What additional evidence would improve the ability to make a balanced long term decision?

Further information

35. Further information on the pathogens is available at the following websites:

Defra: www.defra.gov.uk/planth/pests.htm

Welsh Assembly Government: http://new.wales.gov.uk/topics/environmentcountryside/food_and_market_development/plants_seeds_biotechnology/plant_health/?lang=en

Forestry Commission: www.forestry.gov.uk/forestry/INFD-66THS4

or by post from Plant Health, Defra, Foss House, Peasholme Green, YORK, YO1 7PX.

Publicity information on the pathogens, including pictures of symptoms is available at: www.defra.gov.uk/planth/pramorum.htm and www.defra.gov.uk/planth/pkernovii.htm

The Central Science Laboratory/Forest Research data sheet for *P. ramorum* can be found at: www.defra.gov.uk/planth/pra/sudd.pdf

The Central Science Laboratory/Forest Research Pest Risk Analysis for *P. kernoviae* can be found at: www.defra.gov.uk/planth/pra/forest.pdf

A summary of key research findings and also Defra/Forestry Commission research reports are available at: www.defra.gov.uk/planth/pramorum.htm and http://defra.gov.uk/planth/pkernovii.htm

The relevant EU legislation can be found at:

Commission Decision 2002/757EC

http://eur-lex.europa.eu/LexUriServ/site/en/oj/2002/l_252/l_25220020920en00370039.pdf

Commission Decision 2004/426/EC

http://eur-lex.europa.eu/LexUriServ/site/en/oj/2004/l_154/l_15420040430en00010007.pdf

Commission Decision 2007/201/EC

http://eur-lex.europa.eu/LexUriServ/site/en/oj/2007/l_090/l_09020070330en00830085.pdf

Commission Directive 2000/29/EC

http://eur-lex.europa.eu/LexUriServ/site/en/oj/2000/l_169/l_16920000710en00010112.pdf

Legislation in England and Wales relating to *P. ramorum* and *P. kernoviae* can be found at:

For England:
http://www.opsi.gov.uk/si/si2007/20072155.htm
http://www.opsi.gov.uk/si/si2004/20043367.htm
http://www.opsi.gov.uk/si/si2004/20042590.htm
http://www.opsi.gov.uk/si/si2005/20052530.htm

For Wales:
http://www.opsi.gov.uk/legislation/wales/wsi2007/20072715e.htm
http://www.opsi.gov.uk/legislation/wales/wsi2006/20061344e.htm
http://www.opsi.gov.uk/legislation/wales/wsi2006/20061643e.htm

Forestry Commission legislation:
http://www.opsi.gov.uk/si/si2002/20021478.htm
http://www.opsi.gov.uk/si/si2005/20052517.htm

36. It would help our analysis if you were also willing to give us some basic information about your own perspective. There is no obligation to do this, and any answers to these further questions will not be made publicly available, nor used for any other purpose.

i) Are you:

- An association or representative body;
- a nursery stock grower;

- a nursery stock wholesaler;
- a nursery stock retailer (i.e. garden centre)
- owner of a garden open to the public;
- a land manager;
- a conservation organisation
- other (please specify)

ii) What has been the impact (positive or negative) on you or your business of these two pathogens and the measures taken against them?

iii) Have you had an outbreak of either *P. ramorum* or *P. kernoviae* on land where you are the owner or occupier?

iv) If the answer to iii) is yes, what has been the impact (positive or negative) on you or your land of either of these two pathogens and the measures taken against them?

v) Do you live in the *P. kernoviae* Management Zone or have land or business within the zone?

vi) Your name and address.

What to do next

37. Views and contributions are welcome from all individuals and organisations with an interest in the issue. Please:

i) read the consultation paper and partial Impact Assessment;
ii) consider the questions at paragraph 34 in this consultation paper;
iii) submit your comments to Margaret O'Donnell, Plant Health, Ground Floor, Foss House, King's Pool, 1 – 2 Peaseholme Green, York YO1 7PX or email to phytophthora.consultation@planthealth.defra.gsi.gov.uk
iv) if you want an acknowledgment or a specific response on any points, please provide contact details.

38. Defra and the Forestry Commission are intending to hold consultation meetings to discuss this issue, initial meetings have been arranged in Cornwall on 29 July and in London on 31 July. A further meeting may be held in York towards the end of the consultation period. Please let Margaret O'Donnell know if you would be interested in attending such a meeting.

39 Please send your replies by 10 October 2008.

Phytophthora ramorum: Science Summary

Background

1. *Phytophthora ramorum* is an exotic fungus-like plant pathogen which causes damage to trees, shrubs and other plants. Since the mid 1990's, it has caused widespread death of millions of trees in forest environments in coastal California and Oregon in the USA. Because the most commonly affected trees that have been killed are tanoaks (not true oaks) as well as several true oak species, this extensive phenomenon is commonly known as 'Sudden Oak Death'. The pathogen was first found in the nursery trade in the USA/Canada in 2001.

2. Between October 2003 and January 2008, 26 trees have become affected with bleeding cankers in GB and at least another 14 trees with these symptoms over the same time period in the Netherlands. In Britain, one of the affected trees (the first) was in the south-east, with most of the remainder in the south-west of England. More recently (October 2007) a beech tree was found with a bleeding canker in a historic garden in West Yorkshire, and around the same time a red oak was diagnosed with the disease in Northern Ireland. All the diseased trees have been close to large numbers of infected rhododendron. It is thought that *P. ramorum* was introduced separately to North America and Europe from an unknown origin (or origins), speculated to be Asia, possibly Yunnan, Taiwan or the eastern Himalayas.

3. *P. ramorum* is subject to emergency phytosanitary measures in the EU. Here, including GB, measures are aimed at eradication on nurseries and eradication or containment in managed gardens and woodlands.

What kind of diseases are caused by *Phytophthora ramorum*?

4. *P. ramorum* causes three main types of disease. 'Ramorum bleeding canker' refers to cankers (discoloured lesions) on trunks of trees which emit a dark ooze. As they increase in size they can lead to tree death. This is referred to as 'Sudden Oak Death' in the USA. 'Ramorum leaf blight' refers to infection of the foliage of trees, shrubs and some herbaceous plants that leads to discoloured lesions on the leaves. 'Ramorum dieback' refers to leaf and shoot/stem infections which result in wilting and dying back of affected parts.

Which plants are affected by *Phytophthora ramorum*?

5. *P. ramorum* has a very wide natural host range. Currently numerous species in 70 host genera are affected, representing 33 different families. The types of hosts that are affected varies between countries. In GB, the majority of nursery hosts are species of rhododendron, viburnum and camellia. 26 trees have been confirmed exhibiting bleeding cankers in GB, these are mainly European beech, but individual trees of horse chestnut, sweet chestnut, several oak species, sycamore, southern beech and *Schima* have also become affected. In the

Netherlands, the trees with bleeding cankers are European beech and northern red oak.

What do we know about the biology of *Phytophthora ramorum*?

6. *P. ramorum* has an optimum temperature for growth of 20°C and a requirement for moisture; it is therefore well suited to a cool-temperate climate. It produces sporangia (containing infective motile zoospores) on the leaves and shoots of a wide range of plants; these are known as sporulating hosts. These sporangia are mostly spread locally over short distances during rain. *P. ramorum* can be found in soil and leaf litter and can be moved on the footwear of humans and possibly on the feet of other animals, and potentially by vehicles. It is also found to contaminate and persist in watercourses at infected sites but it is not known whether this can lead to new infections of plants. Long-distance spread is primarily by movement of infected plant material.

7. Tree hosts only produce infective sporangia from infected foliage. Some tree species only develop bleeding cankers; these do not produce sporangia and so are not a source of infection for themselves or for other host species. These trees become infected as a result of being in the proximity of sporulating hosts. In GB, all of the trees that have developed bleeding cankers have been adjacent to, or very close to, infected rhododendron, particularly *Rhododendron ponticum*.

8. Sporulating hosts vary in the amount of infective sporangia that they produce. Although rhododendron produces less sporangia than some of the sporulating hosts in woodlands in California and Oregon (predominantly California bay laurel and tanoak), it is the most abundant sporulating host in GB woodlands, especially now *R. ponticum* has become widespread. It has the potential to produce inoculum all year round within Great Britain.

9. Experiments in historic gardens have shown that by completely removing infected rhododendron and other foliar hosts, this has prevented new plant infections. In one garden, no new plant infections have been recorded four years after all the infected plants were removed. The pathogen can still be detected in soil and watercourses; however, the level of residual inoculum appears to be epidemiologically insignificant, at least with respect to trees. Regrowth of rhododendron shoots has however become infected. In soil, the pathogen is most likely surviving in the form of a robust spore known as a chlamydospore. This type of spore can maintain the pathogen in the GB environment for several years .

10. Chlamydospores are large, thick-walled spores which have a major role in survival. They are produced asexually in infected leaf and (possibly) shoot tissue; they are also reported to occur in bark phloem and xylem tissue of tanoaks in the USA. The tissue in which these are formed can vary with the host; they can also be formed on mycelium growing out of leaf lesions but are not as readily detached as sporangia. Chlamydospores formed within rhododendron leaves are smaller with thicker walls than those formed in the laboratory. Chlamydospores typically germinate to produce hyphae and sporangia.

11. Examination of bleeding cankers has shown that *P. ramorum* can be found extending up to 25mm into the wood of some tree species and can survive there for at least 27 months. This appears to be a dead end for the pathogen but it may be possible for this to lead to further spread via movement of infected timber. Currently no wood has been harvested from known infected trees in GB.

12. *P. ramorum* has the potential to reproduce sexually but this depends upon the presence of two mating types, A1 and A2. European/GB isolates are mainly A1 and North American isolates A2. A few European A2 isolates have been found in Belgium and a few European A1 isolates have been found in North America in nurseries and in an adjacent water course. However, to date, sexually produced spores (oospores) have not been observed naturally and there is evidence to suggest that the mating system is not fully functional. Oospores have two roles: one is to increase the genetic diversity of the population, which may then lead to changes in behaviour; the second is a survival role, since these are thick-walled and potentially longer-lived spores than sporangia. European and North American populations differ: some European isolates tested are generally more aggressive towards plants than the North American isolates. Asexual recombination also has the potential to occur between the two populations; this may also change the behaviour of the pathogen. There is evidence that the European population is more genetically diverse than the US population. We are trying to prevent entry of non-European isolates to GB/EU.

What damage is being caused by *Phytophthora ramorum* in GB?

13. In England and Wales, between April 2002 and January 2008 there have been 217 outbreaks at 198 sites in locations other than nurseries of which 65 have been eradicated. These woodland or garden/park sites are fairly widely distributed but the highest incidence and severity of disease has been in the south and west of England and in south Wales; these areas of the country appear more favourable for the disease since they are mild and wet. Although the number of trees that have developed bleeding cankers is low (*ca*. 26), it is increasing; a few trees have also been infected outside of the SW. Ornamental plants in historic gardens involved in tourism have been badly affected by the pathogen and some rare or historically-important specimens or collections are now considered to be at risk. Visitors to some historic gardens have complained about the appearance of the plants; gardens which rely on spring-flowering rhododendrons and camellias to attract visitors have been most affected. Nurseries have mainly been affected by the phytosanitary measures that have been implemented to try to prevent spread to the environment. Between April 2002 and January 2008 in England and Wales there were 576 nursery outbreaks at 488 sites of which 464 have been eradicated. In Scotland, between April 2002 and January 2008, there have been 42 outbreaks at 31 sites; these have mainly been on nurseries or garden centres except one outdoor finding (garden/landscape) in 2002, two landscape sites in 2007 and 4 outbreaks in established gardens to January 2008. No findings occurred in 2006 and so it was thought that the pathogen was eradicated. However, in 2007 to January 2008, two new nursery findings were made in addition to the four new outdoor finds.

What potential does *Phytophthora ramorum* have?

14. In GB/EU the pathogen is subject to an eradication/containment programme and so its full potential in terms of impact on the environment has not been realised. An epidemic on the scale of California has not yet occurred. The geography, climate, hosts and mixture of hosts in California and Oregon is different to GB and favours disease development. In California, California bay laurel and tanoak are the main sporulating hosts in affected woodlands. In GB, evergreen rhododendron (especially *R*. *ponticum*) is the main sporulating host that will drive woodland epidemics, with beech and some oak species being particularly threatened. In California, sporulation is seasonal with little or no sporulation in hot dry summers. Under GB conditions, the pathogen has the potential to produce spores all year round on rhododendron. *P. ramorum* may be particularly damaging in GB woodlands infested with rhododendron and in historic gardens with susceptible plants, especially in the west of GB or in other parts with favourable microclimates. *P. ramorum* has the potential to affect GB heathland environments but is yet to be found there; species of *Vaccinium,* a common heathland plant, could be at risk as laboratory experiments have shown these to be susceptible and *V. myrtillus* was recently found infected (with *P. kernoviae*) in woodland in Cornwall. *Vaccinium ovatum* (evergreen huckleberry) is susceptible to *P. ramorum* in forests in North America. The longer-term risk may increase if additional non-European isolates are introduced or if climatic conditions become more favourable for the pathogen. If the pathogen was not controlled it is not yet clear when or whether the whole of GB would become affected. However, in the absence of existing measures, potential spread into and within the environment is predicted to increase; the scale of environmental damage is uncertain but the maximum development of the epidemic in GB habitats is likely to take decades.

What management options are available to limit *Phytophthora ramorum*?

15. To limit further spread of the pathogen into the environment it would be necessary to remove rhododendron and other foliar hosts that are significant inoculum sources from woodlands and historic gardens where the disease occurs, as well as those in the vicinity. Surveillance and monitoring of these sites would need to be continued for at least two years after clearance of the foliar hosts to monitor the management regime; regrowth of rhododendron should be targeted. Surveillance and testing of nursery stock in GB and entering GB, especially from North America and the rest of Europe would be necessary to limit further spread in the nursery trade and the continued potential for movement from nurseries to the natural environment or to historic gardens. Further surveillance would also be required to determine the pathogen's distribution outside nurseries. Consideration of further controls on imports of timber, especially from the USA, might also be needed. Fungicides are not currently recommended as a control strategy for *P. ramorum*. Although a range of fungicidal have activity against *P. ramorum*, they have not been shown to be very effective as eradicant treatments. There are also concerns over whether use of fungicides on nurseries may mask symptoms on plants, which might result in further spread of the pathogen in trade.

Phytophthora kernoviae: Science Summary

Background

1. *Phytophthora kernoviae* is a recently-discovered, exotic, fungus-like plant pathogen which causes damage to trees and shrubs. It was first found in the south-west of Great Britain in 2003 during official surveillance activities for *Phytophthora ramorum*. It is mainly found in woodlands, parks and managed gardens in the south-west of England and south Wales. It has also been found at one managed garden and one nursery in the north-west of England as well as two nurseries in the south-west. In January 2008 it was found for the first time in Scotland at an established garden site. In May 2008 it was found on imported plant material on a nursery in Kent.

2. The only other country where *P. kernoviae* has been reported from is New Zealand, where official reports were made in March 2006. It has recently been announced that the pathogen has probably been present in New Zealand since at least the 1950s. There is currently insufficient information to judge whether the pathogen was introduced to New Zealand or whether it is endemic or native there. Prior to this it was speculated that *P. kernoviae* may have been introduced to GB from Asia or Patagonia.

3. Whenever *P. kernoviae* is found in the GB it is currently subject to emergency phytosanitary measures, aimed at containment and eradication. More specifically, under the Plant Health (*Phytophthora kernovii* [sic] Management Zone) England Order 2004, a defined area of the south-west of England was established in 2004 within which specific measures are taken aimed at containing and eradicating the pathogen within the zone. However, since that time new findings have been made some distance from the zone.

What kind of diseases are caused by *Phytophthora kernoviae*?

4. *P. kernoviae* causes three main types of disease. 'Kernoviae bleeding canker' refers to cankers (discoloured lesions) on trunks of trees, which emit a dark ooze. As they increase in size they can lead to tree death. The other two types of disease affect both shrubs and trees. 'Kernoviae leaf blight' refers to infection of the foliage, leading to discoloured lesions on the leaves. 'Kernoviae dieback' refers to shoot and bud infections which result in wilting, discolouration and dying back of affected parts.

Which shrubs and trees are affected by *Phytophthora kernoviae*?

5. In GB, shrub and tree species in 15 host genera are affected, representing 9 different families. The main shrub host affected is rhododendron. About 60 trees have exhibited bleeding cankers in GB, and these are mainly beech trees. Trees with foliar infections have been predominantly magnolias and *Drimys*. More detail is given below. The first official report of *P. kernoviae* in New Zealand was on the orchard fruit tree known as cherimoya or custard apple. It has recently

been discovered that an unidentified *Phytophthora* isolated from beneath stands of the conifer tree *Pinus radiata* in the 1950s in NZ is *P. kernoviae.* These trees exhibited no disease symptoms.

What do we know about the biology of *Phytophthora kernoviae*?

6. *P. kernoviae* is considered to be adapted to a temperate climate as it has an optimum temperature for growth of 18°C, with an upper limit of 26°C, and a requirement for moisture. It produces spores known as sporangia (containing motile infective zoospores) on the leaves and shoots of shrub and tree hosts; these are known as sporulating hosts. These sporangia are mostly spread locally over relatively short distances during rain. *P. kernoviae* can be found in soil and leaf litter and can be moved on the footwear of humans and possibly on the feet of other animals, and potentially by vehicles. It is also found in watercourses but it is not known whether this can lead to new infections of shrubs or trees. Long-distance spread is primarily considered to be by movement of infected plant material.

7. Tree hosts only produce infective sporangia if the foliage becomes infected (hosts with susceptible foliage include magnolia, holm oak, *Drimys*, *Michelia*, Chilean hazelnut, tulip tree, holly and cherry laurel). Some trees only develop bleeding cankers (beech and English oak): these cankers do not produce sporangia and so are not a source of infection for these hosts or for other hosts; they become infected as a result of being in the proximity of sporulating foliar hosts. In GB, all the trees that have developed bleeding cankers have been adjacent to, or in most instances actually in contact with, infected rhododendron, invariably *Rhododendron ponticum*.

8. Sporulating hosts vary in the amount of infective sporangia that they produce with rhododendron being the greatest sporulator (compared to magnolia, *Michelia* and holm oak). Rhododendron is the most abundant sporulating host in GB woodlands, especially now that invasive *R. ponticum* has become so widespread.

9. Monitoring work in woodlands in Cornwall has shown that by completely removing infected rhododendron from the woods, no new trees have developed bleeding stem cankers within the two years since rhododendron removal. However, some rhododendron re-growth and seedlings have continued to become infected. The pathogen can still be detected in raintraps and in soil, although the level of inoculum has declined significantly and may be below that required to initiate stem infections on trees. Comparative data on the persistence of *P. ramorum* and *P. kernoviae* in soil indicates that levels of contamination of *P. kernoviae* may decline more quickly but it is not known in what form the pathogen may be surviving. It is speculated that *P. kernoviae* could be surviving in the form of a robust spore known as an oospore. Oospores are produced through sexual reproduction and as *P. kernoviae* is self-fertile it can achieve this without needing a mate. No evidence has been found for the presence of oospores of *P. kernoviae* in the GB environment to date but they have been occasionally observed in infected plant material.

10. Examination of bleeding cankers on beech trees has shown that *P. kernoviae* can be found extending up to 12mm into the wood and can survive there for at least 24 months. This appears to be a dead end for the pathogen but it may be possible for this to lead to further spread via movement of infected timber. Currently no wood has been harvested from known infected trees in GB.

What damage is being caused by *Phytophthora kernoviae* in GB?

11. In England and Wales, between October 2003 and January 2008 there have been 52 outbreaks in locations other than nurseries and all but one are subject to on-going eradication or containment action. The most significant damage has been in the south-west of England (Cornwall and one site in Devon) and at five sites in south Wales, with only one finding on a single mature *R. ponticum* in a managed garden in north-west England. These areas of the country appear most favourable for the disease. Although the number of trees that have developed bleeding cankers is low (*ca*.60), it is increasing, and a few trees with bleeding cankers have died. Ornamental plants and trees in managed gardens involved in tourism have been badly affected and some rare or historically-important specimens continue to be at risk. Visitors to some historic gardens have complained about the appearance of the plants. The nursery industry has not been significantly affected by the disease or by the phytosanitary measures taken because up until January 2008 there were only three nursery outbreak sites: one in the north-west of England and two in the south-west of England all of which have been eradicated (May 08). One of these nurseries adjoins the woodland in the managed garden where *P. kernoviae* was first found on beech and rhododendron in October 2003. In May 2008 a nursery in Kent was found to have imported plant material infected with *P. kernoviae* which is subject to eradication. In January 2008 it was found for the first time in Scotland at an established garden site.

What potential does *Phytophthora kernoviae* have?

12. Currently the pathogen is subject to an eradication/containment programme and so its full potential has not been realised. *P. kernoviae* may continue to be damaging in woodlands infested with rhododendron and in historic gardens with susceptible plants, especially in the west of GB or in other parts with favourable microclimates. *P. kernoviae* was found infecting *Vaccinium myrtillus* in woodland in Cornwall in December 2007 and in open heathland in February 2008. These are the first records on vaccinium in GB. The potential for the pathogen to spread further in heathland environments is not known; however, prior to these findings laboratory experiments have shown that this and other heathland species were susceptible to *P. kernoviae*. If the pathogen is not controlled it is not known whether or when the whole of GB would become affected. However, in the absence of measures, potential spread into and within the environment is likely to increase; the scale of environmental damage is uncertain but the maximum development of the epidemic in GB habitats is likely to take decades.

What management options are available to limit *Phytophthora kernoviae*?

13. To limit further spread of the pathogen into the environment it would be necessary to remove rhododendron and other foliar hosts that are significant inoculum sources from woodlands and managed gardens where the disease occurs, as well as those in the vicinity. Surveillance and monitoring of these sites would have to be continued for at least two years after clearance of the foliar hosts to monitor the management regime; regrowth of rhododendron should be targeted. Extension of the existing *Phytophthora kernovii* [sic] Management Zone could be considered, or the development of new management zones. Surveillance and testing of nursery stock in GB and entering GB, especially from New Zealand (where the full status of the pathogen, particularly in the nursery trade is unknown), and possibly from other as yet unknown areas, would be necessary to prevent spread into the nursery trade and the potential for movement from nurseries to the natural environment or to managed gardens. Continued surveillance would also be required to determine the pathogen's GB distribution in the environment. Consideration of controls on imports of timber, especially from New Zealand would also be needed. Fungicides are not currently recommended as a control strategy for *P. kernoviae*. Although a range of fungicides have activity against *P. kernoviae*, they have not been shown to be very effective as eradicant treatments. There are also concerns over whether use of fungicides on nurseries may mask symptoms on plants resulting in further spread of the pathogen in trade.