How Can We Control Fomes Root and Butt Rot?

A Decision Support System

By Jim Pratt, formerly of Forest Research
The Scientific name of the fungus causing Fomes Root and Butt Rot is:

*Heterobasidion annosum*
What Determines the Spread of *Heterobasidion* through a Stand?

1. Soil and Climate (Hazard)
2. Management Decisions (Risk)
HAZARD is Determined by Site Factors

*Heterobasidion* grows:

- fastest in stumps in soils that are well-drained and warm.

- so slowly where soil is cold and waterlogged that the fungus poses minimal risk
RISK is Determined by Management Decisions

1. High-Risk Decisions:
   - thin susceptible species regularly and hard
   - no stump treatment

2. Low-Risk Decisions:
   - no thinning
   - use stump treatment
   - plant hardwoods
How Do We Assess Hazard?

1. Climate

Britain has been divided into a number of climatic zones which reflect:

- soil warmth (accumulated temperature)
- dryness (moisture deficit)

Such information is available in GIS form in ESC (Ecological Site Classification).
UK Climatic Zones
Our Forest Area Is Distributed As Follows:

- Cool Wet 40
- Cool Moist 17
- Warm Wet 06
- Warm Moist 27
- Warm Dry 10

(%) Total High Forest Area
How Do We Assess Hazard?

2. Soils

Hazard Rating:

• Brown earths and podsols (High)
• Less well drained mineral soils surface and ground-water gleys, ironpans (Medium)
• Shallow peaty gleys (Medium/Low)
• All peats (deeper than 15 cm) (Low)
### Hazard Determined By Climate And Soil

<table>
<thead>
<tr>
<th>$H.\ annosum$ Hazard</th>
<th>Climate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cool Wet</td>
</tr>
<tr>
<td><strong>High</strong></td>
<td>Nil</td>
</tr>
<tr>
<td><strong>Medium</strong></td>
<td>Nil</td>
</tr>
<tr>
<td><strong>Low</strong></td>
<td>BE, GWG, Podzols, Ironpan, SWG, PG, Peat</td>
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</tbody>
</table>
The following maps show how HAZARD is affected by CLIMATE in a forest where SOIL has been fully mapped

Soils were combined into 4 classes:

• Well-drained mineral     (BE, podsol)
• poorly-drained mineral   (SWG, GWG, ironpan)
• Shallow peat             (PG, peat <25cm)
• Peat                     (all other peats)
Basic Soil Map showing well and poorly drained mineral, and shallow and deep peat soils
COOL AND WET

100% Low Hazard
COOL AND MOIST

51% Low       49% Medium
12% Low  56% Medium  32% High
12% Low  23% Medium  65% High
When Should You Treat Stumps?

Cost-Benefit Analysis suggests treatment of stumps is:

- Not justifiable on Low Hazard sites
- Nearly always necessary on High Hazard sites
- *Personal judgement is needed for sites of Medium Hazard*
Medium Hazard Site

- Regular Thinning
- No Stump Treatment (High Risk Management)

- Reduced Thinning
- Stump Treatment (Low Risk Management)

Potential for High *H. annosum*  
Low *H. annosum*
## Overview of Risks

<table>
<thead>
<tr>
<th>Operation</th>
<th>Low Risk Strategies</th>
<th>Medium Risk Strategies</th>
<th>High Risk Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thinning</td>
<td>No Thinning</td>
<td>Reduce Thinning</td>
<td>Frequent Thinning</td>
</tr>
<tr>
<td><strong>Stump Treatment</strong></td>
<td>Treat Stumps well</td>
<td>Allow poor practice</td>
<td>No treatment</td>
</tr>
<tr>
<td>Stump removal</td>
<td>Remove all stumps</td>
<td>Remove rotted stumps</td>
<td>No stump removal</td>
</tr>
<tr>
<td>Species selection following <strong>Pinus</strong></td>
<td><em>Pinus, Abies grandis, hardwood, agriculture</em></td>
<td><em>Pinus mixed with Picea, Larix or Pseudotsuga</em></td>
<td>Pure <em>Picea, Larix, Pseudotsuga</em></td>
</tr>
<tr>
<td>Species selection following <strong>Picea</strong></td>
<td><em>Pinus, Abies grandis, hardwood</em></td>
<td><em>Picea, Larix or Pseudotsuga</em></td>
<td><em>Tsuga heterophylla</em></td>
</tr>
</tbody>
</table>
Still Can’t Decide Whether You Have A Potential Problem?

To get a crude estimate multiply:

Hazard Rating x Risk Rating  
(Low = 1; High = 3)

Scores of 6 or above justify stump treatment!
Using this system, a manager can create a map or a database which contains information about the area of forest for which he has to take decisions on stump treatment.
Summary

Decisions on stump treatment can be made based on a scientific appreciation of *Heterobasidion*, using mapping routines that are already linked into the Forestry Commission management system.