Management of ash in Ireland in the light of ash dieback

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Overview of presentation

- Ash age profile
- Scenarios

- Silvicultural options
  - State-of-the-art
  - Options for Ireland?
    - Systems
  - The future
Ash in Ireland

Tony Grehan – Press 22
Ash in Ireland
Age profile of ash (GB)

Figure 16a Stocked area by age class of ash for GB

The Irish Agriculture and Food Development Authority

Farm Woodland Forum Annual Meeting, May 18-19 2015, Organic Research Centre, Newbury
Age profile of ash (R. Ireland)
Age profile of ash (N. Ireland)
Ash age profile compared

R. Ireland

N. Ireland
Ash age profile compared

R. Ireland

G.B.

N. Ireland
UK and R.I compared

UK: ≈ 142,000 Ha. ash
RI: ≈ 21,000 Ha. ash

UK: ≈ 460 cases per 100,000 km²
RI: ≈ 170 cases per 100,000 km²

UK: ≈ 8.0 cases per 1,000 ha ash
RI: ≈ 6.8 cases per 1,000 ha ash

- Ireland has had very few “Wider environment” cases to-date. Current eradication program.
- UK “wider environment” cases predominantly in the South and East. Will this spread westwards?? No eradication program.
- Is there potential in the coming decades for dieback to spread across GB and over the Irish Sea?

The Irish Agriculture and Food Development Authority

The Irish Agriculture and Food Development Authority
Ash dieback in Slovenia

- Stop promoting ash for afforestation
- Replace in affor with sycamore
  - Or other suitable spp.
  - *Populus* on sandy soils near rivers
- Sanitary felling of heavily damaged ash trees
Dieback of ash in Eastern Austria

- Damage and mortality levels are much higher on:
  - Nursery seedlings
  - In afforestations
  - On natural regeneration
  - In thicket-sized and pole-sized stands
  - ...than on old trees

- Ash dieback causes immense problems for establishing and tending young stands
- Old trees appear to be capable to endure the disease for a relatively long time
Patterns and Severity of Crown Dieback in Young Even-Aged Stands of European Ash (Fraxinus excelsior L.) in Relation to Stand Density, Bud Flushing Phenotype, and Season

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Abstract


The extent and temporal pattern of crown damage (attributed to Hymenoscyphus pseudoalbidus) in even-aged stands of Fraxinus excelsior in relation to bud flushing phenotype, stand density, and season was investigated. Data were collected in 2007 in four statistically designed thinning experiments located in 12–15 years old plantations of ash in Denmark. The study included 21 plots of four contrasting, residual stand densities: (1) 1700–5500 trees/ha (unthinned control plots), (2) 1500 trees/ha, (3) 500 trees/ha, and (4) 100–150 trees/ha. Assessments included estimation of flushing phenotype in May, followed by evaluation of severity of crown damage (percentage of crown killed) in June and September. Simultaneously, for each tree, the presence or absence of crown wilt and dead tops were recorded. The seasonal pattern of disease severity (average crown damage) was similar in all stands, and disregarding stand density the extent of tree crown damage increased significantly towards the end of the growing season (P < 0.005). Disease severity was the worst in unthinned plots, but otherwise unrelated to stand density. Late-flushing trees were most severely affected (P < 0.001). The observed patterns of disease severity are probably associated with ecological features of the pathogen that still remain largely unknown.

- Thinned stands are less severely infected
- Late-flushing trees most severely affected
Senescence

- Trees with early leaf senescence in the autumn are less prone to infection
Associations among symptoms

- The disease was associated with symptoms of *Armillaria gallica*
- No associations were found for symptoms of *Neonectria galligena, Pseudomonas syringae* subsp. *savastanoi pv. fraxini*

Dieback was more frequent on trees of average or below-average size
- suggesting that individual tree resistance decreased with decreasing growth potential or tree vigour

Development of phytosanitary silviculture prescriptions should primarily be targeted towards young stands as these represent the most critical phases of stand development.
Occurrence on infected logs

- The pathogen was able to produce conidia from infected wood
- Export of ash logs could represent a potential risk?
  - (requires confirmation [tested in the lab])
  - the available data do not support control of ash log trade as a quarantine measure
- Involvement of *Armillaria* spp. in the decline process was confirmed
Silviculture

Regeneration → Tending → Thinning

Most critical phase
- Too late for replacement planting?
- Too early for commercial timber sale?
Uninfected site

• Slow the impact of any future infection
  • promote fast growth of selected trees
  • Maximise timber value at time of felling
  • High standards of silviculture and establishment
Infected pole-stage

- Low disease level
  - Selective thinning of diseased and suppressed
- 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.
- 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
- Stand consists of pure ash then consider what alternative species would do well on the site.
Older stands

- Individual-tree approach is recommended for older stands with infected trees.
- > 50% of the crown is infected, and where survival of the tree depends on epicormic shoots, felling should be considered.
- < 50% of the crown is infected, trees should be regularly monitored. Assess the risk of Armillaria (honey fungus) attack. This is often the ultimate cause of death of ash trees once they are infected with *Hymenoscyphus fraxineus*. 

Increase resilience of woodlands

• Increase the genetic and age diversity of the woodland
  
  • Developing stands of mixed species should make the woodland less vulnerable to disease
  
  • Adopting a continuous-cover approach, where practicable, is one way to promote higher levels of species and age diversity.
Our advice?

- Mark trees during or after leaf flushing
- Prefer trees that flush early and senesce early
- Thin
- Remove unhealthy stems
  - including those with epicormics
- Inspect stand annually

- Understory smooths the water balance fluctuations
  - conifers but also broadleaves?
But ...

- We may have time on our side
  - *H. fraxineus* is not prevalent in the wider environment in Ireland
- Let’s be pro-active
- We can prepare for the future
Clearfell and replant

Eradication strategy
Rack and selection thinning
Rack and selection thinning
Rack and selection thinning

Underplant?
Rack and selection thinning
Systematic thin and underplant?
Systematic thin and underplant?
Systematic thin and underplant? - light
Relative illumination (sycamore overstory)

- ≈ 10%
- ≈ 40%
- ≈ 60%
Species for underplanting? - Conifer

<table>
<thead>
<tr>
<th>Species</th>
<th>Ellenberg Value</th>
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<tbody>
<tr>
<td>Western red cedar</td>
<td>4</td>
</tr>
<tr>
<td>Lawson cypress</td>
<td>5+</td>
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<tr>
<td>Douglas fir</td>
<td>6</td>
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<tr>
<td>Western hemlock</td>
<td>6</td>
</tr>
<tr>
<td>European larch</td>
<td>7+</td>
</tr>
<tr>
<td>Lodgepole pine</td>
<td>7+</td>
</tr>
<tr>
<td>Scot’s pine</td>
<td>7+</td>
</tr>
<tr>
<td>Pinus nigra</td>
<td>7+</td>
</tr>
<tr>
<td>Norway spruce</td>
<td>7+</td>
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<tr>
<td>Sitka spruce</td>
<td>7+</td>
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<tr>
<td>Coast redwood</td>
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<tr>
<td>Leyland cypress</td>
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<tr>
<td>Monterey cypress</td>
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<tr>
<td>Grand fir</td>
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</tr>
<tr>
<td>Serbian spruce</td>
<td>n/a</td>
</tr>
</tbody>
</table>

Ellenberg’s indicator values for British plants – sapling stage

3. Shade plant, mostly <5% relative illumination, seldom >30% illumination when trees are in full leaf
5. Semi-shade plant, rarely in full light, but generally with >10% relative illumination when trees are in leaf
7. Plant generally in well lit places, but also occurring in partial shade
8. Light-loving plant rarely found where relative illumination in summer is <40%
<table>
<thead>
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<th>Value</th>
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<tbody>
<tr>
<td>Common beech</td>
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<tr>
<td>Hornbeam</td>
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<td>Wild cherry</td>
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<tr>
<td>Large-leaved lime</td>
<td>4</td>
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<tr>
<td>Norway maple</td>
<td>4+</td>
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<tr>
<td>Sycamore</td>
<td>4+</td>
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<tr>
<td>Common alder</td>
<td>5</td>
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<tr>
<td>Ash</td>
<td>5</td>
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<tr>
<td>Small-leaved lime</td>
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<tr>
<td>Common lime</td>
<td>5</td>
</tr>
<tr>
<td>Spanish (sweet) chestnut</td>
<td>5</td>
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<tr>
<td>Holly</td>
<td>5</td>
</tr>
<tr>
<td>Field maple</td>
<td>5+</td>
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<tr>
<td>Horsechestnut</td>
<td>5+</td>
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<tr>
<td>Black poplar</td>
<td>6</td>
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<td>Walnut</td>
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<tr>
<td>Aspen</td>
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<td>Hybrid poplar</td>
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<td>Sessile oak</td>
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<td>Downy birch</td>
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<td>Silver birch</td>
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<tr>
<td>Red oak</td>
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<tr>
<td>Southern beech</td>
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Free-growth / halo thinning
Free-growth / halo thinning
Free-growth / halo thinning
Free-growth / halo thinning

Underplant?
Group selection and nat regen / underplant
Group selection and nat regen / underplant
Group selection and nat regen / underplant
Strip felling and replanting

Wind →
Strip felling and replanting
Establishment of mixtures?

- With tolerant ash provenances in the future
- Anderson Squares?
- Bands?
- Intimate?
- How many species?
Future positives from *Hymenoscyphus fraxineus* ash dieback?

- Improved silviculture?
  - Amelioration of poor-performing stands
    - Better soils for tree establishment
    - Shelter present?
  - Greater emphasis on thinning
  - Greater owner (and public) interest
  - Less prescriptive silviculture, more site specific silviculture
  - Greater emphasis on establishing mixtures?
- Improved planting stock made available?
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