



# The Living Ash Project

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# Background

## Screening and selection of common ash for resistance to *Chalara fraxinea*: The Living Ash Project

Ran from 2013 - 2018, funded by Defra

Main aims to screen existing ash breeding resource and wider environment to identify trees with tolerance

R+D of tissue culture techniques

Partners: Earth Trust, Forest Research, Sylva Foundation, Future Trees Trust

## Mass screening trials

Defra also funded Forest Research to establish 15 mass screening trials

Also ran 2013 - 2018



# Search for tolerant trees - LAP



- ▶ Assessed 40,000 trees in research trials
- ▶ Private estates to reassess plus trees
- ▶ Woodland Trust and Wildlife Trust Sites in SE
- ▶ Wider environment via citizen science
- ▶ Wider environment via FC tree health officers
- ▶ Goal: To find 400 tolerant genotypes (1% of breeding resource)
- ▶ To secure on public forest estate and make freely available



# Mass Screening Trials

- ▶ 155,000 trees planted on 14 sites during spring 2013
- ▶ 15 provenances: 10 British, 2 Irish, 2 European, 1 seed orchard
- ▶ Differences between sites early on
- ▶ and provenances (24% French healthy compared to 10% of NSZ 304)
- ▶ But differences between provenances & sites decreased over time

e.g. single tree trait



# Foxley Wood, Norfolk



Foxley Wood, Norfolk







Living Ash Project grafts  
February and May 2018,  
EMR



Mass screening grafts  
May 2018, NRS





# The National Archive planted December 2019



# Living Ash Project - Phase 2



# Living Ash Project Phase 2 - securing tolerant material for seed production purposes

- ▶ To assess national archive & mass screening trials
- ▶ Reproduce most tolerant selections (grafting / cuttings)
- ▶ Replace poorer selections
- ▶ Test selections via LC-MS
- ▶ Test selections via controlled inoculations
- ▶ R+D cuttings
- ▶ 2019-2024

# Disease progression in ash provenance trial - first infections observed September 2015

Score	2016	2017	2018	2019	2020	2021	2022
5	26.9	7.0	3.6	1.6	1.3	0.7	0.5
4	34.7	25.9	15.5	10.9	7.9	10.4	7.6
3	24.0	32.7	23.4	17.3	17.0	20.3	17.0
2	8.2	27.1	41.0	45.2	44.7	35.0	26.2
1	1.7	2.8	12.0	20.5	24.7	29.0	43.3
missing	4.5	4.5	4.5	4.5	4.5	4.6	5.3

5 = healthy

4 = one to three small infections on side branches

3 = multiple infections on branches

2 = infection in main stem

1 = dead from ADB

# Liquid Chromatography Mass Spectrometry - LCMS

## Untargeted metabolomics

- Give a snapshot of how a tree is behaving/responding to the environment in which it is living i.e combination of gene expression/protein production/metabolite biosynthesis as a response to the environment



Photograph



Freeze dry



Tissue disruption



Weigh



Solvent extraction



Liquid chromatography-mass spectrometry

Christine Sambles

# Controlled Inoculations



Direct stem inoculations



Leaf spore inoculations

# Next Steps....

- Assessing many more estates and woodlands summer 2023
- Collecting graftwood January 2024
- Screen all using LC-MS
- Replacing poor selections from 2017 with better more tolerant selections January 2025 / 2026
- Second archive site in Scotland
- Defra considering next steps in breeding programme: traditional of genomic selection or both

# What can you do to help?

- Manage your woodlands and trees
- Walk paths recording trees to remove, noting any trees looking very good
- Carry out sanitary felling where appropriate
  - This could mean simply walking away and doing nothing
  - Felling trees along access corridors
  - Leave any very healthy trees where possible
- Report healthy trees



## What is LAP looking for?

- Healthy ash trees - no obvious signs of ash dieback
- Trees located in a woodland setting with high proportion of ash
- Most trees ash showing very heavy ash dieback infections

## What is LAP not looking for?

- Trees in gardens & hedgerows
- Isolated trees
- Very large trees or poor access - need to be able to collect scions with long handled pruners or shooting

Report a Tree: [www.livingashproject.org.uk](http://www.livingashproject.org.uk)



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REPORT A TREE

# Report a Tree

## Welcome to the Report A Tree Page

Together, we can combat ash dieback through harnessing the natural genetic diversity within ash. By bringing together trees showing high levels of tolerance we can start a new breeding programme for ash to ensure it remains a viable option for forestry and the wider environment.

# Crown Assessments

The easiest time to do this is during the summer months, when it is possible to make an assessment on crown health. Trees showing up to 25% crown dieback are also of interest. The following images are reproduced from the Forest Research publication: 'Diseases and disorders of forest trees: a guide to identifying causes of ill health in woods and plantations.'



Please use the recording form (below) to detail your findings on mobile or computer, if you don't know the answer you are able to leave blank. If you experience any difficulties with this form or want to reach out to the team for any other ash related questions or queries please email [info@futuretrees.org](mailto:info@futuretrees.org)

Estate Name \*



or compartment

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REPORT A TREE

Please enter your email, so we can follow up with you.

Enter your grid ref using What3Words.com \*

County

Please use What3words to find your three words or grid reference either through the web or app version.  
<https://what3words.com/>

Woodland Age

Woodland Type

Comments on tree and stand/ woodland

Diameter (cm)

% ash in woodland

% ash infected

Epicormics

Lesions – stem/ basal

Dead twigs

Evidence of spring wilting

Crown dieback - %

Flowering/seed



# Resources



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STRATEGY DOCUMENTS



## Managing Ash Dieback Case Studies

Managing ash dieback: Case Studies – Volume 2 Royal Forestry Society in partnership with Forestry Commission



## Broome et al (2014)

*Ash dieback and loss of biodiversity – Can management make broadleaved woodlands more resilient?*

This report evaluates the practical measures that might be taken to maintain biodiversity if significant numbers of ash trees are lost from British woodlands.



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# Thank You

▶ [Jo.clark@futuretrees.org](mailto:Jo.clark@futuretrees.org)

▶ [www.livingashproject.org.uk](http://www.livingashproject.org.uk)

▶ [www.futuretrees.org](http://www.futuretrees.org)

# Ash Woodland In Great Britain

## NFI 2013 special focus on ash

GB Forest Cover = 1.3 million ha

142,000 ha ash

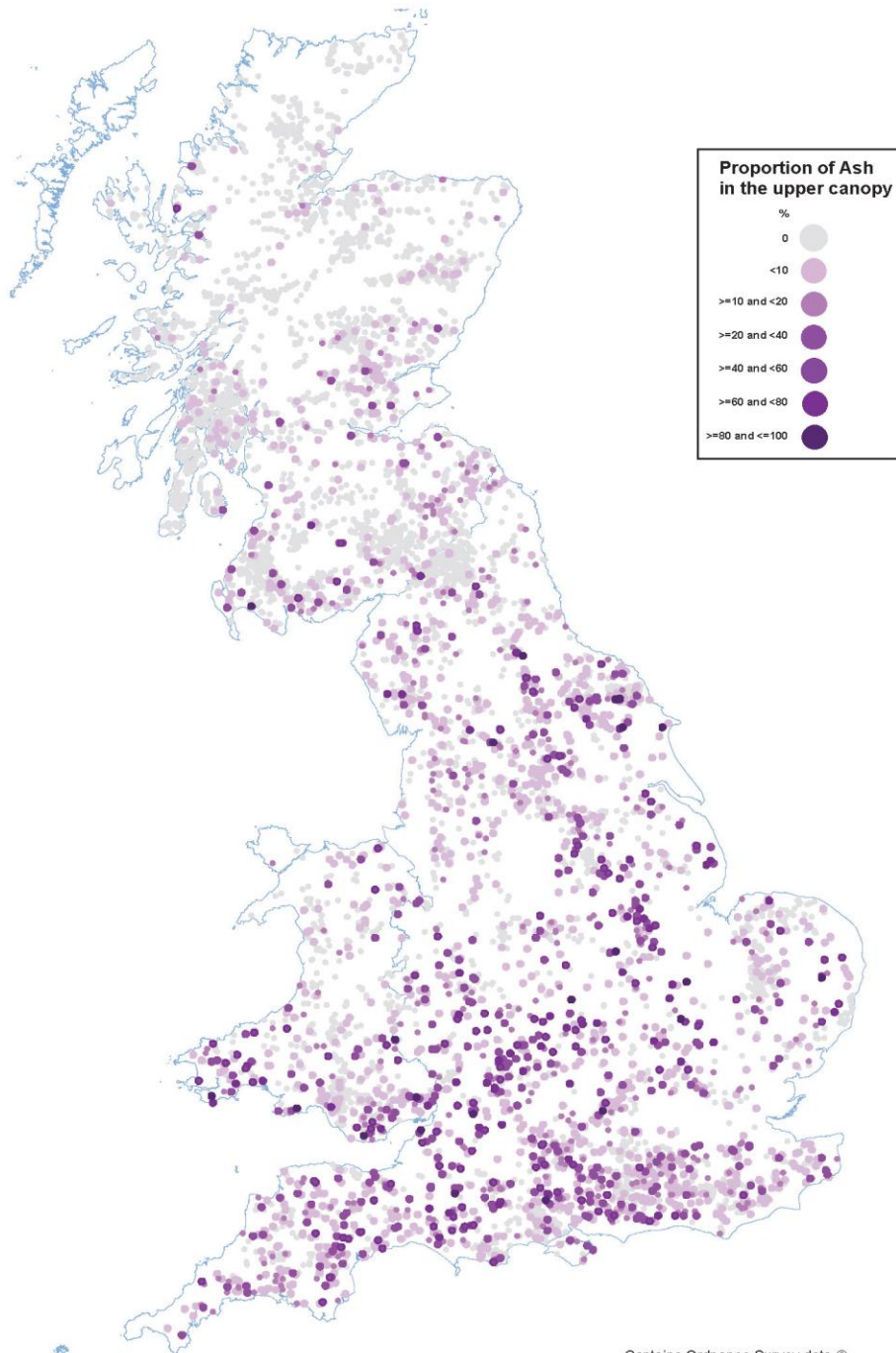
11% of broadleaves / 5% of all tree cover

126 million ash trees (in woodlands >0.5ha)

AND

Estimated 4.2 billion saplings and seedlings,  
of which 39% are ash - 1.6 billion ash trees!

1% tolerant = 16 million trees



# Ash-associated species

955 ash-associated species:

- 12 birds
- 28 mammals
- 58 bryophytes
- 68 fungi
- 241 invertebrates
- 548 lichens

- 62 highly associated species: 19 fungi, 13 lichens, 6 bryophytes, 24 invertebrates
- **45 obligate species on ash**: 4 lichens, 11 fungi, 30 invertebrates
- Obligate and highly associated species most at risk from ash dieback

