

# Silviculture and management guidance for ash trees and woodlands in response to ash dieback (*Chalara fraxinea*) in Britain<sup>1,2</sup>

## Introduction

The recent appearance of the *Chalara fraxinea*<sup>3</sup> fungus in Britain has meant that the future of common ash (*Fraxinus excelsior*) as a woodland, hedgerow and urban tree species is under threat. This document aims to provide practical advice on slowing the impact of the disease to anybody with a responsibility for the management of ash, whether in woodlands, parks and gardens, or individual trees. It is based on the expert knowledge of UK researchers and practitioners, and is informed by experience from Europe, where the disease has been established for more than a decade.

Evidence on management is not extensive, and action will depend very much on owners' and managers' objectives. The advice given is therefore neither exhaustive nor prescriptive. This document outlines current best practice (June 2014), but is likely to be amended as knowledge and understanding of the disease develops.

For general information on ash dieback, a key source of up to date information and statistics is provided online by the Forestry Commission (2014a).

## 1. Principles

The principles underlying this guidance are:

- maintaining the values and benefits associated with ash woodlands and iconic trees;
- securing an economic return where timber production is an important objective;
- reducing the presence and rate of spread of *Chalara* dieback;
- maintaining as much genetic diversity in ash trees as possible with the aim of ensuring the presence of ash in the long term; and
- minimising impacts on associated species and wider biodiversity.

## 2. What are the main management options?

There is currently no cure for *Chalara*, and no clear method for stopping its spread. Therefore the aim of management, as outlined in the *Chalara* Control Plan, should be to slow the spread and lessen the impact of the disease.

Before making any changes to existing management regimes, owners and managers should carefully consider their objectives and local circumstances. Any woodland or individual tree can bring a variety of benefits, and be managed for those multiple benefits. The categorisation below is made purely to assist the owner or the manager when thinking about what to do next - in practice a hybrid approach might be appropriate.

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<sup>1</sup> This paper is adapted from Forestry Commission Guidance: Chalara dieback – managing ash trees.

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<sup>3</sup> The scientific name for *Chalara fraxinea* was recently revised (23 May 2014) to *Hymenoscyphus fraxineus* according to new rules for naming fungi with pleomorphic life-cycles (Baral et al. 2014).

### **3. How do I manage the risk from dead and dying trees to the public?**

Public safety is likely to be one of the biggest management issues for owners of ash trees as the disease kills or weakens trees over the coming years, especially in woodlands, parks, and along roadsides and paths where there is public access.

Trees in areas with high levels of access need to be monitored carefully for risks to public safety, and some felling or pruning of dead or dying trees is advisable if risk assessments show they are a hazard.

The National Tree Safety Group (2011) provides further information about tree safety.

### **4. What is the best way to reduce the impact of any future *Chalara* infection on my timber crop?**

For uninfected stands, the best way to slow the impact of any future *Chalara* infection is to promote fast, healthy growth of selected trees. This will not prevent the onset of the disease if spores are present, but will maximise the timber value at the time of felling. Ensure high standards of establishment and silviculture - guidance on this can be found in existing Forestry Commission publications for managing broadleaved woodland (e.g., Harmer et al 2010, Kerr and Evans 1993). This should be carried out in combination with:

- adhering to biosecurity measures to reduce the spread of *Chalara*; and
- regular monitoring for signs of *Chalara* infection, both in mature stands and, particularly, on planting which has occurred in the past five years.

### **5. What are my options if I already have *Chalara* infection in my timber crop?**

#### ***(a) Younger stands (up to pole stage or <25 years of age)***

Younger trees are the most vulnerable to the disease, and are rapidly killed. If disease levels are low, selective thinning of diseased and suppressed trees is recommended.

If more than 50 per cent of the mature ash in the stand is infected, the annual rate of spore production will be very high. The economic value and condition of the trees will decline rapidly, and therefore you might wish to take the decision to realise that value. Felling all the ash should be considered to allow regeneration, but you might wish to leave some trees which are close to dying to provide deadwood and biodiversity in the stand. Then:

- if the stand is a mixture of species, and there are enough trees of other species to form a closed stand within 10 years, it is likely that management objectives can still be achieved without replanting after felling the ash.
- if the stand is a mixture and there are NOT enough trees of other species to form a closed stand within 10 years, it is likely that the stand will have to be regenerated after felling by planting alternative species (see below for guidance).
- If the stand consists of pure ash you will need to consider what alternative species would do well on the site. (See point 16 below)

#### ***(b) Older stands***

An individual-tree approach is recommended for older stands with infected trees.

Where more than 50 per cent of the crown is infected, and where survival of the tree depends on epicormic shoots, felling should be considered because their economic value is declining, they have become seriously infected, and they will be producing large volumes of spores, which will infect other trees.

Where less than 50 per cent of the crown is infected, trees should be regularly monitored as described above. However, managers should also assess the risk of *Armillaria* (honey fungus) attack. This is often the ultimate cause of death of ash trees once they are infected with *Chalara*. Felling should be considered if *Armillaria* is present on the site and timber production is an important objective.

## **6. I'm not particularly interested in timber, but how do I preserve the environmental benefits of my woodland?**

A lower level of active management might be your best option where preserving environmental benefits is the key objective. However, you should consider planning to retain ash as a component for as long as possible to provide habitat for those species dependant on ash trees, and allow time for resistant strains to be identified. In general, ash woodlands of high environmental benefit also include a mixture of other tree species which will secure many of the same environmental benefits, albeit with a loss of diversity if ash cannot be retained. However, upland ashwoods could potentially decline in environmental benefits if appropriate interventions are not made. Further guidance will be made available when the impacts on dependant species are better understood and mitigation options have been considered.

Taking no action will:

- eventually reduce the proportion of ash in the woodland;
- increase the amount of deadwood (standing and on the ground);
- allow resistant trees to be identified; and
- lead to increased spore production from the woodland.

A more proactive management approach will:

- help to reduce spore levels and the rate of onward infection;
- open up the woodland to allow natural regeneration to take place;
- let more light into the stand; and
- encourage regeneration and structural diversity.

For very small, isolated woodlands, the management of leaf litter during the autumn and winter will help to reduce re-infection levels the following year. However, this can be very time consuming and expensive on anything other than a small scale, and does not cure the disease, but it might buy some time.

## **7. What if there are priority or protected species on my site?**

If there are rare, threatened or protected species with a particular requirement for ash to be present, specific advice might be needed for that site to maintain them. Current advice recommends a presumption against felling mature ash trees, with which some European Protected Species are associated. However, impact on protected species should be considered in all forest operations. For information on protected species please see guidance on safeguarding European protected species (Forestry Commission 2014b).

## **8. How can I best protect valuable veteran ash trees, pollarded ash, or ash trees in my garden, park or similar urban setting?**

Currently the only effective option to reduce spread of the disease is to remove all ash leaf litter from around the trees in the autumn and winter to reduce the local source of spores the following summer. There is some evidence from mainland Europe that leaf removal, possibly

coupled with the lower humidity levels in parkland and urban tree environments, can significantly reduce and slow the impact of *Chalara*.

Safe disposal of the leaves on site can be achieved by burning, burial or composting, although in some areas and circumstances disposal might need to be undertaken by a local authority. For further details see Forestry Commission guidance on managing and disposing ash leaf litter (2014c).

Urban and veteran ash trees should be surveyed to establish the level of infection present, and the disease status of the tree should, ideally, be assessed by a professional before agreeing any work programme.

Where no infection is present or suspected, any routine, planned work on ash trees should continue. The timber and brushwood can be removed, chipped and processed as usual. Best practice, however, would include burning, burying or composting the foliage or twigs on site where possible. The ecological benefits of leaving deadwood on site should be noted (Forestry Commission 2011).

For pollarded trees the current recommendations from the Swedish authorities, where there is a long history of pollarding, is to avoid all restoration cutting of old pollarded ash trees for the time being if there is not an acute risk that they will fall apart. However, for both healthy and infected ash trees which have been pollarded regularly, pollarding should continue until such time as we know more. If possible avoid pollarding all trees in the same year, but spread the pollarding out over several years. It is very important to revisit these trees and assess the impact of ash dieback.

## **9. What should be done with infected urban or veteran trees?**

There should not be a presumption to fell these trees. Veteran trees in particular can provide many important environmental and social benefits, even when dead. Any work on a tree should be undertaken after a risk assessment, which should consider age, condition, the number of other trees in the locality and their species, the potential risk of further infection, and the danger to the public. The cost of taking or not taking action is also likely to be a factor in any final decision.

Where infected trees are pruned or felled and there is a Statutory Plant Health Notice on the site, ash logs or firewood may only be moved off the site with authority from the Forestry Commission. Twigs and leaves should remain on site, and be burned, buried or composted if practicable. Strict bio-security measures must be employed.

## **10. How should I deal with infected trees in hedgerows and rural situations?**

Hedgerow and rural trees often make significant visual contributions to the landscape, and many also provide environmental benefits. Public safety and cost are likely to be key considerations in managing these trees, and expert advice is advisable.

Management options will depend on the trees' situations and locations, and the environmental and social benefits they bring. Managers are therefore advised to consider the questions and answers above on preserving environmental benefits and managing veteran and urban/garden trees for guidance.

To ensure continuity of ash standard trees in hedgerows, planting of replacement trees of an alternative species will ensure environmental benefits of hedgerow trees will be preserved.

### **11. What do I do about trimming my ash hedge?**

There is no specific advice about this. However the guidance for ash trees in parks and gardens above is equally relevant. Safe disposal of the leaves on site can be achieved by burning, burial or composting, although in some areas and circumstances disposal might need to be undertaken by a local authority. Guidance on managing ash leaf litter is provided by the Forestry Commission (2014c).

However, it is recognised that this is unlikely to be an option for hedges in the countryside, particularly those where the hedge is cut using a tractor with a mechanical flail. At present there is no practical control strategy in these instances. If a hedge requires cutting, then it is probably better to do so rather than neglect it. It is best to avoid cutting during the summer months and during the breeding bird season, when the spore production from dead leaves on the ground is highest, and disturbance might increase dispersal. Natural England (2014) and Hedgelink (2014) provide advice on hedgerow management and associated regulations.

### **12. How do I increase the resilience of my woodland to *chalara*?**

The single best strategy is to increase the genetic and age diversity of your woodland. Developing stands of mixed species should make your woodland less vulnerable to disease, and adopting a continuous-cover approach, where practicable, is one way to promote higher levels of species and age diversity.

### **13. Is it worth encouraging ash regeneration?**

Planting ash is currently not possible because of the restrictions on moving planting material, but it would not be recommended even if these restrictions were lifted.

Natural regeneration is the preferred method of replacing ash stands. Resistance to *Chalara fraxinea* is likely to be highly heritable, so natural regeneration from resistant trees is the preferred option for replacing the species in areas which retain sexually mature trees (more than 30 or 40 years old). Advice and information on the use of natural regeneration is provided by Harmer et al. (2010) and Kerr and Evans (1993).

### **14. Is regeneration from coppice recommended?**

Regenerating a stand using coppice shoots from felled, infected trees is not recommended. *Chalara* can be isolated from roots, and it is thought to be highly systemic, so coppice regrowth from the infected trees is also likely to be infected.

If the aim is to reduce infection pressure on a site, or allow space for natural regeneration of ash or planted trees of other species to establish, it is recommended that coppice stumps are killed using approved herbicides. However, in ancient woodlands or woodlands where coppice is an important cultural factor, only do this if coppice stools are infected with *Chalara fraxinea*. For such woodlands, postpone coppicing ash until more information is available – newly planted trees and freshly cut coppice are particularly vulnerable to infection.

### **15. What are my options if there are no resistant mature ash trees on my site?**

If there are no apparently resistant mature ash trees left on a mixed-species site, and regeneration has failed, and if there are enough trees of other species to form a closed stand within 10 years, it is likely that your management objectives can still be achieved without carrying out further regeneration.

In other cases the stand should be regenerated by planting alternative species, until resistant strains of ash can be made available.

### **16. What alternative species can I plant?**

The choice of species must always be guided by management objectives, site conditions and designation status of the site. For example, on brown earth soils the range of alternative broadleaved species is wide and includes aspen, beech, birch, cherry, field maple, hornbeam, oak, lime, rowan, sweet chestnut and sycamore.

On other sites the choice is much more restricted. For example:

- on ground-water gleys - alder, aspen, willow and oak are possible alternatives;
- on rendzinas - beech, birch, field maple, whitebeam, hawthorn, holly and the wayfaring tree could be considered;

If the site is designated for conservation purposes (for example, as an SSSI, SAC or SPA), or is an ancient woodland, advice should be sought from conservation agency advisers.

More detailed advice about what species to plant or encourage by regeneration instead of ash for sites of nature conservation importance is a subject of wider debate at the present time. Online discussion groups, such as those on Linked In, are providing an opportunity for practitioners to discuss and debate options.

### **17. Can I re-use my tree shelters if they have had diseased ash plants in them?**

Even if *Chalara* spores are present they will not pose a risk for any non-ash saplings being grown in the shelters, so re-use on the same site will pose no problems. There is a small risk of transferring the disease to another site, either by moving leaves or spores with the shelters or stakes. If you must use the shelters or stakes on another site, then you should ensure that any leaf litter is fully removed, and a period of at least a month elapsed before moving them. This will ensure that any *Chalara* spores will have died.

### **18. Where can I get guidance on species choice?**

Harmer et al. (2010) provide detailed guidance on species choice in native broadleaved woodland.

Ecological Site Classification (ESC) can also be used to investigate the suitability of species to a site, and will help managers consider the options with regard to longer-term climate change. The Forestry Commission (2014d) provides a free ESC tool through its Decision Support Service.

Non-native species should also be considered for sites with few constraints using the same guidelines and online tools.

It is important to note that some alternative species, such as beech, sycamore and Norway maple, are very susceptible to bark stripping by grey squirrels.

### **19. Is deer control necessary?**

Deer should always be controlled where establishment by planting or natural regeneration is an aim. This is particularly important when regenerating ash stands infected with *Chalara*, because it is likely that deer will tend to target healthier, resistant ash seedlings, rather than susceptible, diseased and dying plants.

## 20. What's the situation with logs and firewood?

### **(a) Uninfected sites**

Ash wood may continue to be moved from uninfected sites within Great Britain.

However, brushing leaf and shoot material from logs, firewood and vehicles should be done before leaving the site, as a precaution against the possibility that the disease might be present and thereby spread unintentionally with logs and firewood.

### **(b) Infected sites**

Ash wood may not currently be moved from woodlands or other sites where *Chalara* has either been confirmed or is suspected and a Statutory Plant Health Notice has been served. Ash logs or firewood may only be moved off these sites with authority from the Forestry Commission. Ash wood may, however, be used on site as fuel.

The conditions for the movement of infected ash wood are currently under consideration (Forestry Commission 2014e).

## 21. What is happening about breeding *Chalara*-resistant ash, and can I help?

Research in mainland Europe shows that some ash trees show signs of resistance to *Chalara fraxinea*, although so far no individual trees have been found to be totally resistant. However, a few in each population consistently show low levels of infection, and these could be used to create a *Chalara*-tolerant breeding population for restocking infected areas in the future.

This tolerance is heritable (i.e. it can be passed on between generations), and appears to be due to a suite of genes rather than a single gene. This is important, because the disease resistance is less likely to break down due to genetic change in *Chalara* if the observed disease resistance is based on a combination of several genes in ash. It should therefore be possible to breed some degree of tolerance into ash populations, but it will take several years before this will provide planting stock for the market.

Woodland owners in particular can help by:

- not felling any mature ash trees unless necessary for public safety or timber production reasons; and
- monitoring their ash trees' health over the coming years, and reporting to the Forestry Commission any which appear to be little affected by the disease.

## 22. Are there any chemical control methods available?

There are currently no fungicides or other chemicals approved for use in UK forests for controlling *Chalara fraxinea*. Research and development work is taking place to identify whether any of these products might have value in some situations.

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