



Biosecurity – guarding against the introduction or spread of pathogens and diseases.

No-one wants to be responsible for spreading harm, but when bugs can move around the countryside on pets' paws or timber lorries, causing sickness and often death to trees, shrubs and animals in their wake, there is a lot to be aware of. The need to reduce the impact of pathogens requires an input of time into cleaning, organising and communicating with members of the public that can be overwhelming and off-putting. We have all become more familiar with biosecurity measures since living with the Covid-19 pandemic. We may have lived through the foot and mouth outbreak in 2001 and gained biosecurity experience then. Increasingly it seems we are having to live with the arrival of ever more plant pathogens and we are having to manage the consequences of that.

This information note will introduce some of the plant pathogens of concern to woodland managers, biosecurity controls and legislation in place, and simple methods for reducing the spread of plant diseases.

Introduction

You may well be familiar with the story and impacts of Dutch elm disease (that is still advancing on Scotland's Wych elm population) and familiar with large pine weevil (*Hylobius abietis*) that is present and endemic across Scotland, adding significantly to the cost or restocking after clear-felling conifers. There are a host of other pests and diseases of trees and shrubs in Scotland or poised to arrive in Scotland if we are not careful.

Some of these may become a minor problem, others, such as ash die back caused by *Hymenoscyphus fraxineus*, are having a catastrophic impact on our native trees. Imported pathogens are usually non-native species and there is no natural control or resistance to them. The impacts are in reduced timber productivity, tree death and potentially a change in whole forest ecosystems.

The risk of other pests and diseases becoming established in the UK is ever-present because of plant material imports, global travel and climate change. Authorities, professionals and the public all need to be vigilant to guard against letting in new plant pathogens.

We may be powerless to stop the spread of ash dieback and most foresters are living with and managing the problems caused by endemic pathogens such as the large pine weevil, but for other diseases we are still in the position of being able to slow their spread in order to

reduce the economic impacts of the disease and to allow our knowledge of the pest to catch up with rapidly evolving situations on the ground.

Current Pathogens of concern

Dutch Elm disease, affecting all elm (*Ulmus*) species, caused by the fungus that is transmitted by a bark-boring beetle. The disease is spread by beetles flying between trees or by beetles being moved with firewood or other elm logs still with the bark attached.

Elm zig-zag sawfly (*Aproceros leucopoda*), the newest threat to our already damaged elm populations, the larvae of the elm zig-zag sawfly can defoliate whole trees through multiple generation in a summer. As well as weakening, the elm tree, this non-native sawfly will threaten populations of native invertebrates also dependent on elms. It is present in England, first recorded in 2017, having arrived from Asia via Europe.

Chalara ash dieback, caused by the fungus *Hymenoscyphus fraxineus* and affecting all ash (*Fraxinus*) species. Spores are wind-borne but the disease has also been introduced by moving and planting infected transplants to new areas. It is expected to kill up to 95% of the UK's ash trees.

Phytophthora ramorum, a water mould, affects a wide range of tree and shrub species, but in Scotland is having a particular impact on larch. It is a notifiable species and infected stands of

larch are felled and replanted with other species. It can be spread in wind-borne water droplets and in needles and mud stuck to boots or vehicles.



Dieback on an ash sapling caused by *Hymenoscyphus fraxineus*

Phytophthora austrocedri, a water mould affecting juniper (*Juniperus*) and *Cupressus* species, but has also been found affecting some specimens of *Chamaecyparis* (e.g. Lawson cypress). It has caused some significant decline of juniper in some areas, especially wetter sites, killing a proportion of bushes, exacerbating population decline where it is already vulnerable.

Phytophthora pluvialis infects western hemlock (*Tsuga heterophylla*), Douglas fir (*Pseudotsuga menziesii*) and some species of pine. It was first discovered in Cornwall in September 2021. Extensive surveys identified several infection sites along the length of the UK, including one in Lochcarron, Wester Ross. The water mould causes needles to die and fall off and stem lesions result in dieback of the infected branch, shoot or leader. Infections can kill whole trees, young and old.

The fungus *Dothistroma septosporum* is sometimes known as red band needle blight, but more specifically as *Dothistroma* needle blight (DNB). It affects pine trees and can weaken them sufficiently to cause mortality or

at least a significant reduction in growth rates. Corsican pine is particularly susceptible and is now no longer planted in the UK, as a commercial timber species. It spreads in windborne water droplets and on boots and vehicles, and also on transplants from tree nurseries.

Sirococcus tsugae is a fungal disease that attacks cedars (*Cedrus*) and hemlock (*Tsuga*), causing disfigurement and eventually death to shoots and branches. It is recorded from a number of sites across the UK. Biosecurity is very important with this type of pathogen. The disease is spread by spores from the needles and bark of the infected tree, so it will travel on infected transplants and on cut foliage. Rain and wind spread the spores and they can also be transported on clothing, footwear and vehicle tyres.

Sweet chestnut blight (*Cryphonectria parasitica*) is the fungal pathogen that decimated the chestnut forests of Eastern USA. It arrived in Italy in the 1930's and since then has been spreading through Europe, arriving in the UK in 2011. Here it seems to be slow moving and is localised to southern England. A positive is that there is a natural phenomenon associated with sweet chestnut blight called 'hypovirulence'. This is when the fungus is infected by a naturally occurring virus which makes it less aggressive by limiting the growth of the pathogen in the bark and prevents it from producing spores. This allows the trees to recover from infection.

Pine tree lappet moth (*Dendrolimus pini*), the caterpillars, as yet localised to one known area near Beaulieu, Inverness-shire can cause serious defoliation of Scots pine. It could be spread on foliage or logs with bark attached.

Spruce bark beetles: *Dendroctonus micans* is present in Scotland and its populations are being somewhat controlled by the predatory beetle *Rhizophagus grandis*. *Ips typographus* has now reached SE England, and is of significant concern as it causes huge losses in Europe, where it kills spruce trees already weakened by drought or other factors. It spreads naturally by adult beetles flying between spruce trees and it can also be spread in logs with attached bark.

Ips cembrae is specific to larch, predominantly European larch. It is widespread within the UK except for Northern Ireland, Isle of Man and West Scotland where it is subject to phytosanitary quarantine measures. *I. cembrae* is most likely to be spread by fresh logs with bark attached and it will kill larch trees already weakened by other factors such as environmental stress or fungal infections.

Oak processionary moth (*Thaumetopoea processionea*) is present in the South of England and despite vigorous efforts it seems to be out of control. The hairy caterpillars can defoliate and weaken oak trees, but the hairs are also an irritant to skin, eyes and lungs for people and pets.

European mountain ash ringspot-associated virus, is a condition affecting *Sorbus* species. It has been reported in Scotland and parts of Europe, but not yet elsewhere in the UK. Little is known about how the virus works and moves about the countryside but the condition causes discolouration and mottling of leaves and general weakening of trees as a result.

Horse chestnut bleeding canker (*Pseudomonas syringae* *pv.* *aesculi*) can eventually kill infected horse chestnuts by girdling the stem with infection. It is estimated that half the population of horse chestnuts in England, Wales and Scotland show symptoms of this bacterial infection.

Horse chestnut leaf miner (*Cameraria ohridella*) is probably a native of the horse chestnut's southern European home and is now catching up with our fondness for the tree and is known as far North as southern Scotland. As well as travelling in leaps with foliated nursery plants, *C. ohridella*, a tiny moth in its brief adult stage, might be blown short distances on the wind or hitch accidental rides in vehicles. *C. ohridella* can defoliate horse chestnut trees before autumn arrives and sequential infestations can seriously weaken host trees.

Pests at the gate

Several pests and diseases are poised to arrive in the UK and the following are some of the species of greatest concern (the list could be longer!):

Bronze birch borer (*Agrilus anxius*); a North American wood boring beetle that can kill birch trees. It is not yet present in the UK but could arrive here on imported transplant saplings and birch logs, with or without bark.

Asian and citrus longhorn beetles (*Anoplophora glabripennis* and *A. chinensis*); Two wood-boring and leaf-eating beetles that will kill a wide range of broadleaved trees. They are present in North America and have made their way into central Europe from Asia. They arrived to the UK in 2012 but were eradicated that time and there's a high risk of them being imported again on wood packaging.



Asian longhorn beetle (*Anoplophora glabripennis*)

Emerald ash borer (*Agrilus planipennis*) has killed billions of ash trees in the US. If it gets here, it will do the same to our already vulnerable ash populations. It has also spread westwards from Asia and has been recorded West of Moscow. As well as this natural spread it could arrive here with imported timber that is not kiln dried, including firewood.

Pine processionary moth (*Thaumetopoea pityocampa*): The caterpillars feed on the needles of pine trees, and is seriously destructive. They can rapidly strip trees of their needles in forests in Asia, Africa and southern Europe, leaving them vulnerable to other diseases. Having reached Paris there are fears *T. pityocampa* is heading north to the UK, the most likely vector being in soil with imported planting material, as the pupae can remain dormant in the soil for a year or more.

Legislation and Existing Controls

Statutory Plant Health Notices (SPHN) are used to tackle particular pathogens.

For example, if *Phytophthora ramorum* is discovered in your larch trees, you will be required to fell these trees and the urgency and priority of removal depends on whether your infection is within the Priority Action Zone, Risk Reduction Zone or Management Zone. Grant support is available to cover some of the additional costs.

Demarcated Area Notices have been introduced to contain the spread of *Phytophthora pluvialis*. These notices prohibit the movement of any wood, isolated bark and trees (including live trees, felled or fallen trees, fruit, seeds, leaves or foliage) of the genus *Tsuga*, *Pseudotsuga*, *Pinus* and *Notholithocarpus*, that has originated within the demarcated area.

Provision is made within the notices to enable plant health inspectors to authorise movements and processing of material from the demarcated area where this can be achieved without risking the spread of *P. pluvialis*. Notices now also include an additional restriction on the felling of susceptible material within the demarcated areas, unless Scottish Forestry has been notified in writing in advance.

Importing and exporting timber products requires compliance with Plant Health Regulations.

If a disease is “Notifiable” within the plant trade, then you have to report an occurrence of the disease when you find it, e.g. in a tree nursery or shipment of plants. Imports into Europe of certain genera are banned and others need to be accompanied by a phytosanitary certificate.

Practical biosecurity

The following guidance for members of the public is taken from Scottish Forestry’s ‘Keep it Clean’ campaign:

“You’re the best defence our trees have. The spores that infect trees can live for a very long time so even if it’s been months since you were last out in the woods, it’s always best to check your kit is clean.”

“Before a forest visit, remember to:

- clean your equipment or any kit that carries soil such as tent pegs
- brush off any visible dirt from your shoes or tyres
- wipe your dog’s paws.”



Don't
give tree pests
and diseases
an easy ride

As woodland managers you might also consider the following:

If you have a tree nursery, ensure your seed is locally sourced or comes from a reputable supplier. Gather seed from obviously healthy parent trees.

If you are planting trees, ensure your transplants come from a reputable supplier. If you wish to plant Scots pine close to Caledonian Pinewood Inventory sites, the source tree nursery will need to be registered free of *Dothistroma* needle blight.

Regularly monitor your woods, especially new planting, to check for symptoms of ill-health in trees. Report tree diseases through TreeA!ert (<https://treealert.forestresearch.gov.uk/>). You will need to send a photograph of the symptoms. It is a useful site for reporting any ill-effect on trees, recognizable to you or otherwise.

A more public facing pest reporting platform is Observatree, focussing on the 22 pests and diseases of most concern and working with more than 200 volunteers who help follow up on TreeA!ert reports.

The Observatree guidelines follow the ‘clean-it’ principle, but add:

- Keep to obvious paths
- Look out for signs on noticeboards
- Observe biosecurity notices

- Avoid taking cuttings or samples of vegetation
- Resist planting out home-grown plants in woodland
- Clean boots, tyres, etc as you leave the site.

If you have been served a Statutory Plant Health Notice (e.g. to remove a stand of larch infected with *Phytophthora ramorum*), follow the biosecurity requirements within the SPHN and make sure others accessing the site follow them too.

Put up relevant posters on your notice boards to keep visitors informed about biosecurity efforts.

If your wood is providing mountain bike facilities, consider installing a bike wash so that it is easier to clean bikes after a session on the trails – it helps to keep bikes in good condition and lasting longer too!

Basic biosecurity kit to have in the car:
Washing up bowl / wide bucket, 2 to 5 litres water, stiff brush, towel to dry off wet paws.

The procedure might be:
Knock off as much dirt as possible, brush off as much dirt as possible, put water in bucket/bowl and give boots a final clean with water.

If you are visiting an area known to have *P. ramorum* and *P. kernoviae* then the use of a suitable disinfectant for cleaning boots is recommended. (Propellar is effective against these two water moulds. Compliance with the health and safety data sheet will require additional items, such as a sealed container for the disinfectant, applicator bottle, eye protection, protective gloves).

Specify biosecurity requirements in woodland contracts; if the contractor turns up with dirty equipment, you then have a lever to ask them to assure you there is no risk or to leave the site and come back when the kit is clean.

Other Biosecurity Concerns

This leaflet has focussed on plant pathogens, but there may be times you will be visiting woodlands with livestock in them. Here there is risk that you could transmit a livestock

disease, especially if you have been recently walking or working on farms or crofts.

Again, the minimum will be to clean footwear, especially the treads.



Water used for cleaning is best disposed of on grassy areas well away from water courses.

Risk Assessment

“The likelihood of new pests and diseases entering Britain is increasing. A small number of problematic species could potentially blow into the south of England from the continent. But most introductions are a result of the trade of plants, timber and wood products. Tree imports increased 79% between 2016 and 2019 alone.” (The Woodland Trust)

Obviously, the more we move about, the greater the risk of transmitting a pathogen with us, but especially if the wood we were visiting yesterday, or the wood we are going to visit is already infected.

For obvious reasons we also want to encourage the sharing of woodland experience and knowledge by visiting other woodlands. So, there are simple risk assessment thought processes we can use to inform our biosecurity management:

Is our wood or the wood we want to visit subject to a plant health or other control order relating to a known infection?

Is the wood known to be infected with a pest but not subject to plant health orders? (Bearing in mind that some pests are now virtually omnipresent and our movement is not going to impact on its spread, e.g. ash dieback.)

Do you suspect that a damaging pest might be present, or the wood contains species vulnerable to a known pest?

Will you be working with tools or walking off main tracks and trails?

If the answer is 'yes' to any of these questions then you may need to consider more thorough

disinfection of tools and clothing, quarantining tools and clothing so that they do not leave the infected woodland, or simply just giving boots, clothing and vehicles a good wash. If 'no' to these questions, then following good hygiene as per the 'Keep it Clean' guidance is sufficient biosecurity action.

Resources

Community Woodlands Association (advice and support for community woodlands)

<http://www.communitywoods.org>

Making Local Woods Work (advice, tools and resources for woodland social enterprises)

<https://makinglocalwoodswork.org>

Scottish Forestry – Keep it Clean – public guidance

<https://forestry.gov.scot/sustainable-forestry/tree-health/keep-it-clean>

Forestry & Land Scotland – Biosecurity & you

<https://forestryandland.gov.scot/blog/biosecurity-and-you>

Forest Research – guidance for staff and contractors & recommended best practice

<https://www.forestresearch.gov.uk/tools-and-resources/fthr/pest-and-disease-resources/ramorum-disease-phytophthora-ramorum/phytophthora-manual-3-biosecurity-measures/>

UK Government Biosecurity guidance

<https://www.gov.uk/guidance/prevent-the-introduction-and-spread-of-tree-pests-and-diseases>

UK Government – importing & exporting timber products - firewood

<https://www.gov.uk/guidance/import-firewood-into-great-britain>

Scottish Forestry – *P. ramorum* management zones

<https://forestry.gov.scot/sustainable-forestry/tree-health/tree-pests-and-diseases/phytophthora-ramorum>

Scottish Forestry – *P. pluvialis* demarcated area notices

<https://forestry.gov.scot/sustainable-forestry/tree-health/tree-pests-and-diseases/phytophthora-pluvialis>

Forest Research – *P. pluvialis* symptom guide

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1029958/Symptom_guide_P_pluvialis_final_21-10-29.pdf

Woodland Trust – what we are doing about tree pests and diseases

<https://www.woodlandtrust.org.uk/trees-woods-and-wildlife/tree-pests-and-diseases/what-we-are-doing/>

Forest Research – Tree Alert

<https://treealert.forestresearch.gov.uk/>

Observatree – citizen science early warning system

<https://www.observatree.org.uk/>

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