Silviculture and management of ash: best practice advice for woodland managers

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Chalara Ash Dieback Workshop
Yorkshire Dales National Park
Town Hall, Grassington, North Yorkshire
08 June 2017
Outline

• Modern Silviculture: adaptation and resilience
• Principles underlying guidance for ash
• Management options:
  – Uninfected stands
  – Infected stands
  – Older stands
  – Coppice
  – Urban/parkland/hedgerow trees
• Further information
• Questions and Discussion
Guiding Principle

‘All our resolves and decisions are made in a mood or frame of mind which is certain to change.’

Proust
The evolution of silviculture
Summary of the major dimensions and trends

<table>
<thead>
<tr>
<th><strong>Primary Focus</strong></th>
<th><strong>Ecological Factors</strong></th>
<th><strong>Management Factors</strong></th>
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<tr>
<td><strong>Unit of Production</strong></td>
<td><strong>Stand Structure</strong></td>
<td><strong>Objectives/Issues</strong></td>
</tr>
<tr>
<td>Tree</td>
<td>Pure, regular</td>
<td>Single, discreet</td>
</tr>
<tr>
<td>Ecosystem</td>
<td>Mixed, irregular</td>
<td>Multiple, integrated</td>
</tr>
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Ecological Resilience

• **Resilience** is the capacity of an ecosystem to respond to a disturbance by resisting damage and recovering quickly

• **Not a new concept, but perhaps newly relevant to forestry**
  – now >6000 citations (to 2016)

• **Types of disturbance**
  – **Stochastic:** fires, flooding, windstorms, insect population explosions
  – **Human activities:** deforestation, introduced exotic plants/animals

• **Disturbances and regime change**
  – sufficient magnitude or duration of disturbance → profound affect on ecosystem → threshold ("tipping point") → different regime of processes and structures predominate
Rumsfeldian “Ecology”

- There are *known knowns*; there are things we know we know.
- We also know there are *known unknowns*; that is to say, we know there are some things we do not know.
- But there are also *unknown unknowns* – the ones we don’t know we don’t know.

Donald Rumsfeld
US Secretary of Defense, 12 February 2002
Strategies for Enhancing Resilience

Succession stages in a natural forest

- initial stage
- intermediate stage
- final stage

Species choice
- genetics/provenance

New species introduced

Wider use of “minor” species

Mixed species

Assisted migration of native species

Modify thinning regimes
- Under-planting

Extend “rotations”
- Diversify Structure
  - CCF

Thanks to Jens Haufe for the diagram used in this slide.
Alternative Species
Chinese mahogany
(Toona sinensis)
After 2 growing seasons
Westonbirt Arboretum

Photo: E. R. Wilson
Prolific ash natural regeneration in a small canopy clearing – lots of competition and selection

Photo: Sharon Rodhouse
New native oak plantation. Note close spacing to promote form, competition and natural selection.
Continuous Cover Forestry

• “...the use of silvicultural systems whereby the forest canopy is maintained at one or more levels without clear felling.”
  
  Mason et al. 1999

It has 4 main guiding principles:
1. Managing the forest ecosystem
2. Using natural processes
3. Working within site limitations
4. Diversifying stand structure

In order to transform a planted forest we have to:

- develop adequate tree stability (Frame Trees).
- promote the best trees as likely source for Natural Regeneration (NR)
- get the species composition right
- create optimal conditions for NR (ground vegetation, seedbed, browse control)
Lowland broadleaved shelterwood
Sharon Rodhouse 2007
Management Guidance and Advice for Ash

Managing Chalara Ash Dieback in Kent

Chalara fraxinea (Ash dieback) is well established in the wider environment in the east of England, especially Kent, Essex, Suffolk and Norfolk, and in pockets in many other areas of England and Wales. Based on evidence from elsewhere in Europe, it can be expected to spread to other areas of the country in the coming years. Chalara sapwood can be killed; there is no known cure, but landowners and managers can take steps to slow the rate of spread, protect individual stands, minimise the impact on biodiversity and increase the longer term resilience of trees and woodlands.

The advice given here is consistent with advice published by the Forestry Commission (FCC, www.forestry.gov.uk/chalara) and does not intend to replace it. FCC advice is updated as more information becomes available. Woodland owners are encouraged to seek additional advice from a professional forestry consultant.

For further information on identifying symptoms and reporting suspected cases of Chalara, visit www.forestry.gov.uk/chalara or map showing distribution of Chalara May 2016 (source: Forestry Commission).

Principles

The RPS endorses the principles underlying FCC guidelines on the management of Chalara which are consistent with good practice, including:
- Controlling the spread of disease to avoid the loss of productive woodland and the associated economic value;
- Minimising the loss of biodiversity and the ecological damage caused by disease;
- Minimising the cost to society, especially for those who invest in multiple trees or a single tree;
- Maintaining impacts on associated species and wider biodiversity.

RPS

wprp.gov.uk/ashdiesback

Managing Chalara Fraxinea (Ash Dieback)

GUIDANCE FOR WOODLAND OWNERS AND MANAGERS

1. Introduction

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Ash Silviculture and Management Principles

• **Maintain the values and benefits** associated with ash woodlands and iconic trees;

• **Secure an economic return** where timber production is an important objective;

• **Reduce the presence and rate of spread of Chalara dieback**;

• **Maintain as much genetic diversity in ash trees** as possible with the aim of ensuring the presence of ash in the long term; and

• **Minimise impacts on associated species and wider biodiversity**

Source: Forestry Commission 2013, Royal Forestry Society  2014
Key references

Silviculture Practice

1. Modified and targeted to alleviate the immediate consequences of ash dieback
2. Ensure potentially healthy ash has a future role in the woodland

Critical Stage
- Too late for replacement planting
- Too early for commercial thinning (sale)

A planned sequence of interventions to pursue original or modified management objectives

Source: Skovsgaard et al 2017
Inventory procedures for stands with *Chalara* ash dieback

- General principles
- Crown dieback and defoliation
- Collar lesions
- Stem quality
- Spatial location of ‘good’ trees
Be vigilant!

Early identification of infected trees will give more options for management and conservation of woodlands.

Wider Environment: A mature ash tree with Signs of Chalara ash dieback disease

Photo: Sharon Rodhouse 2012
Crown Assessment

- Numbers indicate the estimated proportion of foliage remaining for each tree (%).
- Note visual assessments are approximate and associated with large variation.

Source: Skovsgaard et al 2017
Stages of collar lesion and bark and wood discolouration (1)

Early stage necrosis and red-brown discolouration of stem bark

Mid stage collar lesion with depression and one or few cracks in bark

Late stage collar lesion with depression and many cracks in bark

Source: Skovsgaard et al 2017
Stages of collar lesion and bark and wood discolouration (2)

Early stage collar necrosis caused mainly by *H. fraxineus*

Mid stage collar necrosis due to *H. fraxineus* and *Armillaria* sp., with white mycelium of *Armillaria* sp.

Advanced collar rot and discolouration in wood, with black zone lines due to *Armillaria* sp.

Source: Skovsgaard et al 2017
Stages of collar lesion and bark and wood discolouration (3)

Early stage brown discolouration of wood due to *H. fraxineus* (in this case entering through an epicormic branch)

Mid stage discolouration due to *H. fraxineus* (entering at the root collar) and *Armillaria* sp.

Late stage brown discolouration of the stump due to *H. fraxineus* and *Armillaria* sp., with black zone lines due to *Armillaria* sp. in progressively decaying parts of the wood.

Source: Skovsgaard et al 2017
Creating a Stand Sketch Map

• Spatial location of potential future crop trees in a young stand of ash infected by dieback.
• Map was drafted in the field using only step size measurements.
• Each square is 10m × 10 m.
• Numbers indicate the id number of potential future crop trees. Tree number 504 was marked for special attention.
Monitoring stand structure

APPENDIX 2a: MONITORING TRANSFORMATION TO CONTINUOUS COVER: Worked example

<table>
<thead>
<tr>
<th>PLOT NO.</th>
<th>SPECIES</th>
<th>TREES</th>
<th>SAPLINGS (and any 'new' trees)</th>
<th>SEEDLINGS</th>
<th>OTHER VEGETATION</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>DBHs (≥7 cm)</td>
<td>Height (m)</td>
<td>Total number</td>
<td>With deer damage</td>
</tr>
<tr>
<td>1</td>
<td>WRC</td>
<td>43 49</td>
<td>DH 1</td>
<td>6</td>
<td>5</td>
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<tr>
<td></td>
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<tr>
<td>2</td>
<td>DF</td>
<td>42 45</td>
<td>DH 1</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
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<td>BE</td>
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<tr>
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</tr>
<tr>
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<td>DF</td>
<td>36 44</td>
<td>DH 1</td>
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<tr>
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<td>NS</td>
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<td>3</td>
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<td>0</td>
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<tr>
<td></td>
<td>HOL</td>
<td></td>
<td></td>
<td>8</td>
<td>2</td>
</tr>
</tbody>
</table>

1 Tally trees and saplings of coppice origin separately.
2 Use: 1 = grasses, 2 = bramble, 3 = ferns + bracken, 4 = other herbaceous and broadleaved, 5 = woody shrub, 6 = bare, 7 = leaf and/or needle litter, 8 = mosses, 9 = other (specified).

Source: Kerr et al 2002
1. **Uninfected stands**

1. **Planning**
   Before taking any action, owners/managers need to review their management objectives and local circumstances.

2. **Silviculture**
   Carry on with planned work and thin to promote fast, healthy growth in selected trees.

3. **Biosecurity**
   Adhere to guidance on biosecurity, ensure tools are disinfected, boots and clothes cleaned and ash leaves are not moved from the wood.

4. **Monitoring**
   Regularly monitor trees for signs of Chalara and, if found, report to the Forestry Commission (see earlier guidance).

Silviculture and management options for ash

2. Infected stands (<25 years)

1. Where there are low levels of disease
   
   – **Young Plantations**
     Remove recently planted trees and natural regeneration if small numbers are infected and burn or bury them on site.

   – **Pole-Stage Stands**
     Thin woodland as usual. Select diseased trees for thinning which show symptoms of Chalara, preferably when in full leaf to ensure the right tree is felled, and where possible burn the brash.

   – **Coppice**
     Do not bring forward coppicing of ash as this will make stools and new growth more vulnerable to Chalara.

Silviculture and management options for ash

2. Infected stands (<25 years)

2. Where there are **high** levels of disease (>50% stand infected)

- **Support Research**
  Do not rush to remove recently planted or mature trees, or ash coppice. This will prevent identification of resistant trees.

- **Realise Timber Value**
  Consider felling ash to realise the value before timber condition deteriorates or thin to favour alternative species.

- **Biodiversity**
  Consider leaving some trees close to dying for deadwood and biodiversity. Restock with alternative species suitable for local site conditions and to emulate the ecological value of ash (see Natural England guidance). Validate the provenance of any new stock with your nursery prior to purchase.

Natural England Guidance for management of woodlands of conservation importance

- Assessing and addressing the impacts of ash dieback on UK woodlands and trees of conservation importance
- Published on 30 April 2014
Silviculture and management options for ash

2. Infected stands (<25 years)

3. Where timber **production is not a consideration**
   
   – **Habitat Conservation**
   
   The aim here is to retain ash in the wood for as long as possible to provide habitat for species dependent on ash and to allow time to identify trees that may be resistant.

   – **Commitment to Management**

   Continuing to manage the wood will ensure less spore production and more light on the woodland floor to encourage regeneration and structural diversity.

Source: Forestry Commission 2013, Royal Forestry Society 2014
Silviculture and management options for ash

3. Infected older stands

• Adopt an individual tree approach
  – There should be a *presumption against* the felling of ancient, veteran or mature ash trees, whether or not they are infected with Chalara.
  – Where less than 50% of the crown is infected the tree should be regularly monitored and symptoms of honey fungus (*Armillaria*) – often it is this secondary infection that kills the tree.
  – Where more than 50% of the crown is infected consider felling.

– **Health and Safety around Dead and Declining Trees**
  Take special care and appropriate measures where trees are in areas close to public access.

Ash and oak planted mixture, Suffolk
Photo: Gary Battell
Ash being managed for firewood, Suffolk

Photo: Gary Battell
Silviculture and management options for ash
5. Urban/parkland/hedgerow trees

- **Litter Removal**
  There is evidence that removal of leaf litter combined with the lower humidity in urban and parkland environments can significantly reduce and slow the impact of Chalara.

- **Wider Benefits**
  There should not be a presumption to fell infected trees in these environments as these trees can continue to provide benefits even when dead.

- **Health and Safety**
  Carry out a full risk assessment before taking action. Public safety is of paramount importance in this assessment.

New Woodland Considerations:
- Management objectives
- Site-based silviculture
- Diversify species choice
- Consider ecological alternatives (Natural England Guidance)
- Consider mixtures

Mixed native woodland
Golden Wood (Green Light Trust)
Lawshall, Suffolk
Photo: E. R. Wilson 2014
Principles of ESC are well-established

ESC is a knowledge-based model; productivity distribution data are used to inform decisions

ESC was developed to support commercial species selection

Also analysis of National Vegetation Classification community types

Detailed species information, including some provenance guidance

ESC does not consider rising CO₂ levels or plant health issues
Supporting Forestry Research is Vital
Become an Applied Scientist

Ash Genetics Trial
Photo: Jo Clark, Earth Trust
Chalara ash dieback – the search for resistant trees

Forest Research, the research agency of the Forestry Commission, is carrying out work here as part of a series of trials to find ash trees with resistance to Chalara ash dieback.

The outbreak of ash dieback disease is affecting ash trees in the UK. The disease is not harmful to people or animals but it does kill ash trees. This is a very serious disease affecting one of our major native tree species and work is underway to find a solution.

This area has been planted with ash saplings from across the UK and has been fenced to protect the young trees from deer and rabbits. We will monitor the saplings for the next five years; any that show resistance to the disease will be used in future breeding programmes to allow ash to be planted back into the UK countryside.

Unfortunately, this means we must restrict access to these areas during the next five years. We apologise for any inconvenience caused, but hope you appreciate the importance and value of these trials to the future of ash trees in the UK.

Further information, contact details and progress reports are available on our website – visit www.forestry.gov.uk/fr/chalara_trials or scan the code.

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The Woodland Trust has provided two sites for this trial: Pound Farm, Suffolk (8.5 ha) and Hucking Estate, Kent (2 ha).

The Research Agency of the Forestry Commission

The Forest Research Site at Pound Farm, Woodland Trust, Suffolk. Photo: E. R. Wilson 11 August 2015
The Forest Research Site at Pound Farm, Woodland Trust, Suffolk. Photo: E. R. Wilson 11 August 2015
Conclusions

• **Resilience**
  – Theoretical framework within which we can ensure sustainable management of natural resources

• **Working with Uncertainty**
  – In all future decisions and actions
  – Adaptive management approach

• **Silviculture Applications**
  – *Diversification* of genotypes, species, structures, approach
  – Site-based decision making
  – Promote healthy trees, vigour (thinning prescriptions)

• **Consider active contribution to research**
"A gentleman takes as much trouble to discover what is right as lesser men will take to discover what will pay."

K'ung Fu-tzu (Confucius), quoted by M.L. Anderson 1951

Reference:
livingashproject.org.uk

Project partners:

Department for Environment, Food & Rural Affairs
Forest Research
earthtrust
Future Trees
Sylva
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