Paper 2/09

Information paper for the
Forestry Commission
Biosecurity Programme Board

PRESENT STATUS OF CURRENT BIOSECURITY ISSUES

1 This paper sets out the present status of a number of pests and diseases of current concern. It does not, however, attempt to put them in any particular order of importance.

Acute Oak decline

2 Over the past two years an increasing number of cases of oaks with prominent bleeding stems have been reported to the Forest Research Disease Diagnostic Advisory Service (DDAS) from locations in southern and central England. Both *Quercus robur* and *Q. petraea* are affected and symptoms are characteristic: bleeding occurs profusely all around the tree stem and extends high into the branches. A severe decline in the health of individual trees can take place over just 3-5 years and not infrequently results in mortality. Initially, there was concern that *Phytophthora ramorum* (the cause of 'Sudden Oak Death' in the USA) could be causing the stem bleeding. However, investigation confirmed this was not the cause and the condition was described as 'an episode of acute oak decline'. A preliminary but detailed study to determine possible causal agents associated with this disorder was undertaken at a single site and bacteria were isolated consistently from bleeding lesions on affected trees. DNA sequences (of the 16S region) indicated that the bacteria belong to three groups in the *Enterobacteriaceae*, within the genera *Serratia* and *Brenneria*. Work is underway to determine if any or all of these bacteria are the cause of the decline and stem bleeding symptoms seen on affected oaks where the bacteria are present (a process known as Koch's Postulates). Thus, this study aims to identify the cause(s) of the recently reported bleeding on native oak species in Britain, to discover how widespread it is, and to determine if this is the same as a bacterial disease recently reported to cause similar symptoms to native oaks in Spain. Some of the experimental work is also aimed at understanding how other pests and pathogens that attack oak might be exacerbating this disorder, and the future impact of climate change.

3 Recently 250 oak trees with profuse bleeding on their stems in the Charnwood Forest area (Leicestershire) were reported to FR. Four to five years after the bleeding was first noticed, more than half of the oaks in the affected area developed these symptoms suggesting a dramatic spread in the condition. By the summer of 2007 a significant number of the oaks with these symptoms in the Charnwood forest area had died. This led to a preliminary investigation into the cause of the problem and species of bacteria in the families *Brenneria* and *Serratia* were isolated from diseased tissue. An apparently similar syndrome affecting oak at

other sites in southern and central England has also been reported and searching the literature revealed that a similar bacterial disease is affecting southern European oak species in Spain.

Ash Dieback

4 *Chalara fraxinea* is a fungal pathogen which attacks ash causing a disease known as ash dieback or 'dry-top'. Initially thought to be a new pathogen, it was later realised that the fungus had been present in Europe (including Britain) for many years but recorded under the name *Hymenoscyphus albidus*; in this form it is mainly associated with fallen ash leaves. However, ash trees suffering from symptoms of leaf loss, dieback and even mortality have been observed increasingly in various continental European countries, and *C. fraxinea* is now considered the likely causal agent.

5 The pathogen is recorded as the cause of damage to common ash (*Fraxinus excelsior*) in Austria, Denmark, Finland, Germany, Hungary, Latvia, Lithuania, Norway, Poland, Slovenia and Sweden. Similarly affected ash has been observed in other European countries such as The Czech Republic, Estonia and Switzerland but *C. fraxinea* has yet to be confirmed as the cause. *F. excelsior* is the most frequently affected ash species although *F. angustifolia* and the 'Pendula' ornamental variety of *F. excelsior* have also been reported as hosts. Susceptibility of other *Fraxinus* species is unknown. Ash trees of all ages can be affected, but it has been reported that mortality is particularly common in saplings. The disease has been observed on forest trees, trees in urban areas (parks and gardens) and also on young trees in nurseries. Dieback and mortality caused by *Chalara fraxinea* has not been found in Britain. A small scale survey of ash trees was carried out in Autumn 2009 and no evidence of the disease was found and all samples proved negative.

6 Apart from being isolated from leaves, shoots and branch/stem lesions, *C. fraxinea* has also been isolated from the roots of symptomatic trees.

7 Information on how *C. fraxinea* is disseminated is largely speculation, as few details are known of its biology or ecology. However, it has been shown to sporulate on the surface of wounds following inoculation, so potentially it could spread via rainsplash or even arthropod vectors. It is also considered that there is a risk of disease spread via the movement of diseased *F. excelsior* plants. Movement of logs or unsawn wood from infected trees may also be a pathway for disease spread.

8 We have been approached by both ConFor and the HTA asking us to ban the import of ash trees to prevent the introduction of *C. fraxinea*. We have had to explain that that this is not possible. We would only be able to take such action if we either were able to show we did not have the pathogen in either form or that it was under official control with a view to eradicating it. To do otherwise would be regarded as an artificial barrier to trade which would be in breach of our international obligations under the World Trade Organisation's Sanitary and Phytosanitary Agreement.

Citrus Longhorn Beetle

9 The Citrus Longhorn Beetle (*Anoplophora chinensis**)*** has a wide range of host species including *Acer, Citrus, Cryptomeria Japonica, Populus* and *Salix.* In international trade, movement is likely to be as eggs, larvae or pupae in woody planting material, including bonsai. This pest tends to colonise its host at or even below ground level and wood is not therefore considered to be a likely pathway and is not regulated. While the greatest risk is to the citrus growing countries of the Mediterranean and it seems less likely that it would survive to become established and cause great damage in the cooler conditions of Northern Europe. Nevertheless, it has been found in Lancashire and the south of England in 2005 on imported maples (*Acers*) from China and as this beetle is designated a serious plant pest with a wide range of hosts, its import into the UK requires a high degree of vigilance. A number of contaminated *A. palmatum* plants were recently found to have been inadvertently distributed around the country from a nursery in Guernsey following a free reader offer by a national newspaper. This required significant resource to trace and deal with infested plants.

10 Emergency measures to prevent the introduction into and spread within the Community of *A. chinensis* are set out in Commission Decision 2008/840/EC. These call for the destruction of all infested trees and the setting up initially of a 2 km radius buffer zone surrounding any trees where presence of the pest has been determined. This may be reduced to not less than 1 km if the buffer zone is found to be free of the pest. Annual surveys of the buffer zone must continue for a four year period following destruction of infested trees. It has not been considered necessary to designate any infested or buffer zones in the UK but official action is being taken in both Italy, where there are significant areas affected, and more recently in The Netherlands.

Emerald Ash Borer

The EAB, *Agrilus planipennis*, is wood boring beetle native to Eastern Asia. This pest was found for the first time in North America in the summer of 2002 in Windsor, Ontario, and Detroit, Michigan. In North America, EAB has been found to attack and kill various species of ash trees (*Fraxinus* spp.). The larval stage of EAB damages and can kill ash trees. During their feeding, larvae create serpentine tunnels or galleries in the inner bark which disrupt the flow of water and nutrients inside the tree's vascular system, resulting in the eventual death of the host tree. At outbreak levels, ash trees are frequently killed within two to three years of the initial attack, but may succumb after just one year where EAB populations are especially high.

In July 2007, the Russian authorities confirmed the widespread presence of EAB in ash trees in Moscow. The level of infestation was regarded as so great that no attempts are being made to combat it.

Ash trees (genus *Fraxinus*) are significant components of forests and urban landscapes across the whole of Great Britain. There are in total 119,000 ha of ash woodland, but the vast majority are less than 5 ha in area.

New import controls on trees, wood and isolated bark were adopted by the EC and implemented in Great Britain from 1 April 2009 by an amendment to The Plant Health (Forestry) Order 2005. An Exotic pest Alert has been published and is on the FC website. A small scale survey has been carried out this autumn and no signs of the pest were observed.

Horse Chestnut Bleeding Canker

For several decades small numbers of horse chestnut trees have been known to suffer from bleeding cankers caused by either *Phytophthora citricola* or *Phytophthora cactorum*, which are fungus-like organisms and of no quarantine concern. However, in recent years there has been a steep increase in the number of reports of bleeding canker and the organism responsible has been identified by Forest Research as the bacterium *Pseudomonas syringae* pathovar *aesculi*, not previously recorded in Great Britain.

Bleeding canker can sometimes kill the tree, or it can weaken it until it becomes unsafe and needs to be felled for safety reasons. Some trees do show signs of remission although it is not yet known whether this leads to permanent recovery. Scientists believe that *P. syringae* pv. *aesculi* is a relatively recent arrival because it had only previously been recorded infecting the leaves of horse chestnut trees in India. However, it has now also been found in The Netherlands, Belgium, France and Germany.

Based on the National Inventory of Woodlands and Trees, a conservative estimate of the number of horse chestnuts in woodlands in Great Britain is 473,000, of which 432,000 are in England. However, the National Inventory does not take account of trees in non-woodland situations and it is believed that overall there may be between 1 and 2 million horse chestnuts in the country. We do not have a breakdown of these estimates by county. Many horse chestnuts are highly visible amenity trees in parks and public gardens, while others form important features in avenues, historic gardens and landmarks.

In 2007 the Forestry Commission carried out a survey to obtain data on the likely extent of Bleeding Canker of Horse Chestnut in Great Britain. Sample groups of horse chestnut trees in all regions of Britain were inspected to estimate the incidence and distribution of bleeding canker. It would appear from the survey that horse chestnuts displaying the symptoms of bleeding canker are more widespread across Great Britain than had been previously thought. Infection levels appear to be higher in the urban environment than the rural environment, and bleeds on the stems or on branches were observed in all regions. The levels of infection vary across the regions but an average of 49%of the trees inspected displayed symptoms that indicate or might indicate bleeding canker.

Observational evidence indicates that natural resistance to Bleeding Canker of Horse Chestnut exists in some individual specimens. Even in heavily affected locations, some trees remain healthy and symptom free. Other species of *Aesculus* also show low levels of disease. Disease free horse chestnuts have been

propagated and, as part of an ongoing Forest Research study, will be tested for disease resistance in inoculation trials and compared against other disease prone individuals. A real-time PCR assay recently developed by Forest Research will be used for the quantitative detection of the disease on host tissues, in infected host debris, and in soil and water surrounding infected trees. This will be undertaken to determine the environmental contagion hazard of this pathogen, taking into account the time of year as a possible factor in its spread and survival. A better understanding of how such organisms survive and spread in the environment is important for the development of informed and appropriate disease management strategies.

Horse Chestnut Leaf Miner

The horse chestnut leaf miner (*Cameraria ohridella*), is a tiny moth that lays its eggs on the leaves of its host and whose larvae "mine" within the leaf tissues. Infested leaves turn brown in July/August and fall off, making the tree look as though autumn has come early.

The leaf miner first appeared in London in 2002, probably arriving as a 'hitchhiker' on road transport, and has been spreading ever since. It is now reported as far north as Yorkshire and there have been recent reports from west Wales. It is expected to spread further.

Although it looks unsightly, damage by the leaf miner does no serious harm and leaves grow back the following year. Clearing away leaves from beneath horse-chestnut trees during the autumn and winter and destroying them, either by burning or through composting, kills the over-wintering pupae and helps to reduce infestation in the following year. However, this is only practicable where small numbers of trees are involved.

Given the widespread distribution of the pest, and the lack of effective measures to eradicate it, there are no plans to implement controls to either prevent further introductions or to seek to eradicate it.

Oak Processionary Moth

Oak Processionary Moth (*Thaumetopoea. processionea)* causes extensive defoliation to a range of oak and, occasionally, other broadleaved tree species. This defoliation can be cyclic and result in almost complete defoliation of affected trees when the outbreaks peak. Although the pest is regarded as a having a southern European range, it has progressed northwards during the 20th Century and is now firmly established in Belgium and The Netherlands where it is causing extensive defoliation. Additional societal impacts arise from the extreme irritation that can arise from contact with the urticating hairs of mature larvae. This affects both humans and animals.

OPM was first reported in London in late summer 2006 and was found in relatively recently planted semi-mature Cypress oaks used in landscaping. Work to control and eradicate the pest commenced in 2007, following its detection at a second site in oaks used to screen a Thames Water Treatment Plant and has continued through to this year, the moth is native to continental Europe but not Great Britain, and statutory action has been taken under the Plant Health (Forestry) Order 2005, carried out on the ground by a team of consultant ecologists contracted by us and appointed as Forestry Commission Plant Health Inspectors.

Infestation is measured by the number of larval or pupal nests found. The numbers of trees infested is also recorded. In 2009 a grand total of approximately 2380 nests were found in the outbreak area. This compares to 506 in 2008 and 708 in 2007. In 2009, 1783 were found in Richmond (424 in 2008), 361 in Hounslow (13 in 2008), 214 in Ealing (53 in 2008), 15 in Brent (18 in 2008), 2 in Hammersmith & Fulham (0 in 2008) and 5 in Royal Parks (Richmond Park) (0 in 2008).

The extent to which the fourfold increase this year is due to increased survey effort or a real increase in population size is unclear. The scale of the problem is, however, considerably worse than previously thought.

Given the problems associated with the work, infestations are likely to be at similar levels in 2010. Further spread can be expected as undetected outlying populations increase in size and become evident, either through inspections, public health issues or publicity.

Eradication may no longer feasible and, while it will remain the prime objective, future planning will shift towards control. Efforts will also be increased in order to make the arboricultural industry, local and national government, health professionals and the public more aware of OPM.

A single nest was found at St. James University Hospital, Leeds. The infested tree was planted recently, and this is considered to be unrelated to the London infestations. Investigations are ongoing as to the origin of this nest, and follow-up inspections will be made in 2010.

Phytophthora ramorum* and *P. kernoviae

Phytophthora ramorum and *Phytophthora kernoviae* are serious diseases of trees and shrubs, posing a threat to native woodland and heathland species. *P. ramorum* was first detected in Britain (E. Sussex) in 2002, and *P. kernoviae* in Cornwall in 2003. Since then, and until 31 March 2009, an interdepartmental programme board has been overseeing emergency action to contain and eradicate the diseases and to co-ordinate research to inform decisions on future management.

Following an extensive consultation with stakeholders in 2008, a new programme was launched in March and which came into being on 1 April 2009. This aims to deliver, with additional Defra funding of £20 million over a five-year period, the option most favoured in the consultation responses described thus:

> A programme of increased activity, aimed at reducing the level of inoculum to epidemiologically insignificant levels: by removal of infected sporulating hosts in wood lands and the wider environment and removal of uninfected *Rhododendron ponticum* to protect vulnerable woodland/heathland that is currently uninfected; combined with enhanced containment and eradication measures in infected gardens and nursery sites, as well as the identification and control of any new outbreaks.

The programme has three main work streams: disease management; education and awareness; and research and development and will be reviewed after three years to gauge success and plan future activity.

Although *Phytophthora ramorum* is known in the USA as "sudden oak death" because of its effects on North American oak and tanoak species, Britain's two native oak species, sessile oak (*Quercus petraea*) and pedunculate or "English" oak, (*Q. robur*) have proved much less susceptible. Only a tiny handful of native oaks have been found infected with either organism, and only when they occur in very close proximity to heavily infected rhododendron.

Other British trees species are more susceptible, particularly beech and to some extent ash, but the numbers found infected to date have also been very small – less than 100 in total.

However, we are currently investigating a recent outbreak of this disease affecting a number of trees on sites in Devon, Cornwall and Somerset which appears to mark a significant step change in the susceptibility of new tree species to *P. ramorum*.

Up until very recently, *P. ramorum* has been largely associated with *Rhododendron ponticum.* These new finds, detected in August 2009, are in Japanese larch. This is the first time that conifer species have been found with stem lesions caused by *P. ramorum*. Many of the infected trees are not growing in close proximity to rhododendron which raises the question of how they have become infected.

Forest Research have isolated *P. ramorum* on a number of sites and are investigating further. As a priority we are now carrying out more extensive tests and research to determine if *P. ramorum* is the main cause of the outbreak. Apart from finding *P. ramorum* on a number of Japanese larch and Western hemlock trees, some broadleaf species (beech, birch and some oaks) growing in the same area are also infected.

It is too early to tell how significant this development is and nor do we yet understand enough to determine the most appropriate response to deal with it and minimise any accidental spread. Forest Research has begun work, funded from the Defra Programme, to help determine answers to these questions and we will be forming a stakeholder Liaison Group in the South West to keep forest and woodland owners and others with an interest informed.

Pine-tree Lappet

Male adults of Pine-tree Lappet moth (*Dendrolimus pini*), and several larvae (caterpillars) and a cocoon have been found in pine forests in Inverness-shire. The presence of larvae prove that there is a local breeding population, rather than long-distance, male-only migrants that very occasionally make their way to Great Britain.

DNA analysis is being undertaken to try to determine whether the Scottish population represents a recent introduction or a hitherto undiscovered native population. Initial results suggest that it is unlikely to be native. We are also looking at climate data, present and future, as well as site factors to compare Scottish conditions with those locations in Europe where this moth has been a significant pest. Early indications suggest that conditions in which the pest could cause damage may occur as soon as 2020.

The caterpillar feeds on the needles of pine and, occasionally, spruce and other conifer trees in its native range in continental Europe, Russia and Asia. It is a forestry pest because, if a population reaches epidemic levels, it can affect thousands of hectares and last up to eight years before declining. This can result in seriously reduced tree growth, tree decline and tree deaths, especially because trees defoliated by this moth become susceptible to other risks such as bark beetles, wood-boring insects and disease.

If the conditions in Scotland are suitable, deaths and weakening of significant numbers of trees would risk serious ecological disruption to Scotland's forests, and reduced habitat for many other forest-dwelling species such as red squirrels, capercaillie and Scottish crossbill. Of particular concern would be the ancient Caledonian pinewoods. It would also increase the risk of forest fires from the build-up of fuel in the form of excess dead wood.

Some of the tree species which the caterpillars attack, particularly Scots pine, Lodgepole pine and Sitka spruce, are commercially important in Scotland's economy, so any significant damage to these species would also threaten jobs and businesses, particularly in economically fragile rural areas.

We therefore believe we must consider a range of options to control or, if thought necessary, eradicate this species from Scotland while the population is still small and before it has the potential to causes serious damage and spread to other areas. We have therefore initiated our Pest Contingency Plan and formed an Outbreak Management Team. For the moment, we shall continue to monitor the area we have defined as the outbreak zone, covering a radius of 10km centred on Ruttle Wood, which appears to be the focal point. Once we have gathered further information on the potential of the moth to cause damage we shall consider in consultation with SNH, Butterfly Conservation and local woodland owners what options for control, if any, should be implemented. At the moment, we do not envisage a need to implement emergency import controls, but we shall be requiring appropriate biosecurity measures to prevent accidental spread from the are, especially during

felling associated with the planned electricity power line from Beauly to Denny which would run through one of the affected woods.

Pine Wood Nematode

Since 1999, following the confirmation of Pine Wood Nematode (PWN) *Bursaphelenchus xylophilus* in its Setubal Region, Portugal has been implementing a set of actions aiming to control and PWN and to control its wood boring vector, *Monochamus galloprovincialis.*

Several strategic action plans were prepared and implemented over successive years focusing on different actions namely surveying, eradication, monitoring, insect-vector control and inspection and control of forest operations, particularly the ones related with coniferous trees forestry operations, including the creation of a 3km-wide pine-free clear cut belt, some 140 km long, encircling the enlarged infested zone, in an attempt to prevent the natural spread of PWN to others areas of the Continental territory.

In 2008 PWN was found in the Central Region of Portugal, considered before as the pest free zone. The most likely reason for the spread is wood movements between the former Infested Zone and the former Free Zone.

Surveying actions were intensified and, following more positive findings, the territorial coverage has now been increased to include the whole country.

A new strategy was adopted and a new Action Plan was set up, adapted to the characteristics of the newly designated affected areas and taking in account the updated related scientific knowledge to define adequate phytosanitary measures to control the PWN. The control of industrial units carrying out wood and wood packaging material treatments is now required, with the permanent official presence of an inspector at all such premises. Furthermore movement control of wood and wood packaging material has been implemented by the National Republican Guard (GNR), through a system of roadblocks, particularly at the country's external borders. All conifer wood and wood packaging material leaving Portugal, regardless of destination, must be treated and marked in accordance with ISPM 15. All Member States are now required to carry out inspections of consignments of goods of all kinds arriving from Portugal with associated wood packaging material to ensure compliance. Consignments of conifer wood arriving from Portugal are also subject to border inspection.

All Member States are required to carry out surveys of trees, as well as of imported wood and wood products at ports and sawmills to detect the presence of PWN, and to report the findings to the European Commission and the other Member States by 15 December each year. The UK has never detected any presence of either PWN or vectors in the genus *Monochamus* spp.

Red Band Needle Blight of Pine

Red band needle blight is the most significant disease of coniferous trees presently facing Britain. Since the late 1990s there has been a dramatic increase in the occurrences of the disease, and our surveys have identified in all forest districts in England and a number in Scotland and Wales. The disease causes premature defoliation and mortality, and in GB is primarily affecting Corsican pine (CP). CP is particularly important in England, with over 20% of the FC coniferous area comprising of this species. Due to the extent and severity of the disease on CP, there is presently an indefinite moratorium on its planting. In the last 12

months it has also been found to be causing significant damage to lodgepole pine (*Pinus contorta* var. *latifolia*) in several areas in Scotland. It has also been identified on a further 13 species in GB, with Scots pine (*Pinus sylvestris*) being of particular concern. Recent work by Forest Research has also shown that that young Douglas fir, sitka spruce and Norway spruce can all become naturally infected under field conditions.

Research is underway both to monitor the extent and severity of the disease in GB, and to gain an understanding of the disease epidemiology to aid disease management decisions, to assess its impact on timber yields in terms of mortality and loss in volume increment, and to evaluate the suitability of different management techniques including species susceptibility and changes in silvicultural practices.

A GB Programme Board has been set up to oversee the work being carried out against this disease and to help in formulating changes to be proposed to EU legislation, which is not now considered by us to be fit for purpose.

Roddie Burgess
Head of Plant Health
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