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Department
for Environment
Food & Rural Affairs

# Tree Health Management Plan

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Forestry Commission

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## Contents

# Executive Summary

This plan sets out:

- An overall approach to tree health in England;
- Management approaches to tackle Chalara, Phytophthora and Oak Processionary Moth (OPM); and,
- A framework for managing future threats to tree health in England.

The Government's approach to tree health in England is centred on:

1. Building the social, environmental and economic resilience of our tree population, to minimise the impact of pests and diseases, and help improve its capacity to adapt and mitigate the impacts is faces.
2. Taking a strategic risk-based approach to prioritise action on pests and pathogens using the newly published risk register.
3. Investing in developing a robust interdisciplinary evidence base to improve our collective capacity and capability to identify and respond to risks.
4. Working collaboratively with stakeholders, delivery partners, and Defra agencies in recognition that Government cannot tackle tree pests and diseases alone.

A large part of this Plan focuses on action to mitigate the spread and impact of three established tree pests and pathogens: *Chalara fraxinea*, *Phytophthora ramorum*, and oak processionary moth (OPM). Our priorities for these pests and diseases are to:

## Chalara

- Continue to support action to slow the spread of Chalara given there is no known means of eradication.
- Fund, through England Woodland Grant Scheme (EWGS), the removal of infected ash (in selected counties) and the replanting with alternative species nationally.
- Understand the impact of Chalara on non-woodland trees.
- Continue the ongoing programme of research to identify and exploit resistance; identify potential disease management approaches (including chemical treatments); improve understanding of the pathogen (including spread), and; understand the ecological impacts.

## Phytophthora ramorum

- Continue to fund the most effective elements of the previous Fera-led 5 year programme for a further 2 years.
- Work with Forestry Commission, Fera and stakeholders to undertake a review of Government policy on *Phytophthora Ramorum and Phytophthora Kernoviae.*

## Oak Processionary Moth (OPM)

- Continue to fund the current Forestry Commission (FC)-led OPM programme in 2014/15 to contain the outbreak in South West London, and seek to eradicate isolated outbreaks in other areas.
- Work with the OPM advisory board and the Tree Health Policy Group (THPG) to consider future policy and management approaches on OPM beyond 2015.

## Other pests and pathogens/Future threats

Finally, in Chapters 5 and 6 the Plan sets out work Government and others are undertaking to combat new and future threats to our tree population – pests and pathogens that are either nearly established or may become so in time. Our priorities are to:

- Continue to work with stakeholders to agree future actions and management strategies for prioritised emerging tree pests and pathogens.
- Work on phase 2 of the risk register, building on progress from phase 1 to provide more sophisticated analysis of risk, looking at pathways of spread of pests and diseases.

In addition to these priorities, the government will support cross-cutting work to build the resilience of our tree population and:

- Work with a broader coalition of delivery partners to better understand and address the cumulative pressures and threats faced by our tree population such as climate change, biodiversity and ecosystem health to develop a strategic approach to tree health.
- Ensure provisions are included in the New Environmental Land Management Scheme (NELMS) that could be used to help address immediate pest and disease threats.
- Work with the nursery sector to develop an assurance scheme/industry standard.
- Continue to work with stakeholders, and build links with Europe and internationally to help strengthen our biosecurity.

- Raise awareness of tree disease, and publish new guidance on tree disease as required.[1]

[1] See Annex A for details on existing guidance on tree diseases.

# Chapter 1: The Government's approach to Tree Health in England

## Introduction

This Tree Health Management Plan sets out the Government's new approach to tree health in England, and how it will help to build the social, environmental and economic resilience of our tree population.

This chapter sets out why this plan is needed, and how it fits with wider Government policy. It also summarises the key components of the Government's approach on tree health. Chapters 2, 3, and 4 set out how the Government is putting the plan into practice to tackle specific pest and pathogen outbreaks: Chalara, Phytophthora and Oak Processionary Moth (OPM). Chapter's 5 and 6 sets out a framework for how the Government and others might manage future threats to tree health in England.

## The importance of trees to society

Trees[2] are an essential economic, environmental and social asset: they shape the visual landscape; provide timber; contribute to flood and erosion control, provide habitats for wildlife; they are important for cleaning pollution from the air; they support our health and wellbeing; and, provide recreational opportunities for people. They are a vital part of our heritage, equally important in urban and rural areas.

In the UK, trees and woodlands provide a wide range of ecosystem services valuable to the economy and societal well-being. The total UK forestry and logging sector, including support services, directly employed around 14,000 people in 2010, in more than 3,000 separate enterprises. Based on data from the Office for National

[2] The definition of trees throughout this document includes woods, forests, trees in hedgrows, and urban trees (streets, squares, parks and public and private gardens) on public and commercial land.

Statistics (ONS), Gross Value Added (GVA) data for this sector was around £400 million in 2011 and for sawmilling and planing was around £430 million in 2011[3].

The total societal and environmental value of woodlands is several times higher than the commercial value of the forestry and logging sector. These societal benefits are estimated at around £1.8 billion per year (2012 prices) and it is recognised that there are further benefits that cannot readily be monetised.[4]

## Reducing risks to our tree population

Threats to our tree population have increased along with the globalisation of trade in goods and services, different trees and plants including wood for fuel and wood associated products being imported, which may be acting as hosts or vectors for pests and diseases coming from an increasing number and range of sources. This in turn increases the risk that new tree pests and pathogens are introduced into England. In addition, trees are facing other pressures from changes to our climate such as warmer winters, and changes in seasonal rainfall and storm patterns. Therefore, the Government believes we should build the resilience of our tree population, to minimise the impact of pests and diseases, and help improve their capacity to adapt and mitigate the impact of these threats.

As a result of these threats, our forests, woodlands and landscapes and urban areas may look different in the future, and collectively Government and stakeholders will need to work together to continue to find ways of helping to improve their capacity to adapt and mitigate the impacts of those pests and diseases that threaten our tree population.

[3] These figures exclude subsequent processing of wood into goods such as paper, pulp and panels, secondary processing further down the supply chain, and forest related tourism; this is therefore a cautious estimate of GVA.

[4] Based on the generic method set out in a 2013 Defra report entitled ‘Chalara in Ash Trees; A Framework for Assessing Ecosystem Impacts and Appraising Options’ which builds on the original Willis et al. 2003.

Many services which trees provide are public goods (for example carbon sequestration) and they are often not directly provided by markets[5]; the Government and others therefore have a role as stewards, intervening where necessary to ensure this value is protected and available to all. Government intervention acts to protect public goods through reducing the threat from pests and diseases. Without Government coordination, there may be inadequate incentives for individuals to protect tree health and the benefits that flow (for example enjoying recreational activities). Similarly, coordination of action on outbreaks is unlikely to be provided without Government intervention. In line with the Government's risk-based approach to tree pest and disease, such interventions should be prioritised, in order to safeguard tree health to maximum effect, within available resources.

## Government policy

The Government recognises the vital role that improving tree health plays in building the economic and environmental resilience of our tree population. It is doing this in a number of ways:

- The Government's Forestry and Woodland Policy Statement, incorporating its response to the report of the Independent Forestry Panel sets its objectives for forest and woodlands: to protect, expand, and improve this valuable national asset for future generations. The Government's and other's work on tree health is contributing to the protection and improvement elements of this Policy Statement.[6]

- Biodiversity 2020 sets out a strategy for England's wildlife and ecosystem services. It includes actions to reduce environmental pressures and to bring more

[5] Markets do exist for a number of forestry goods and services such as processing and selling timber products. However, many forest goods and services, such as carbon sequestration, are 'public goods' and hence are under-supplied by the market without intervention including collating information on pests or disease findings.

[6] https://www.gov.uk/government/publications/government-forestry-policy-statement

woodland into sustainable management, as well as to expand the area of woodlands.[7]

- The newly published Plant Biosecurity Strategy for Great Britain sets out the Government's approach to plant biosecurity which focuses specifically on prevention and exclusion of new pests and diseases, and reflects the recommendations of the 2013 Independent Taskforce on Tree Health and Plant Biosecurity that made a number of recommendations to strengthen our approach. The Government has now accepted and is taking forward all of the taskforce recommendations.

This Tree Health Management Plan describes how we are starting to implement the Plant Biosecurity Strategy for pests and diseases of trees in England. The Government will take a more risk-based approach to tree health, setting out risks posed by, and action being taken in response to, specific pests and pathogens, and by highlighting the links between healthy trees and a healthy economy and healthy environment. It also builds on previous work such as the Tree Health & Plant Biosecurity Action Plan.[8]

## Building resilience

While we can reduce the risks of new pests and diseases affecting our tree population, we can never eliminate them, and so Government is working with a wide range of partners to ensure that our tree population and economy are more resilient to the new pests that will inevitably arrive from time to time.

- The use of healthy planting stock is critical to the biosecurity and resilience of our tree population. Diversity of tree species and genetics within tree species is at the core of woodland adaptation and ensuring resilience in the future. Advice and information on what species to plant, and origins of their seed, can be found using the resources within the Forestry Commission England's web site www.forestry.gov.uk/climatechangeengland

[7] https://www.gov.uk/government/publications/biodiversity-2020-a-strategy-for-england-s-wildlife-and-ecosystem-services

[8] http://www.forestry.gov.uk/forestry/INFD-8LQGC2

- The Forestry Commission and Woodland Trust are carrying out further work to build environmental resilience. The Woodland Trust, with support from Defra, convened an Expert Seminar in London, in June 2013, to discuss the wider conservation impacts of Chalara and other tree diseases and to consider issues surrounding the future resilience of our woodland resource. The event brought together 40 scientists, researchers, forest pathologists, woodland managers, representatives of professional bodies, government agencies and nature conservation NGOs to share experience and learning as well as to identify key gaps in knowledge and practice. Since the seminar the Woodland Trust has appointed a new full time officer working on tree disease issues and placed a major suite of procurement contracts to deliver UK sourced and grown planting stock for all its future woodland creation needs.

- In line with the Plant Biosecurity Strategy, and the commitment in the 2013 Chalara Management Plan, the Government is working with industry to improve sourcing of material and the ability to adapt to established pests. This includes work to develop an industry charter for the nursery sector. Building on initial work looking at tree nurseries in Scotland, the Government and industry partners are working together to explore the feasibility of a scheme. We will consider the options, benefits and barriers in establishing such a scheme for tree and plant nurseries. An initial scoping study, which will report later this year will cover the whole of Great Britain, and encompass all trees and shrubs, including those used for forestry, landscaping and amenity purposes. The recommendations of the scoping study will inform future work in this area.

- The Rural Development Programme for England (RDPE) is an important mechanism that is helping Government to contribute to the improvement and expansion of our woodlands; 12,480 hectares of woodland have been planted through the England Woodland Grant Scheme (EWGS) during the current programme.

- The current RDPE was due to end on 31 December 2013 and the next programme will be launched from 1 January 2015. Following EU level negotiations, the Government successfully negotiated provisions that allow for continuity of support under RDPE for woodland creation and capital grants to the forestry sector throughout 2014.

- During 2014 the Government will continue to prioritise allocation of funding to capital grants that secure the removal of diseased trees and plants in priority

locations where they pose a threat, and also securing the regeneration of woodland that has to be felled due to tree health issues.

- The Government has made a commitment that 2,000 hectares of new woodland will be created through the planting of 4 million trees as part of a £30 million government investment through RDPE in 2014/15. In addition the Government will be accepting applications for new woodland creation for the 2015/16 season in early 2015, once the new programme has been approved.

- The development on the New Environmental Land Management Scheme (NELMS) will be completed during this year. A high priority of the programme will be to ensure provisions are included that could be used to help address immediate pest and disease threats.

- The Government, in collaboration with other funding partners, is investing in research to identify and exploit resistance for longer-term adaptation and resilience. For example, genetic research is being undertaken to produce maps of the ash tree genome, and Forest Research are undertaking a mass screening trial to identify ash trees less susceptible to Chalara.

## Taking a risk based approach

- In January 2014 Government published the first iteration of the Plant Health Risk Register[9], an important new tool for Government and stakeholders to assess current and future threats, and identify priority actions.

- It is helping to identify where limited Government and stakeholder resources can be employed to best effect against a profile of current and future risk in order to take a risk based approach to tree health.

[9] https://secure.fera.defra.gov.uk/phiw/riskRegister/

- Government and stakeholders also need to consider unknown pests and the pathways by which they may enter the UK. This will be undertaken in phase 2 of the risk register work.

- There will inevitably be new unknown threats which are not captured by the risk register. Our work on resilience and improved understanding of the risks posed to our tree population will mean that, whilst we cannot plan specifically for those unknown threats, we can be better prepared for them.

## Developing robust evidence

A key component of our approach to tree health is ensuring that any action that is taken to prevent or mitigate a pest or disease outbreak is informed by robust evidence. We are doing this in a number of ways:

- Investing in developing a robust interdisciplinary evidence base which combines a long-term programme of strategic research with more applied, responsive research which will improve our collective capacity and capability to identify and respond to risks. The Government is using evidence from a wide range of disciplines to enable it to establish priorities for intervention (this requires an understanding of the costs and benefits to society from policy changes including social, environmental and economic impacts).

- Working proactively and collaboratively with, and sharing evidence across, government, industry, civil society and the public to maximise the value of existing funding and ensure the best possible research is delivered. An example of this is the interdisciplinary "Living With Environmental Change" Tree Health Plant Biosecurity Initiative; this has been co-funded and co-designed with Research Councils, Forestry Commission and the Scottish Government.[10]

[10] http://www.lwec.org.uk/

- The Government is working to ensure we have a strong underlying scientific and research capacity and capability across the key scientific disciplines (including the social sciences) to meet our future needs. The Government Chief Scientific Adviser, Sir Mark Walport and Defra's Chief Scientific Adviser, Professor Ian Boyd are undertaking a study to determine the UK's future needs for capability in the provision of research of animal and plant health.[11]

## Working in partnership to reduce impacts of pests and diseases

The Government recognises that it cannot tackle pests and diseases alone, and that a collaborative approach is needed to improve tree health in England. As a result the Government is working more collaboratively with our stakeholders, delivery partners, and Defra agencies in a number of ways;

- There has been greater involvement of stakeholders in setting policy direction and priorities which have strengthened overall capacity and co-ordination. Since Chalara was first identified in October 2012 the Government has been working collaboratively with key sectors through the Tree Health Policy Group (THPG). Membership includes the Horticultural Trade Association (HTA), The Woodland Trust, The Tree Council, Landscape Institute (LI), the National Trust , Confederation of Forest Industries (Confor), and the Country, Land and Business Association (CLA) [12]. This group worked with the Government to develop the Chalara Management Plan in 2013. The group's remit has now been broadened to develop management approaches to established or nearly-established tree pests and pathogens, as well as exploring how we can build resilience more widely. Their work this year has included the development of management approaches to Chalara, *Phytophthora ramorum*, *Phytophthora kernoviae*, and Oak Processionary Moth (OPM) in England.

[11] This study will determine the UK's future needs for capability in the provision of research to underpin the assurance of best practice management of animal and plant health. The project is expected to report in summer 2014.

[12] Annex B sets out THPH membership and remit of the group.

The Government has valued the work of this group which has helped to inform action on these tree pests and pathogens.

- Plant health and forestry are devolved matters. The responsibilities of public agencies for plant health are set out in the Plant Health Act 1967. This splits responsibility for protection of forest trees and timber products between the Forestry Commission, in England and Scotland and the Welsh Government in Wales, and Defra and the Devolved Administrations, having responsibility for other aspects of plant health. Fera's Plant Health and Seed Inspectorate (PHSI) are responsible for implementing the plant health regulations in England and Wales. All UK administrations work within the EU framework of the plant health law, to have the best possible approach to biosecurity, work collaboratively to consistent approaches where possible.

- Defra along with its delivery partners Forestry Commission (FC) and the Food Environment Research Agency (Fera) has developed improved ways of working, with Defra leading policy responses to outbreaks of pests and diseases, and FC and Fera providing an operational and expert advisory role and expertise. This has been supported by closer working with the Joint Nature Conservation Committee (JNCC) and Natural England (NE) to ensure that there is a better understanding of the linkages between plant health and biodiversity and ecosystems.

- The FC is playing a key role in co-ordinating country approaches to tree diseases, in liaison with the DA's who are developing their own plans, to ensure a coordinated approach. Internationally, the Government is working to ensure strong biosecurity at EU and country borders and that action is coordinated to strengthen plant health in light of the review of the EU Plant Health regime.

- In line with the Government's collaborative approach, we recognise that the public have an important contribution to make in both the effort to identify and report potential threats, and in helping to minimise risks by undertaking measures to avoid their introduction and spread. The public reaction to the outbreak of Chalara in October 2012 confirmed how much the British public value their trees and that people are motivated to speak out when their trees are threatened or there is a risk of a specific tree species being more or less removed from our landscape.

Many of the commitments on public awareness and engagement were elaborated in the 2013 Chalara Management Plan, but the work set out below relates to tree pests and diseases more widely and have become an integral part of our approach.


The “Stop the spread” garden was shown at the RHS Chelsea Flower in May 2013. The garden contrasted a beautiful cottage garden with an avenue of dead trees and was supported by some simple messages about how the public can help to reduce the risk of pests and disease entering and spreading within the country. Through the media coverage of the garden, and the visitors to the show, the garden helped to raise awareness of plant health issues and inspired actions. The garden was estimated to have reached an audience of many millions through extensive television and press coverage.

We are applying evidence from the social sciences to understand what motivates and constrains individuals’ and groups’ ability to protect tree health and wider plant biosecurity to improve the targeting of action. We are also using citizen science to contribute in a number of key ways – increasing public awareness of the risks posed by tree diseases; supporting existing networks of individuals with an interest in plant health, and; enhancing public capability and capacity to identify outbreaks of pests and undertake surveillance activities. Examples include:

- The OPAL tree health survey, which was launched successfully in May 2013. This citizen science project is being used to engage people and raise awareness of tree health issues. The survey asks members of the public to examine the tree population in their local area and to report suspect sightings of high risk pests.

- ObservaTREE, is developing a citizen science based Tree Health Early Warning System (THEWS) using volunteer groups. This citizen science project involves working with trained volunteers with technical expertise to record and verify instances of diseases, as well as providing a mechanism for the general public to report instances. In summer 2013 the ObservaTREE partnership[13] successfully secured 1.1 million Euros (nearly £945,000) of EU LIFE+ funding to develop THEWS over four years. It is being designed to help identify tree pest problems earlier, and enable members of the public and voluntary bodies to play a greater role in protecting tree health by making the reporting of incidents easier.

[13] Forest Research (FR), Fera, the Woodland Trust and the National Trust are working together to deliver ObservaTREE

# Chapter 2: Management update on Chalara

## Key facts: Chalara[14]


- Chalara dieback of ash is a disease caused by the fungus *Chalara fraxinea*[15]. The disease causes loss of leaves, dieback of the crown of the tree, and usually leads to tree death.[16] *(CR High)*
- *Chalara fraxinea* has infected many species of ash worldwide, but with differing intensities[17]. *(CR High)*

[14] Confidence ratings (CR) are used throughout the document in order to help the reader understand the data presented. Please see Annex C for further details. Confidence ratings have only been applied to completed projects

[15] Kowalski T (2006). *Chalara fraxinea* sp. nov. associated with dieback of ash (*Fraxinus excelsior*) in Poland. Forest Pathology 36, 264-270.

[16] Kowalski T and Holdenrieder O (2009). Pathogenicity of *Chalara fraxinea*. Forest Pathology 39, 1–7.

[17] Forest Research (2012). *Rapid assessment of the need for a detailed Pest Risk Analysis for Chalara* fraxinea

- Common ash (*Fraxinus excelsior*) is the most severely affected species and is the only native species of ash in the UK. Young trees are particularly vulnerable to *Chalara fraxinea* and succumb to disease rapidly.[18] *(CR High)*
- Infection is via air-borne spores produced from fruit bodies on leaf litter.[19] *(CR High)*
- *Chalara fraxinea* infection starts primarily on leaves and is progressive over time with dieback and stem lesions usually manifesting in the next growing season. Leaf symptoms can be detected within two months of infection (experience from Denmark). *(CR Medium)*
- Natural spread is by wind-blown spores (ascospores) from the fruiting bodies.[20] Spread can also occur via the movement of infected material through trade. *(CR High)*
- The impact of *Chalara fraxinea* infection depends on tree age, provenance or genotype, location, weather and microclimate conditions and presence of honey fungus (*Armillaria)* or opportunistic secondary pathogens. Trees in forests are likely to be more affected because of the greater prevalence of honey fungus and favourable microclimates for spore production and infection. Trees cannot recover from infection, but larger trees can survive infection for a considerable time and some might not die. *(CR Medium)*
- Ash as a proportion of total GB woodlands is around 4.7percent (142k hectares as a proportion of 3 million hectares), and therefore the social and environmental value of ash is estimated at between £72 million and £124 million per year. Combined with the commercial value of ash, which is estimated at around £22

[18] Kowalski T (2006). *Chalara fraxinea* sp. nov. associated with dieback of ash (*Fraxinus excelsior*) in Poland. Forest Pathology 36, 264-270 Forest Research (2012). Rapid assessment of the need for a detailed Pest Risk Analysis for *Chalara fraxinea*

[19] Timmermann V, Børja I, Hietaka AM, Kirisits T and Solheim H (2011). Ash dieback: pathogen spread and diurnal patterns of ascospore dispersal, with special emphasis on Norway. EPPO Bulletin, 41: 14-20. doi: 10.1111/j.1365-2338.2010.02429.x

[20] (Kowalski T (2006). *Chalara fraxinea* sp. nov. associated with dieback of ash (*Fraxinus excelsior*) in Poland. Forest Pathology 36, 264-270. Kirisits T and Cech TL (2009). Zurücksterben der Esche in Österreich: Ursachen, Verlauf, Auswirkungen und mögliche Forstschutz- und Erhaltungsmaßnahmen. Kowalski T and Holdenrieder O (2008). A new fungal disease of ash in Europe. Schweiz. Z. Forstwes 159, 45–50. Queloz V, Grünig CR, Berndt R, Kowalski T, Sieber TN and Holdenrieder O (2010). Cryptic speciation in *Hymenoscyphus albidus*. Forest Pathology. doi: 10.1111/j.1439-0329.2010.00645.x.

million per year, the total yearly value is estimated at between £94 million to £146 million. [21] *(CR Medium)*

## Government Policy

In response to the discovery of Chalara in October 2012, the Government - in collaboration with stakeholders - developed the Chalara Management Plan which was published in March 2013. This set out an approach to managing the disease with four objectives: (1) reducing the rate of spread; (2) building resistance to the disease; (3) encouraging citizen, landowner and industry engagement in surveillance, monitoring and action in tackling the problem of Chalara; and (4) building environmental and economic resilience. Details of progress against each of these are set out later in this chapter.

## Improving our understanding of the disease

Over the last year the Government has sought to increase our collective knowledge and understanding of Chalara to inform potential management approaches and to mitigate impacts of the disease. It has commissioned an extensive programme of research that focuses on:

- Identifying and exploiting resistance (tolerance) for longer-term adaptation and resilience.

[21] The direct commercial value of UK woodlands (reflected in GVA of timber and sawmilling as outlined above) is around £0.8bn per year (2012 prices). The social and environmental value of GB woodlands is estimated at £1.8bn per year (2012 prices), including the value of landscape, biodiversity, recreation and carbon sequestration (as outlined above). Therefore the total value of GB woodlands is around £2.6bn per year. Data on hectares of tree species are taken from Forestry Statistics 2013. The monetary values are derived from methods that are developing (as described in 'Chalara in Ash Trees; a Framework for Assessing Ecosystem Impacts and Appraising Options' (Defra 2013)), but nevertheless are useful, current indications of value. In future, values may be developed more specifically by geographical location, which will help to provide more accurate information on social and environmental value – e.g. to reflect where specifically in the country individual tree species are most prominent along with the amount of people who benefit from them. The method used to derive commercial value, is a developing method, but does try to reflect the value of individual tree species specifically – rather than simply using the proportion of overall forestry as a proxy for the proportion of GVA.

- Identifying potential disease management approaches (including chemical treatments and sources of resistance in ash) through appropriate experimentation and modelling.

- Work to improve the understanding of the pathogen (including spread).

- Developing an understanding of the potential ecological impacts of Chalara in woodlands, and how this might help in developing woodland management and monitoring strategies to adapt to the disease.

Collectively, this work is telling us[22]:

- Spores are likely to have been spread by:

  (i) Movement of infected material through trade; and,

  (ii) Airborne dispersal from continental Europe.

- Distribution is estimated to increase by 2018 and continue increasing beyond this with the highest incidences expected in South-East, East and South West of England.

- Ash trees support a large number of other species, which depend on it as a host or a food source, 45 of which are only found on ash and a further 62 are highly associated. Decreasing numbers of ash trees are likely to affect species already endangered and potentially threaten other species.

- It is currently not possible to eradicate Chalara and no cures exist for trees already infected.

- Preliminary results indicate Chalara is sensitive to a number of chemical pesticides. However, further evidence is needed on whether treatments can

[22] Please see the Chalara Evidence Synopsis Report for further details. This section summarises insights which are emerging from current projects. These projects are still underway and findings have not yet been peer reviewed. Findings may be subject to change as further analysis and research is undertaken.

form part of a practical, cost-effective and sustainable management strategy in some situations (e.g. high value individual trees).

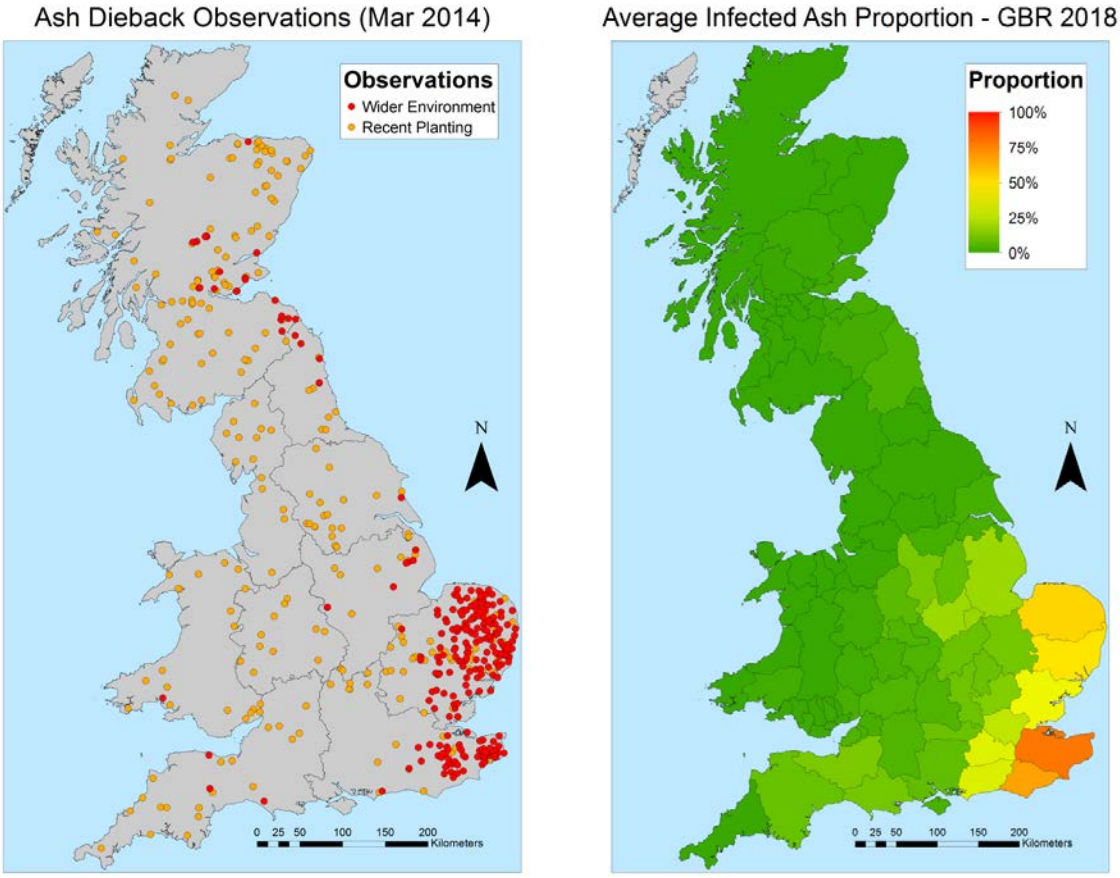
- Climatic conditions in the UK are unlikely to limit the pathogen's ability to survive and spread. For example, laboratory tests indicate that pathogen will be suited to the UK climate in terms of temperature (growth is optimal between 15-20ºC) and moisture (e.g. rainfall and humidity).

## Predicting the spread of Chalara

Epidemiological models have been used to predict the progression of the Chalara outbreak in Great Britain. The Government commissioned a team from the University of Cambridge to model the progression of the Chalara outbreak in Great Britain. As limited information is available on the biology of the disease, spore dispersal and the infection process, the model results are subject to uncertainty[23]. The latest model outputs indicate that the pathogen is likely to continue to spread in Great Britain although there is potential regional variation with areas in the South East, East and South West most likely to be affected. These predictions will continue to be updated as additional information from ongoing research activities becomes available.

[23] Some of these uncertainties have been quantified (e.g. spread parameters) which is reflected in the prediction ranges provided, whereas others have been evaluated in a more qualitative way.

**Figure 1: Current outbreaks of Chalara in recently planted sites and the wider environment (left pane) as of March 2014 and the predicted proportion of ash trees that are expected to be infected by 2018 (right pane)[24]**




## Progress and next steps

Since the publication of the Chalara Management Plan in March 2013 the Government has worked with stakeholders to implement commitments in this plan. The information below sets out progress against each of these objectives.

[24] This map is the result of a large number of stochastic simulations and shows the average proportion of ash in each county that predicted to be infected in 2018.

## Objective 1: Reducing the rate of spread

Given what the recent modelling is predicting and our current knowledge of the pathogen's biology, the Government continues to believe there is benefit in seeking to reduce the rate of spread of the disease where it remains cost effective to do so, and whilst our scientific understanding is still evolving.

**Monitoring and surveillance:** Since the publication of the March 2013 Plan, Fera and the FC have carried out further surveillance and monitoring to provide intelligence on the rate of spread of Chalara. By the end of June 2013 they had completed inspections at all suspect recently planted sites that could be identified in the high risk counties. These counties were predominatley in the east of England where infection had previously been found. Nationally, trees at 1,600 sites were inspected.

In summer 2013 the Forestry Commission issued an advisory note to woodland owners to encourage them to inspect plantings of ash in the age range of 6 to 20 years. This recognised that large quantities of ash were imported from parts of continental Europe where the disease had been present before 2007 and this could mean that the disease was present on a very small proportion of plants imported from the continent at least 10 years ago. Results from this survey and other reports identified isolated outbreaks in the wider environment detected further west in Devon, Somerset, Dorset, Derbyshire and Pembrokeshire, which were associated with older plantings from the late 1990s onwards. These observations are most readily explained by the possibility that the trees were infected prior to planting. This is because at each location the planted trees appear to exhibit the oldest signs of infection and there is no other obvious explanation how the trees could have become infected at those locations 10 or more years ago.

During September 2013 the FC conducted a second wider environment Chalara survey. This work was concentrated on the eastern side of the country to assess the spread of the disease from known points of infection. Sites showing visual symptoms of infection were then confirmed by laboratory analysis of samples. Observed spread in the east has been relatively modest; however, noticeable decline was observed in the overall condition of some mature trees suggesting that these trees were infected with Chalara several years prior to the first observations of the disease in 2012.

In the future FC and Fera will continue to monitor spread of Chalara by following up on reports assessed as highly suspect in 10km squares not currently known to be infected. The Government, in consultation with stakeholders, will consider what further surveillance work is needed on Chalara, in light of the fact that our understanding of the disease is still evolving, but balancing this against surveillance needs on other pests and pathogens and where resources can best be deployed.

- **Promoting removal of infected ash and replanting of recently established young ash:** The Government continues to pursue a voluntary approach to managing the disease and does not believe there is a market for ash, and is therefore not encouraging planting of this species. In line with this, the Government is supporting the removal of young, recently planted ash and replacement with alternative species through the England Woodland Grant Scheme (EWGS). Since the publication of the 2013 Chalara Management Plan the Government has funded the removal of infected ash trees in areas that were deemed higher priority counties. These were counties where Chalara had not previously been observed in the wider environment, and therefore removing young infected ash trees in these counties is likely to help slow the spread and be cost effective. Contracts for work totalling £120,000 have been agreed. These higher priority counties are likely to change in the future given spread of the disease into these areas. The FC will publish further guidance on the approach for 2014/15 in April 2014.

- The Government believes that over time, landowners and woodland managers should consider replacing young, recently planted ash with alternative species at the earliest opportunity. In 2014/15 the Government will continue to support action to remove recently planted infected ash trees in priority counties. The Government will also protect and improve the resilience of woods by supporting nationally the replacement of ash in woodlands affected by Chalara with alternative species using funds from the RDPE. Taking action in this way will help to improve the resilience of our woodlands and ensure minimal loss of woodland cover. In areas of particular importance for biodiversity, alternative management strategies may be appropriate.

- In addition landowners who have planted young ash trees on sites through the Higher Level Stewardship (HLS) funding, that subsequently become infected with Chalara, during the course of the agreement can invoke force majeure, and make an application to replant infected ash with alternative species until the end of 2014. Further information can be found at http://www.naturalengland.org.uk/ourwork/enjoying/ashdiebackfeature.aspx. HLS agreement holders should contact Natural England as soon as they are aware of the presence of the disease on their holding.

**Felling of mature ash trees:** The Government will not, in general, be encouraging the felling of mature ash in either urban or rural situations as part of the action to slow the rate of spread of the disease. However, there may be particular circumstances where landowners and woodlands managers should consider replacing older, more mature ash trees once they have succumbed to disease with alternative species. For example:

- If landowners and bodies such as local authorities, the Highways Agency or Network Rail believe infected trees on their property are a health and safety risk then they will be responsible for them as for any other diseased tree.

- In isolated outlying areas of infection in the wider environment.

Currently it is not possible to predict whether or how long, infected trees will survive. In European countries where the disease is more prevalent, mature ash trees have been found to survive for many years after infection. The retention of mature trees also maximises the potential for regeneration of a new population of disease resistant trees. The Government will keep the policy on mature trees under review as our collective understanding of the disease continues to evolve and the disease progresses.

**Movement restrictions:** UK emergency legislation has been in place since October 2012. Given the evolving situation, the legislation has been kept under review but retained to date as part of the overall management approach. In line with their obligations, it is anticipated that the European Commission will wish to establish a common position on Chalara, before autumn 2014. This would include the recognition of EU Protected Zones for any areas of the EU which wished to retain freedom from the disease, which could include parts of the UK (though not England, where Chalara is established in parts). One consequence would be that national legislation would need to be revoked at the same time that any EU legislation was introduced and any remaining statutory movement controls restricted to material being moved into and within Protected Zones. The Government will keep this under review as the position with the EU evolves.

**Treatments[25]:** The 2013 Chalara Management Plan set out an approach to scientifically test potential treatments. The Government continues to advise against expecting to find a treatment for Chalara which can be widely applied to protect or treat infected woodlands. Whilst there is currently no known means of eradicating Chalara, treatments may have a role, in protecting individual trees such as heritage or amenity trees; including trees in gardens and parkland trees, or groups of trees or

[25] This section summarises insights which are emerging from current projects. These projects are still underway and findings have not yet been peer reviewed. Findings may be subject to change as further analysis and research is undertaken.

level of damage or rate of spread in some circumstances. The Government is continuing, through scientific testing, to explore whether treatments may have a role in protecting individual trees or groups of trees.

Fera, in collaboration with an expert group and industry has identified and tested 17 chemical treatments against the Chalara pathogen. Fourteen of these chemicals are registered for use in the UK, although none are currently approved for use in woodland or nurseries[26].
http://www.fera.defra.gov.uk/plants/plantHealth/pestsDiseases/documents/fungicideListForScreening20March2013.pdf

Interim results indicated that the Chalara pathogen was sensitive to many of the chemicals tested and highly sensitive to four. Further research is under way to test the level of control that can be achieved using the most promising chemicals under field conditions.

Chemical treatments cannot fully eradicate the pathogen from infected trees and therefore they are likely only to be useful in protecting specific, high value trees through repeated treatments. The outputs of this research will need to be used alongside other research to understand the potential benefits that chemical treatments may have in managing the impacts of ash dieback or slowing the spread of the disease

In addition, further analysis and research will be needed to understand whether chemical treatments can form part of a sustainable, practical and cost-effective management strategy that will not impact adversely on the environment or biodiversity.

[26] Laboratory bioassays have tested the potency of each chemical against the Chalara pathogen by defining the half maximal effective concentration (EC50) for each chemical. The EC50 concentration is point at which the chemical is producing half of its maximum effect. An EC50 at or below 0.1 parts per million (ppm) demonstrates that the pathogen is highly sensitive to the chemical

## Objective 2: Developing resistance to the disease in the ash population

The Government believes the best hope of securing the environmental future of the ash tree lies in understanding and, identifying durable resistance or (tolerance) to Chalara, and facilitating the spread of that resistance sustainably in our ash populations. As part of this, the 2013 Chalara Management Plan committed to take forward a programme of research to identify and exploit resistance in UK ash trees, and potentially those elsewhere.

Resistance may be conferred by reduced risk of infection (low susceptibility) or an ability to withstand infection (tolerance) the latter may not be apparent for a number of years. Identification of trees less susceptible or able to tolerate Chalara infection could potentially provide a route to maintaining ash trees as part of UK woodlands as well as limiting the impact on biodiversity.

Defra has commissioned research to identifying relevant trees as well as developing genetic tools to allow incorporation of resistance into breeding material. Ash trees within UK woodlands are being monitored for signs of reduced susceptibility and seed is being collected and maintained for future use. The level of susceptibility can only be monitored in areas where the disease is already present. As a result, Forest Research established and will monitor a mass screening trial in which ash saplings from across the UK and elsewhere have been planted in areas at high risk from Chalara to allow more rapid identification of those less susceptible to the disease. This screening and monitoring will continue until at least 2018. Genetic research is producing maps of the ash tree genome. These maps will be a valuable tool in identifying the location of genes involved in resistance and identifying genetic markers for use by breeders. The research is also attempting to understand the process by which some trees are less susceptible.

Techniques for rapid propagation are also being investigated so that resistant trees can be made available more quickly than they would be with traditional breeding.

## Objective 3: Encouraging citizen, landowner and industry engagement in surveillance, monitoring and action in tackling the problem

The 2013 Chalara Management Plan, referred to a wide range of activities to promote citizen science which are now part of our wider approach to tree health and these are set out in detail in Chapter 1 of this Plan under public awareness and wider engagement.

## Objective 4: Building resilience in woodland and associated industries

As part of this, the 2013 Chalara Management Plan committed the Government to work with stakeholders to build resilience in woodlands and associated industries.

**Environmental resilience:** Environmental resilience can be defined as the capacity of the system to resist damage and recover quickly when challenged by environmental pressure.

The impact of Chalara on England's tree population will continue to evolve. Taking into account the current and predicted spread and impact of the disease the Government will continue to balance action we take now based on the information available, with future action when further evidence is available to make better informed decisions.

The 2013 Chalara Management Plan, made commitments to help build environmental resilience in the following areas:

**Non-woodland Trees:** Ash is a significant feature of the non-woodland landscape. It is found in various locations ranging from gardens, hedgerows, along roads and railways, in urban and rural parkland. Given the diversity of areas where ash is found, the impact of dealing with Chalara will be experienced by many different types of landowner, including those not used to dealing with tree issues before. This could range from private individuals, to large infrastructure companies and public guardians of the landscape.

The Government is working with The Tree Council to better understand the impacts of Chalara in non-woodland situations. Representatives from The Tree Council's, 180 member organisations including local authority planning officers, the landscape and tree sectors, plus commercial, charity and government organisations are being consulted as part of this work which focuses on:

- The numbers of non-woodland ash and where they are located - this will provide us with a clearer picture about where non-woodland ash is and help to better understand the number of trees that could be potentially affected.

- The management issues relating to non-woodland ash, including hedgerow trees, ancient ash trees, planning issues, protected trees, and tree safety. Given that non-woodland trees feature in a variety of settings a clearer picture is needed about how these trees are currently managed.

- Continental research on the impacts of Chalara. Given that Chalara is already widespread in much of Europe, there is much we can learn from these countries experience on non-woodland trees.

- Ash trees are growing in a variety of non-woodland settings, such as urban areas, public and private gardens, and transport routes. If in the future an ash tree in one of these settings is found to have Chalara, approaches to managing this will need to be developed to ensure public safety.

This work is intended to help build our understanding about the nature of the potential spread, in order to consider what management approaches and other policies may be needed. The Government will look at what guidance is needed to support the wide range of audiences that will require information on how to manage ash in non-woodland areas. The Government will continue to work with The Tree Council and other interested parties to further develop this work.

**Ecological impacts of Chalara in woodlands:** The 2013 Chalara Management Plan set out plans by the Joint Nature Conservation Committee (JNCC) and associated countryside agencies to review of the potential ecological impacts of ash dieback. The research explored the impacts of the potential loss of ash trees in England's woodlands and how this will impact on the other species which use ash as a food source or, habitat, and the study also looked at potential management responses to this. A report of the first phase of this research was published in January 2014.[27] In summary, to-date the work has found the following:

- 1058 species have all or part of their lifecycle associated with ash trees in the UK. Of these, 45 have only been recorded on ash trees and are therefore considered obligate; a further 62 are highly associated but have also been recorded on other species.

- No single tree species will be able to fill the niche provided by ash trees, in terms of both its ecosystem characteristics (e.g. nutrient cycling and light penetration properties that influence other ground cover) and biodiversity contribution.

[27] http://jncc.defra.gov.uk/page-6459

The second phase of the project led by Natural England has just been published and extends the analysis and produced tools, including case studies, that can be used by policy and land managers to better understand the impact ash dieback could have on the biodiversity if their sites and what measures they might take to address this, including which tree and shrub species could help support the biodiversity value currently provided by ash trees. The case studies show how the results may be applied to individual sites.

**Economic resilience:** In the 2013 Chalara Management Plan the Government committed to work with relevant industries, and in particular the nursery sector to help build its resilience. Since then the Government has worked closely with industry organisations, particularly the HTA, and Confor through the Tree Health Policy Group (THPG) in recognition of the fact that the impact of Chalara was felt strongly by this sector. Our work last year has focused on developing an assurance scheme/charter mark for the nursery sector as set out in Chapter 1. This year we will continue to work with industry to develop this further.

## Summary of future work on Chalara

- Continue to support action to slow the spread of Chalara given there is no known means of eradication.
- Fund, through England Woodland Grant Scheme (EWGS), the removal of infected ash (in selected counties) and the replanting with alternative species nationally.
- Understand the impact of Chalara on non-woodland trees.
- Continue the ongoing programme of research to identify and exploit resistance; identify potential disease management approaches (including chemical treatments); improve understanding of the pathogen (including spread), and; understand the ecological impacts.

# Chapter 3: Management update on *Phytophthora ramorum* and *Phytophthora kernoviae*

## Key Facts: P. ramorum and P. kernoviae

- *P. ramorum* and *P. kernoviae* are non-native fungus-like organisms that cause diseases on a wide range of trees and shrubs in UK woodlands, heathlands and managed gardens. [28]*(CR High)*.
- *P. ramorum* was first discovered in England in 2002. While *P. kernoviae* was discovered in 2003.
- Host tree species include sweet chestnut, beech and oak while shrubs in the wider environment include Vaccinium species (e.g. bilberry) and Rhododendron ponticum, as well as many ornamental plants genera (e.g. in nurseries, historic gardens).[29] [30]*P. ramorum* has a wider host range than *P. kernoviae. (CR High)*

[28] Van Poucke et al. (2012) Discovery of a fourth evolutionary lineage of Phytophthora ramorum: EU2. Fungal biology 116, 1178-1191

[29] Brasier *et al.* (2004) Sudden oak death (*Phytophthora ramorum*) discovered on trees in Europe. Mycological Research 109: 1-7.

- *P. ramorum* affected few trees in the UK until 2009, when it was found infecting and killing large numbers of Japanese larch trees in South West England. In 2010 it was found on Japanese larches in Wales, Northern Ireland and the Republic of Ireland, and 2011 in western Scotland. European larch and hybrid larch are also affected. [31]*(CR High)*

- Disease symptoms include leaf necrosis, shoot dieback and bleeding cankers depending on the host species. [32]*P. ramorum* is known to lead to the death of larch trees. *(CR High)*

- The pathogens produce asexual 'spores' in sporangia which are involved in pathogen dispersal. Spores are produced on leaves of susceptible hosts and can be spread from leaf to leaf and plant to plant via rain-splash, wind-driven rain, mist, irrigation or possibly in surface water. Infection occurs through wounds or natural openings. *P. ramorum* also produces chlamydospores which are involved in survival. Long distance spread occurs by movement of infected plant material and associated growing media, in soil carried on vehicles, machinery, and footwear or on animals, and potentially through contaminated growing media or mulches.[33] *(CR High)*

- Using the methods outlined on p17 on Ash, Larch as a proportion of total GB woodlands is around 4.5percent (133,000 hectares as a proportion of 3 million hectares) and therefore the social and environmental value of larch is estimated at around £80 million per year. Combined with the commercial value of larch, which is estimated at around £60m per year, the total yearly value is estimated at around £140 million per year. *(CR Medium)*

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[30] EPPO Bulletin (2013) 43 (1) 81-93.

[31] Webber *et al.* (2010) Dieback and mortality of plantation Japanese larch (*Larix kaempferi*) associated with infection by *Phytophthora ramorum*. New Disease Reports 22: 19.

[32] Evidence is very well documented in various public documents, especially Pest Risk Analyses and Data Sheets, and the technical review of the Phytophthora Programme.

[33] Van Poucke *et al.* (2012) Discovery of a fourth evolutionary lineage of *Phytophthora ramorum*: EU2. Fungal Biology 116, 1178 – 1191.

# Government Policy

Government policy on *P. ramorum* and *P. kernovia*e is to reduce the spread and impact of these pathogens on the wider environment.

EU requirements exist for *P.ramorum* which focus on preventing the introduction (from third countries) and movement (within the EU) of infected material, carrying out eradication of nursery findings and at least containment in the wider environment. There are no current EU requirements on *P. kernoviae* which to date is only in Scotland, Wales Ireland and England, although there is a responsibility on the UK to prevent it spreading to the rest of Europe.

In April 2009, Defra funded a five year programme of work with the aim of reducing the impacts and speed of spread of the two organisms. Its principal original aim was to "reduce pathogen inoculum to epidemiologically insignificant levels by removing infected 'sporulating' host plants". The programme had three main areas of work; (i) disease surveillance and control; (ii) research; and (iii), behavioural change.

It was implemented by Fera, with the FC, and with the involvement of stakeholders. There are other *Phytophthora* species*,* but this programme focused initially on *P. ramorum* as the evidence at that time indicated that it could have a large impact. Given the higher prevalence, current impact and larger host range of *P. ramorum*, this section will focus mainly on this pathogen (although the 5 year programme covers both diseases).

Shortly after the 5 year programme began in autumn 2009, *P. ramorum* infection was discovered for the first time in Japanese larch plantations in South West England and South Wales; this had a major impact on the programme due to the large areas of larch plantations. Larch had not been identified as a potential host for *P. ramorum*, and infection on it significantly increased the area of sporulating host plants and increased the risk of spread to other susceptible hosts. The Government responded by revisiting the programme's original aims and worked with stakeholders to develop a revised management approach.  In response to this discovery the disease control work focussed on removal (felling) of infected larch as well as rhododendron and potential  clearance of uninfected host plants in high risk areas (particularly those close to infected larch and rhododendron and environmentally important sites).

# Improving our understanding of the diseases

Over the last 10 years a programme of research has been undertaken to enhance our knowledge and understanding of these two *Phytophthora* species. The main aims of the research were to improve epidemiological and biological understanding (including host range and susceptibility, growth, infection, sporulation, survival and

spread) and to develop disease management tools and approaches, including detection and control- related methods. Collectively, conclusions from the research programme tell us[34]:

- Spread of *P. ramorum* will continue, although there is likely to be regional variation due to location of current outbreaks, climatic suitability and host density. *P. ramorum* is likely to have greater impact than *P. kernoviae* because of the scale at which it is spreading is greater, and *P. kernoviae* does not survive as well in unfavourable climatic periods such as hot summers or cold winters.
- *P. ramorum* is more serious than *P. kernoviae* due to its wider host range, the scale of impacts on tree species (mainly larch), its greater persistence and wider potential distribution.
- Current differences in the biology, rate of spread and range of host plants susceptible to *P. ramorum* and *P. kernovia*e suggest that these pathogens should be managed differently.
- Research suggests that the best times and approaches for surveillance and management action can vary with pathogen, host, environment, site and region.

## Predicting the spread of *P. ramorum* and *P. kernoviae*

Epidemiological models have been used to predict the progression of *P. ramorum* and *P. kernoviae* in Great Britain. The Government commissioned a team from the University of Cambridge to undertake this modelling work, and the models have recently been updated with current data. The models provide an estimate of the current rate of spread of *P. ramorum* and its likely future impacts. The model outputs indicate that the pathogen is likely to continue to spread in Great Britain although there is noticeable regional variation with infected larch stands occurring predominantly in the west. The modelling work is a prediction subject to various uncertainties including limitations associated with our understanding of the pathogens, host distributions, and data availability. The impact of these uncertainties on model outputs varies between regions with the model providing more reliable

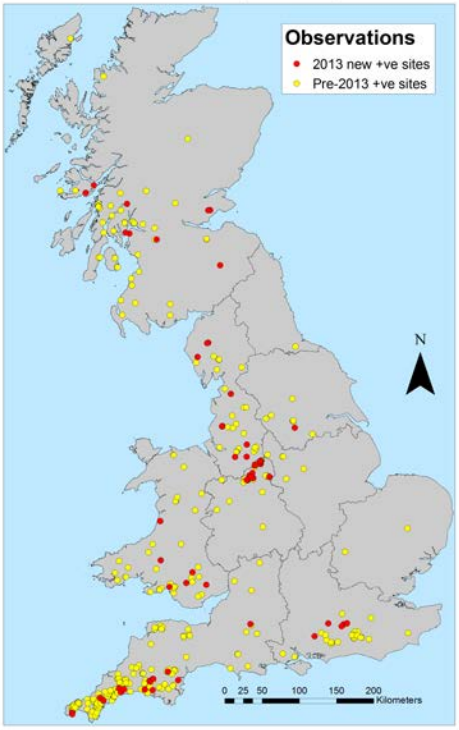
[34] Please see the *P. ramorum* and *P. kernovia*e Evidence Synopsis Report for further details. This section summarises insights which are emerging from current projects. These projects are still underway and findings have not yet been peer reviewed. Findings may be subject to change as further analysis and research is undertaken.

results for England and Wales[35]. Future modelling activities will be coordinated in dialogue with stakeholders and experts and are likely to focus on further refining the model (by incorporating the latest scientific findings) and on exploring the implications of various management options.

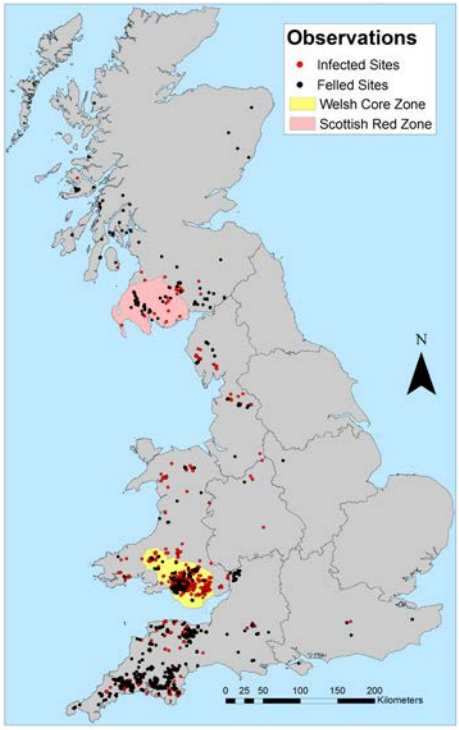
**Figure 2: Overview of current outbreaks of *P. ramorum* on non-larch (left pane, England and Wales only) and larch (right pane) in March 2014, together with the predicted proportion of larch trees infected in each county by 2018 if no intervention is taken after 31 March 2014 (bottom middle pane).**

[35] Limited information is available about the distribution of larch in Scotland. Therefore the model is under predicting the proportion of infected larch, particularly in South-West Scotland.

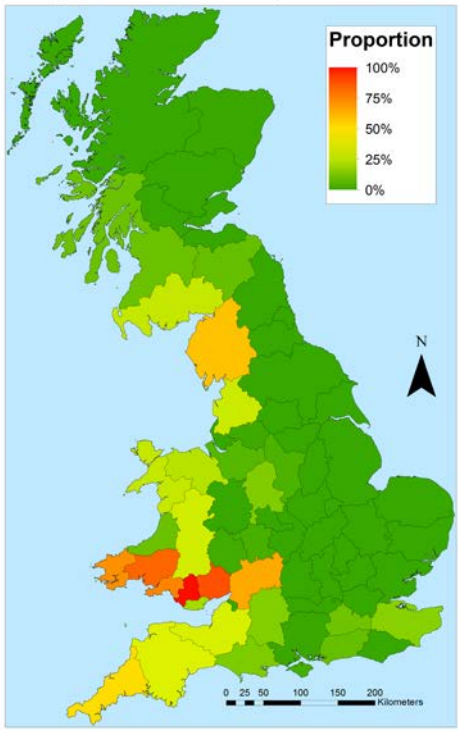
*P. ramorum* Observations (Mar 2014) - Non-Larch




*P. ramorum* Observations (Mar 2014) - Larch

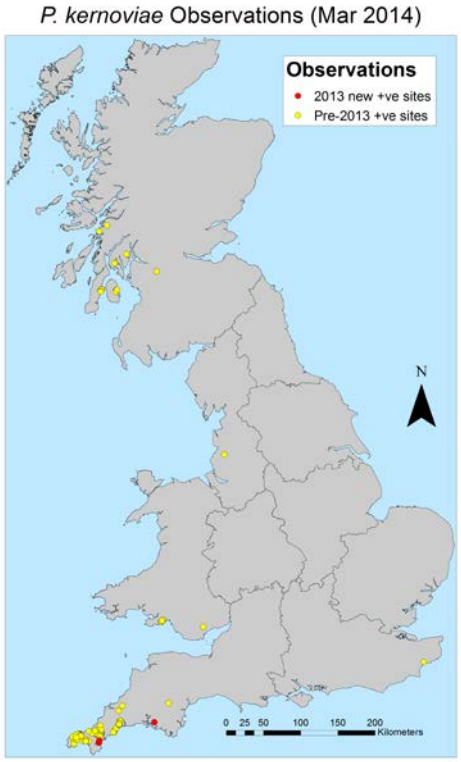



Average Infected Larch Proportion - GBR 2018



Insufficient information is available to inform epidemiological models for *P. kernoviae*, and no attempts have been made to predict its future spread.

**Figure 3 shows the current outbreak map of *P. Kernoviae as of March 2014***




## Progress and next steps

The 5 year *Phytophthora* programme came to an end in March 2014. As managers of the programme, Fera will produce a programme report in spring 2014. In summary, the programme has achieved the following;

- Removal of over 600ha of the sporulating host Rhododendron associated with known infected sites.
- The reduction of *P.ramorum* and *P. kernoviae* findings in the horticulture trade appears to have been successful. The percentage of positive findings has been reduced to levels below 1percent.
- Identification of infected sites through targeted ground surveillance and developing a programme of aerial surveillance flights which have expanded to identify other diseases; and, increased co-operation between agencies involved in plant health leading to greater understanding and improved working

In 2013, a technical review of the Programme was undertaken[36]. The review considered the science and modelling work that has informed the programme, as well as issues of implementation and knowledge transfer to growers, the wider horticultural industry, forest managers and other key stakeholders.

The success of the programme has varied region by region: there has been some progress in the South West of England, where the rate of spread in larch has been reduced. Elsewhere, the rate of spread has increased, for example in Wales where the interconnected nature of the larch in the South Wales valleys has made containment difficult. Work is ongoing to slow the spread of infection across the rest of Wales but it is likely that the disease will infect all larch in Wales in the coming years.

Therefore, despite the 5 year programme of work, the evidence on the ground suggests that with particular reference to larch the prevalence of *P. ramorum* in England continues to rise with the total number of confirmed infections found in larch trees during 2013 standing at 223 sites covering 820 hectares (as at 13 January 2014) bringing the total to-date to 639 sites covering 2,910 hectares.

In Wales and Scotland the infected areas of larch are estimated at around 6,000 hectares each and Northern Ireland 1,000ha. Latest surveillance on *P. kernoviae* shows that the prevalence of the disease is significantly less with 106 sites infected in the wider environment.

The modelling work suggests that the spread of *P.ramorum* is likely to continue. It will therefore continue to have an economic, environmental and social impact. As a result, the Government still considers *P.ramorum* a risk, as reflected in the Plant Health Risk Register[37] assessment of the pathogen. However even with current mitigations in place, which include EU legislation and the existing programme of

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36 http://www.fera.defra.gov.uk/plants/plantHealth/pestsDiseases/phytophthora/documents/phytophthoraReviewFinalReport.pdf

37 https://secure.fera.defra.gov.uk/phiw/riskRegister/

work in England (and equivalents elsewhere in the UK) the likelihood is that the disease will continue to spread across the UK.

Therefore in the context of this prognosis for *P. ramorum*, the Government and stakeholders have been working together to look at what to do in the short-term, when the programme ends and, looking further ahead, what the Government policy on this disease should be in the future. The Government has decided that following the end of the current programme in March this year, the most effective elements of the current programme will be rolled forward for a two year period. In line with this the FC and the Fera will undertake the following activities:

- Inspection and surveillance work including inspections at passporting nurseries and retail premises.
- Aerial surveillance to identify new infections in woodlands and the wider environment.
- A ground level survey of suspect sites in woodlands and the wider environment to confirm infections and issue statutory plant health notices (SPHN). In most cases infected sporulating hosts will be required to be removed. However there may be exceptions to this where other containment measures rather than removal will be acceptable e.g. some specimen plants in heritage gardens, infected heathlands and inaccessible areas of young larch.
- Surveying around confirmed larch sites to detect outbreaks arising from localised spread to prevent hotspots developing and impact on other species and habitats.
- Monitoring of compliance with statutory plant health notices on existing infected sites.
- Support via the RPDE to aid the removal of larch and rhododendron from infected sites.
- Encouraging good practice and land manager engagement, including use of Plant Health Management Plans for heritage gardens and other sites.
- Controlling movement of high-risk material (with appropriate hygiene measures) from areas where the pathogen is more established.

In parallel to rolling over the current programme for 2 years Defra will lead a review of Government policy on these pathogens. It will work with Fera and FC, who were responsible for delivering the previous programme, and through the Tree Health Policy Group and stakeholders. The review will take into consideration successes, limitations, and build on the lessons learnt from the previous technical review of the programme published last year. In parallel the Government will consider where further research may be needed to help shape future policy on *Phytophthora*, as well as taking into account our requirements under the EU on these *Phytophthora* pathogens.

As part of this policy review there are a number of issues that Government and stakeholders will consider such as:

- Given the differences in the biology, distribution and expected impacts of *P. ramorum* and *P. kernoviae*, it is possible that these pathogens should be managed differently in the future. As part of this the Government will consider revising its objectives for managing both pathogens.
- Any policy and management approach in England will need to take account of policy and management approaches in Scotland and Wales as these could impact on the rate of spread in England as well as EU legislation.
- The Government will develop understanding of the costs and benefits of management of infected *Vaccinium* and how the overall control strategy should be implemented on heathlands.
- Given that the spread and impact of *P. ramorum* varies regionally, within England (and also the UK), a policy review will look at whether it is a cost effective to take regionally different management approaches.
- The Government will work with stakeholders to help further build our understanding of the pathogens in light of key uncertainties in our understanding about the spread of the species that may influence policy and *Phytophthora* management.
- The Government will work with stakeholders to explore how the impacts on the timber industry can be minimised. Felling recently infected areas may have commercial benefits as there may be a smaller impact on timber value and there may be environmental benefits from removing *Rhododendron ponticum*, a non-native invasive species itself.

## Summary of future work on *Phytophthora:*

- Continue to fund the most effective elements of the previous Fera-led 5 year programme for 2 years.
- Work with Forestry Commission, Fera and stakeholders to undertake a review of Government policy on *Phytophthora Ramorum* and *Phytophthora Kernoviae.*

# Chapter 4: Management update on Oak Processionary Moth

## Key Facts: Oak Processionary Moth

- The Oak Processionary Moth (*Thaumetopoea processionea*) is a significant defoliator of oak in Europe. The caterpillars feed on the foliage of many species of oaks, including English, Sessile and Turkey oaks (*Quercus robur, Q.petraea* and *Q.cerris)*.[38] Hornbeam, hazel, beech, sweet chestnut and birch are also reported to be attacked, although mainly when growing next to severely defoliated oaks. *(CR: Medium)*
- OPM poses a risk to human health. The older caterpillars are covered in irritating hairs that contain a toxin; contact with these hairs, or their inhalation, can result in skin irritation and allergic reactions in people and animals.[39] These problems are

[38] H. Stigterll, W.H.,J.M. Geraedts & H.C.P. Spijkers (1997) *Thaumetopoea processionea* in the netherlands: present status and management perspectives (lepidoptera: notodontidae). *Proceedings of the Section Experimental and Applied Entomology of the Netherlands Entomological Society,* **8**, 3-16

[39] Lamy, M., Novak, F. (1986) The oak processionary caterpillar (*Thaumetopoea processionea* L.) an urticating caterpillar related to the pine processionary caterpillar (*Thaumetopoea pityocampa* Schiff.) (Lepidoptera, Thaumetopoeidae), *Experientia* **43**, 456-458.

potentially significant because OPM is often most abundant on urban trees, along forest edges and in amenity woodlands. *(CR: High)*

- OPM caterpillars can threaten the health of oak trees because they feed on the leaves. Large populations can strip whole oak trees bare of leaves, leaving them vulnerable to attack by other pests and diseases, and less able to withstand adverse environmental factors such as drought or flood.[40] *(CR: Medium)*
- OPM is a native species of parts of central and southern Europe, where it is widely distributed, but its range has been expanding northwards. It is now firmly established in northern France, Germany, Belgium and the Netherlands, and has been reported in southern Sweden.[41] *(CR: High)*
- Outbreaks are currently managed by (i) surveillance in affected and at-risk areas to detect signs of eggs, caterpillars, nests and (by pheromone trapping of) adult male moths; (ii) treatment of affected trees through controlled use of approved insecticides or nest removal.
- Using the methods outlined on p17 on the value of Ash, Oak as a proportion of total GB woodlands is around 7.5 percent (230,000 ha as a proportion of 3 million ha) and therefore the social and environmental value of Oak is estimated at around £135 million per year. Combined with the commercial value of Oak, which is estimated at just under £40m per year, the total yearly value is estimated at around £175 million per year. *(CR: Medium)*

## Government Policy

Oak Processionary Moth (OPM) was first found on oak trees in West London in 2006 and on newly planted oak trees in Leeds in 2009 and Sheffield and Pangbourne in, Berkshire in 2010. These outbreaks are thought to be the result of accidental introductions rather than natural colonisation. Current Government policy on OPM is to contain the outbreak in south-west London and elsewhere seek to eradicate

[40] Thomas,F.M., Blank,R. & Hartmann,G. (2002) Abiotic and biotic factors and their interactions as causes of oak decline in Central Europe. *Forest Pathology*, **32,** 277-307.

[41] [5] Groenen, F., Meurisse, N. (2012) Historical distribution of the oak processionary moth Thaumetopoea processionea in Europe suggests recolonization instead of expansion. *Agricultural and Forest Entomology*, **14**, 147-155.

outbreaks. These include sites at Pangbourne and Bromley in South East London together with eradication of any new outbreaks.

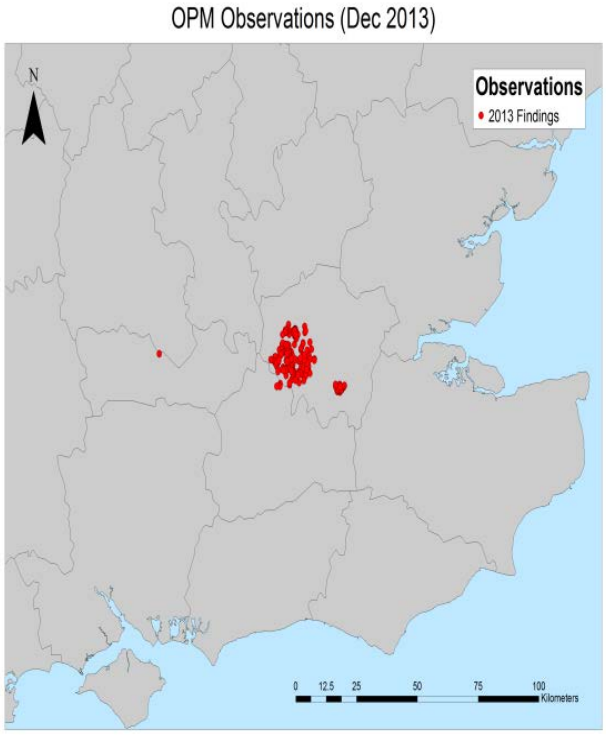
## Improving our understanding of the pest

Defra and FC are undertaking research on OPM to improve its management e.g. by developing better methods for monitoring and detection, developing effective and deployable management approaches and gaining a better understanding of the pest.

Currently, early detection of the pest can be difficult, especially where infestations are small or are located high in the tree canopy. Research is underway to trial novel detection techniques, including spectral imaging, to detect eggs, larval activity and feeding damage. Research is also improving the attractiveness of pheromone lures that are used in monitoring traps and phenology modelling to inform when control measures should be applied.

For OPM, the spraying of trees targeting early stage larvae is more effective than manual removal of larval nests. Research and monitoring is taking place to determine the most effective spray application approaches for control of OPM, whilst minimising biodiversity impact. Spray application techniques are being tested and optimised to ensure both the approved chemical pesticides and the recommended biopesticides can be applied accurately and evenly throughout a tree canopy with minimal run-off or spray drift. Entomopathogenic fungi and nematodes have shown potential as biological control agents under laboratory tests.

**Figure 4: Shows outbreaks of OPM in Great Britain on GB scale and at county level as of December 2013**





## Progress and next steps

Emergency FC legislation has been in force since 2008; requiring oak planting material introduced or moved in GB to be free of OPM. Given that OPM is present in other countries within the EU, for example the Netherlands where it has spread throughout the country, the Commission has considered what action to take at an EU-wide level. As a part of this a proposal for a UK protected zones has been evaluated, and EU legislation to introduce this will be in place by mid-2014.

This EU legislation will replace the current FC legislation and will designate the whole of the UK (except for the outbreak areas in London and Berkshire) as an EU protected zone. The movement of infected material into and within the protected zone will be prohibited. There will be an obligation to eradicate outbreaks in the protected zone and to carry out surveys to check that pest freedom is being maintained. The protected zone will be subject to annual review in the EU Standing Committee on Plant Health to ensure it remains robust.

In parallel to this EU work, the FC has led work to implement our approach to managing this pest. Given the continuing spread in London the FC worked with local stakeholders to develop a more coordinated, effective and efficient containment programme in London and policies on any further outbreaks beyond London.

An enhanced programme of work was implemented from 2012 which involved increased survey work, improved control methods, enhanced sector collaboration and stakeholder engagement. In 2013, Defra funding provided direct financial support for the control programme, this enabled more control and wider surveillance with an additional £2 million of funding for 2013/14 to complement the work already taking place. As a result:

- Recent surveys suggest there has been a reduction in infestation rates and rate of spread of OPM since 2012, including a 53 percent reduction in nest numbers and a reduction in the rate of spread by two thirds. Further work is required to understand the reasons behind the reduction rates and changes in spread, this includes, for example, understanding the impact of different treatment methods and weather conditions.
- The 2012/13 programme helped create major capacity in control contractors and surveyors, including new machinery and use of EU expertise to build capacity for the future.
- The programme included a more collaborative approach to work on OPM between local stakeholders and the Government, and the Oak Processionary Moth Advisory Group was established, consisting of key local stakeholders to advise on how OPM should be tackled.

The summary of last year's programme has now been published on the FC website.[42]

In 2013/14 the Government policy on OPM remains the same: to contain the outbreak in south-west London and seek to eradicate outbreaks where they occur outside the outlying sites of infestation. In line with these objectives, the FC will continue to lead implementation of this management approach which will include the following objectives:

- Containment of the pest to reduce the likelihood of spread to new areas, thereby avoiding increased future control costs and impacts and buying time

[42] http://www.forestry.gov.uk/pdf/140110-OPM-2013-REPORT-for-publication.pdf/$FILE/140110-OPM-2013-REPORT-for-publication.pdf

to enable new solutions to be developed to assist in improved control and thus potential for improved containment and potential eradication.
- Reduce impacts in the current infested area – e.g. human health,
- To develop novel techniques in survey, control and stakeholder engagement to aid future OPM and other pest & disease control, especially in urban areas.
- To retain core capacity and skills as a contingency for quick future redeployment and/or used to guide others in the event new outbreaks of OPM or other similar pest & diseases arise elsewhere requiring action as a higher priority.
- To design and implement an evaluation for the OPM programme to enable us to determine how best to manage the pest in the future, and assess the effectiveness (including cost-effectiveness) of management options.

In parallel to implementing the current management approach to OPM for another year, the Government, along with its delivery partners and stakeholders, and in light of possible EU action on OPM will consider what Government policy on OPM might be in the future. To date the new pilot programme appears to have been successful in containing the pest in South West London, and isolated outlying outbreaks. Therefore, if this situation continues the Government will work with the FC, local stakeholders and Tree Health Policy Group to look at the circumstances under which it could adopt a policy of eradication at the Southwest London infestation.

In parallel, the Government will also develop options for how it and stakeholders might respond to a larger outbreak, for example if OPM spreads out of London into more heavily wooded areas such as Surrey. When developing potential policy and management options the Government will balance the biodiversity impact of any approach, including spraying, to control or eradicate OPM with long-term impact on human health and oak trees, if OPM becomes more widely established in woodlands.

## Summary of OPM future work

- Continue to fund the current FC-led OPM programme in 2014/15 to contain the outbreak in South West London, and seek to eradicate isolated outbreaks in other areas.
- Work with the OPM advisory board and the Tree Health Policy Group (THPG) to consider future policy and management approaches on OPM beyond 2015.

# Chapter 5: Other pests and pathogens

## Government Policy

Over the last 12 months, the Government's and stakeholders' immediate focus has been on pests and diseases which are established and where a coordinated management approach will be of benefit, specifically Chalara, *Phytophthora ramorum*, *Phytophthora kernoviae*, and Oak Processionary Moth (OPM). In addition, the Government is taking action on other pests and diseases. This is in addition to the ongoing work being carried out by the Plant Health and Seeds Inspectorate and the FC to prevent the introduction of other harmful organisms and to ensure timely responses when incursions do occur.

### Priorities for future action[43]

This section briefly summarises information and action on certain pests and disease threats that have a limited presence in parts of the UK. The pests and pathogens listed below have been selected based on their risk register rating and on the advice from the Tree Health Policy Group (THPG) of the importance of further investigating actions in response to the risks posed by the following pests and diseases.

**Acute Oak Decline (AOD):** AOD is a syndrome affecting native oaks (English oak and Sessile oak). It is characterised by a dark stem bleeding, a relatively rapid decline and typically death of affected trees (some of the trees affected with AOD die within 4 to 5 years of the onset of symptoms). AOD symptoms were first seen around 20 years ago but its incidence appears to be increasing. However, the distribution and scale of the problem is not known (a few thousand trees could be affected).

[43] The scientific information and the descriptions of the diseases presented in this section has been developed from a range of publically available sources – most notably the Forestry Commission and Forest Research websites.

Defra is currently funding research to improve understanding of the causes of AOD and its current and potential future distribution and scale in the UK.

A Pest Risk Analysis [44]will draw together current information for public consultation as a first step. In addition a statutory notification requirement for imports of Oak was introduced in 2013.

**Dothistroma Needle Blight (DNB):** *Dothistroma septosporum* (Dothistroma Needle Blight) is a non-native pathogen that is now seriously affecting key pine species in Great Britain resulting in some regionally- specific moratouriums on the planting of some pine species.

It is now found in many forests growing susceptible pine species, with Corsican pine (*Pinus nigra ssp. laricio*), lodgepole pine (*Pinus contorta var. latifolia*) and more recently Scots pine (*Pinus sylvestris*) all being affected. The presence of the disease in some Caledonian pine forests in Scotland could pose a significant risk to this iconic resource, which has an important landscape, biodiversity and heritage value.

As the disease is now widely established in Great Britain, the policy is now to 'learn to live with' and manage the disease in order to minimise its economic, social and environmental impacts. In April 2012, the FC DNB Programme Board published a DNB Great Britain Strategy with the aim of coordinating actions required to minimise the identified risks and impacts from DNB in Great Britain.

An extensive programme of government-funded research is underway to address uncertainties in the epidemiology of DNB and the efficacy of control measures. In Great Britain a strategy is now in place to help protect pine species and reduce impacts of the disease. As part of this the Government introduced a statutory import notification requirement for pine in 2013.

**Alder Rust (Melampsoridium hiratsukanum):** The fungus causes foliar rust on alders. Spread is via airborne spores, making it possible for long-distance spread to occur rapidly. In the UK, the known hosts are principally Alders, including *Alnus*

[44] The process of evaluating biological or other scientific and economic evidence to determine whether an organism is a pest, whether it should be regulated, and the strength of any measures to be taken against it.

*glutinosa*, *A. cordata* (Italian Alder) and *A. incana* (Grey Alder), which are present in woodlands but are also planted as amenity and ornamental trees.

The rust most probably originated in Asia and a coordinated management approach by industry offers the best prospect of reducing impacts. Consultation on a Pest Risk Analysis in 2013 concluded that management action to reduce impacts of the disease should be considered.

**Phytophthora austrocedrae:** *Phytophthora austrocedrae* is a fungus-like pathogen which has been found causing dieback and mortality of juniper in the UK it has also been found on Lawson and Nootka cypress. The first case of *P. austrocedrae* to be confirmed in Great Britain occurred in juniper bushes at the Upper Teesdale in the North Pennines in England in 2011. It has since been confirmed at 18 sites in northern England and Scotland.

The pathogen presents a significant threat to juniper and on individual sites its impact can be significant. Juniper is recognised as important and vulnerable native species with high biodiversity value.  It is potentially very serious for the UK juniper population, because Upper Teasdale has the second largest population of juniper in the UK.

Research is focused on understanding pathways of spread and persistence in the environment. Other work is considering the origins of *P. austrocedure*. Surveillance will continue to establish the distribution of this organism, with action to eradicate findings in nurseries and to manage outbreaks elsewhere, in collaboration with other relevant organisations (such as Natural England). A longer term strategy will need to be determined taking account of developments.

# Chapter 6: Future Threats

The pests and pathogens detailed in Chapters 2-5 of this Plan are either established or have had limited findings in parts of England. There are other tree pests or diseases which could result in isolated outbreaks, or become widespread, if allowed to establish, and it is vital to understand the risks these pose so we can take risk-based, proportionate and value-for-money action. Chapter 1 outlined how the new plant health risk register is helping us to assess future threats to ensure we are directing activity most effectively.

The risk register is not intended to create a "Top 10" list of threats. Instead it focuses on an assessment of whether it is beneficial to take action and, if so, where the responsibility should lie, identifying priority actions, to be considered by the Government and/or stakeholders.

In order to tackle these future priority threats we will work with suppliers and exporting countries to tackle pests at source (pre-border) to minimise the risk of their arriving. We will tackle pests at the border through an increase in risk targeted import inspections, including requiring notification for certain tree imports. We will undertake increased surveillance to detect pest outbreaks inland. We will develop contingency plans to enable us to rapidly tackle outbreaks which do occur to provide the best chance of eradication and to minimise their costs.

Listed below are a few examples of pests not yet present but could pose a future threat, and have been selected based on their risk register rating and indications from the Tree Health Policy Group (THPG) of the importance of further investigating actions in response to the risks posed by the following pests and diseases[45].

**Emerald Ash Borer:** The emerald ash borer (*Agrilus planipennis*) is a beetle native to Asia and Eastern Russia. Outside its native region, the emerald ash borer is an invasive species, and an infestation is highly destructive to ash trees in its introduced range.

[45] The scientific information and the descriptions of the diseases presented in this section has been developed from a range of publically available sources – most notably the Forestry Commission and Forest Research websites.

The pest is regulated at EU level and legislation has recently been strengthened to minimise the risk of introducing infected plants and wood into the EU. PHSI and the Forestry Commission will continue with their monitoring programme of relevant commodities and there will be continued engagement with others, including the European Commission and EPPO, to keep the situation under review.

**The Elm Yellows (EY):** The Elm Yellows pathogen *(Candidatus Phytoplasma ulmi),* belongs to a wider group of phytoplasmas (a type of bacteria) that occur in a number of tree species, but which it has only been able to distinguish separately with the advent of DNA sequencing.

The pathogen is listed in the EU Plant Health Directive because of its lethal effects on native elm species in North America, although findings on European elm species have tended to be less severe.

Although listed in the Plant Health Directive, there have been a number of outbreaks in the EU (Italy, France and Germany.

Until 2014 there had been no findings of the pathogen in the UK, however, a finding has now been confirmed in trees propagated from a batch (of 10 trees) imported from Italy in 2012 for trial purposes.

As a result Government has consulted on options to manage the pathogen and is adding elm to the list of species covered by a statutory scheme on pre-notification of imports from other parts of the EU.

**Ceratocystis platani – Canker Stain of Plane:** Planes (*Platanus spp*.) are commonly planted in urban situations due to their reputation for tolerance to water shortage and high levels of pollution. Their habit of shedding bark allows them to cast off particulate pollutants, whilst their large, stiff leaves make them excellent shade trees.

*Ceratocystis platani* (canker stain) was introduced into southern Europe at the end of the Second World War and has spread steadily northwards although it still remains absent from the UK. The fungus causes damage to the bark resulting in dieback, internal staining of infected tissues leading to death or premature felling.

This fungal pathogen poses a significant risk as it affects a key urban amenity tree species and can be spread easily through the movement of infected plants and wood. It could pose a potential risk to public safety due to branch dieback.

The government introduced tighter controls for all imports of plane (Platanus) in November 2013 in response to the increased threat from plane wilt.

## Summary of future work

- Continue to work with stakeholders to agree future actions and management strategies for prioritised emerging tree pests and pathogens.
- Work on phase 2 of the risk register, building on progress from phase 1 to provide more sophisticated analysis of risk, looking at pathways of spread of pests and diseases.

# Chapter 7: Conclusions

This Tree Health Management Plan has set out the latest work being undertaken by the Government and a wide range of partners, demonstrating a commitment to protect our environment and economy from threats to tree health. The Government will take forward the commitments made in this plan on Chalara, *Phytophthora*, and OPM in order to build our understanding of these diseases, and manage them appropriately. In addition it will work with the Tree Health Policy Group to identify future risks using the risk register to identify priorities for action.

In the future there will continue to be a range of threats to tree and woodland health that the UK is dealing with, not just from pests and diseases, but from other pressures such as climate change, air pollution and grazing pressure. Pest and diseases cannot be considered in isolation from these other pressures, and in the future the Government's work on tree health will need to ensure we work more closely with other parts of Government responsible for climate change, biodiversity forestry and ecosystem health to address the multiple pressures on tree population.

The Government will continue to build a strong interdisciplinary evidence base for pests and pathogens which are established in England and build our understanding of future potential threats. This will improve our collective capability and capacity to identify and respond to the threats to our tree population.

We will continue to work collaboratively with our delivery bodies, Forestry Commission and Fera to deliver shared goals, as well as to build on our strong links with Europe, and those outside of the EU to help strengthen our biosecurity. We will work with our stakeholders through a variety of channels at the national, regional and local level to raise awareness of tree diseases, and work to find ways to address and adapt to these as appropriate. The Government will also take forward work with industry to develop an assurance scheme/industry standard for the nursery sector.

Given the range of threats, the Government and stakeholders will need to make difficult choices about how we prioritise action on various pest and pathogens, and strike a balance between managing those that are well established, and tackling new and emerging threats. Tools such as the risk register will be important to help us do this and the Government will continue to work with stakeholders to develop phase 2 of this work to look at more sophisticated analysis of risk, looking at pathways of the spread of diseases as well as individual pests. There will however, inevitably be threats that we do not know about and which are not captured by the register. Our work on resilience and on improved understanding of the risks to tree populations in all settings will mean that, while we cannot plan specifically for those unknown threats, we should be better prepared whatever the future holds.

# *Annexes*

## Annex A- Details of guidance on pests and pathogen's

**Phytophthora ramorum**

- http://www.forestry.gov.uk/pdf/SPHNDecisionmatrix.pdf/$FILE/SPHNDecisionmatrix.pdf

**Chalara fraxinea**

- The Joint Nature Conservation Council (JNCC) in January 2014 published reports of studies into the potential ecological impact of Chalara ash dieback in the UK, and on the options for long-term monitoring of its impacts on biodiversity http://jncc.defra.gov.uk/page-6322

- The Forestry Commission has produced an updated symptoms guide for Chalara. http://www.forestry.gov.uk/pdf/FCPH-ADD_photoID.pdf/$FILE/FCPH-ADD_photoID.pdf

- Detailed information for householders, landowners and local authorities on the management of ash leaves and saplings. http://www.forestry.gov.uk/forestry/infd-92gjvb

- Advice leaflet for woodland owners and managers http://www.forestry.gov.uk/pdf/ChalaraDiebackofAshAdviceandsupportforwoodlandowners.pdf/$FILE/ChalaraDiebackofAshAdviceandsupportforwoodlandowners.pdf

**Chestnut blight**

- New requirements for statutory notification of imports of Castanea (Sweet chestnut), Platanus (Plane), Quercus (Oak), and Fraxinus (Ash) have been published on the FERA website. http://www.fera.defra.gov.uk/plants/plantHealth/treeHealth

***Phytophthora austrocedrae***

- Guidance on planting of juniper in England and Wales in relation to the risk of infection with Phytophthora austrocedrae http://www.fera.defra.gov.uk/plants/plantHealth/pestsDiseases/documents/phytophthoraJuniperGuidance.pdf

**Oak processionary moth (OPM)**

- Guidance on OPM pheromone trapping is now available. This has been produced by scientists at Forest Research and published at http://www.forestry.gov.uk/fr/INFD-6URJCF

**Good biosecuritybiosecurity practice**

- Information on the recommended Biosecurity Disinfectants http://www.forestry.gov.uk/forestry/INFD-9FJD2D

# Annex B: Tree Health Policy Group Membership and remit

The Group are there as experts based on their individual experience rather than representatives of their organisation.

**Remit:**

- To provide advice and recommendations to the Government in order to develop strategic responses to outbreaks of tree pests and pathogens that are established or at (imminent) risk of establishing in England;
- Provide advice and recommendations on priorities for research on tree diseases, including sharing information about other relevant research.
- Alongside advising on responses to particular outbreaks, develop options to build the resilience of tree population to established and future pests and pathogens in the longer-term

**Membership:** Hillary Allison - Woodland Trust, Raoul Curtis Machin- Horticultural Trades Association, Caroline Harrison- Confor, Roger Kent -Landscape Institute, Simon Pryor- National Trust, Mike Seville –CLA, Jon Stokes- Tree Council

# Annex C: Use of confidence ratings

Data in this paper has been sourced from different organisations / publications. In order to help the reader understand the data presented a confidence rating has been applied where appropriate. Confidence ratings have only been applied to completed projects.

1. CR High: Based on significant evidence (e.g. recent survey, statistically sound using up to date methods, HMRC data, current industry practices; published in peer reviewed papers; recent qualitative research (interviews, focus groups etc.) with sound methodology that includes results from a number of studies in different locations with different types of people that report similar findings).

2. CR Medium: Based on incomplete or dated evidence (e.g. an estimate based on old survey data, trade association estimates, a survey result which may not be entirely representative of the whole; qualitative research from one or two case studies; published in only one or two peer reviewed papers; published in grey literature).

3. CR Low: Based on speculative or incomplete evidence (e.g. rough estimate from a single expert, or industry body lacking supporting analysis, or early result based on fast developing situation on ground, not published in peer reviewed papers, qualitative research that involves a single case or does not provide details of the sample studied or method used.