Habitat Management

Woodland Management

Woodlands: General

- Trees dominant
- 13% land coverage (Forestry Commission 2016)
- Individual canopies overlap
- Light critical – variety of plants species
- Decaying material
- Plantation
- Spacing

Canopy

- Vary in density and structure
- Restriction to understorey
- Mature beech vs ash
- Woodlands – spacing the result of competition
- Plantation – proximity planting

Woodlands: Bark

- 80 species moss – oak woodlands
- 324 species of lichen
- 300+ km^{-2} New Forest
- Microhabitats for invertebrates
- Filamentous algae

Woodlands: Soils

- Good cover – variety of unseen fauna
- Recycling – mycorrhizal
- 1700+ invertebrates in rotting wood habitats.
- Fungal hyphae

Types of woodland: Coniferous

- Predominantly conifers
- Typically evergreen
- Seed producing - inside cones

Broadleaf

- Variety
- Leaf shape – broad and flat
- Deciduous
- Holly
- Seeds – acorns and berries
- Climatic variability

Sessile

Oak Woodland

- Two native species: Sessile oak *Quercus petraea* and Pedunculate oak *Quercus robur*
- Sessile – shallow, acid soils
- Pedunculate – heavy clays of ‘lowland’ Britain
- Often mixed woods - rarely single stands
- Diverse – 400+ invertebrates
- Ancient trees – 300+ lichens

Pedunculate

Beech wood

- Tall crowns and few lower branches
- Autumnal interest
- Dense shade – limited structure
- Saprophytic species – Birds-nest orchids *Neottia nidus-avis*
- Beech leaves – slow to rot

Beech Woodland

- Not impoverished
- Not restricted by soil type – limestone soils
- 100+ species of invertebrates
- 200+ lichens
- Porcelain fungus
- Beech nuts – mast
- Grey squirrel

Ash Woodland

- Limestone areas
- Finely divided, compound leaves
- Loosely branched
- Varied understorey
- Less favoured by invertebrates (40 species)
- Rich in lichens (255)
- Climax species

Birch woodland

- Silver *Betula pendula* and Downy *Betula pubescens*
- Pioneering species
- Not long-lived
- Require high light levels
- Hardy
- Diverse – 300+ insects and mites
- Fly agaric *Amanita muscaria*

Alder/Willow Carr

- Wet or waterlogged soils
- Naturally part of succession from hydrosere
- Willows can support 450+ invertebrates Sedges; rushes
- Land drainage - BAPs

Coniferous Woodland

- Scots Pine *Pinus sylvestris*, Juniper *Juniperus Cupressaceae,* and Yew *Taxus baccata*
- Most planted as plantation – introduced species
- Forestry – economic yield 6 x that of broadleaf
- Softwood – pine furniture to paper

Douglas Fir *Pseudotsuga menziesii*

- Non-native
- Imported to improve yields
- Land too poor for agriculture
- Sitka spruce *Picea sitchensis*
- Conservation concerns – wide rides; streams and gullies cleared

Larch Woodland *Larix decidua*

- Deciduous
- Spreading, loose growth
- Light penetration
- Varied flora and fauna unlike most other conifer plantations
- Yacht building/timber cladding & rot resistant

Woodland Threats

- Legal Loopholes – 85% Ancient woodland has no legal protection
- Land management – agricultural practices, fragmentation & overgrazing
- Climate change – increased temperature, changes to precipitation & storms
- Diseases – fungal, viral & bacterial

- 60 million trees have been taken by Dutch Elm disease
- 126 million trees in British woods at risk of ash dieback
- 19 pests and diseases are attacking our native trees, six have reached epidemic levels. And at least 11 more diseases are nearing our border

Bacterial and Viral Infections

- Lack of light, water, CO_2 and nutrients can lead to reduced growth – stress
- Stressed trees more vulnerable to disease
- Oak decline – complex – bacteria, insect infestation & weathering

Acute – mature trees. Bacterial agents - symptoms such as stem bleeding

– Pedunculate & Sessile affected

Chronic – more prolonged (yrs)

– Early signs - foliage deterioration, twig death, sparse foliage over crown

– Typically Pedunculate

Acute Oak Decline

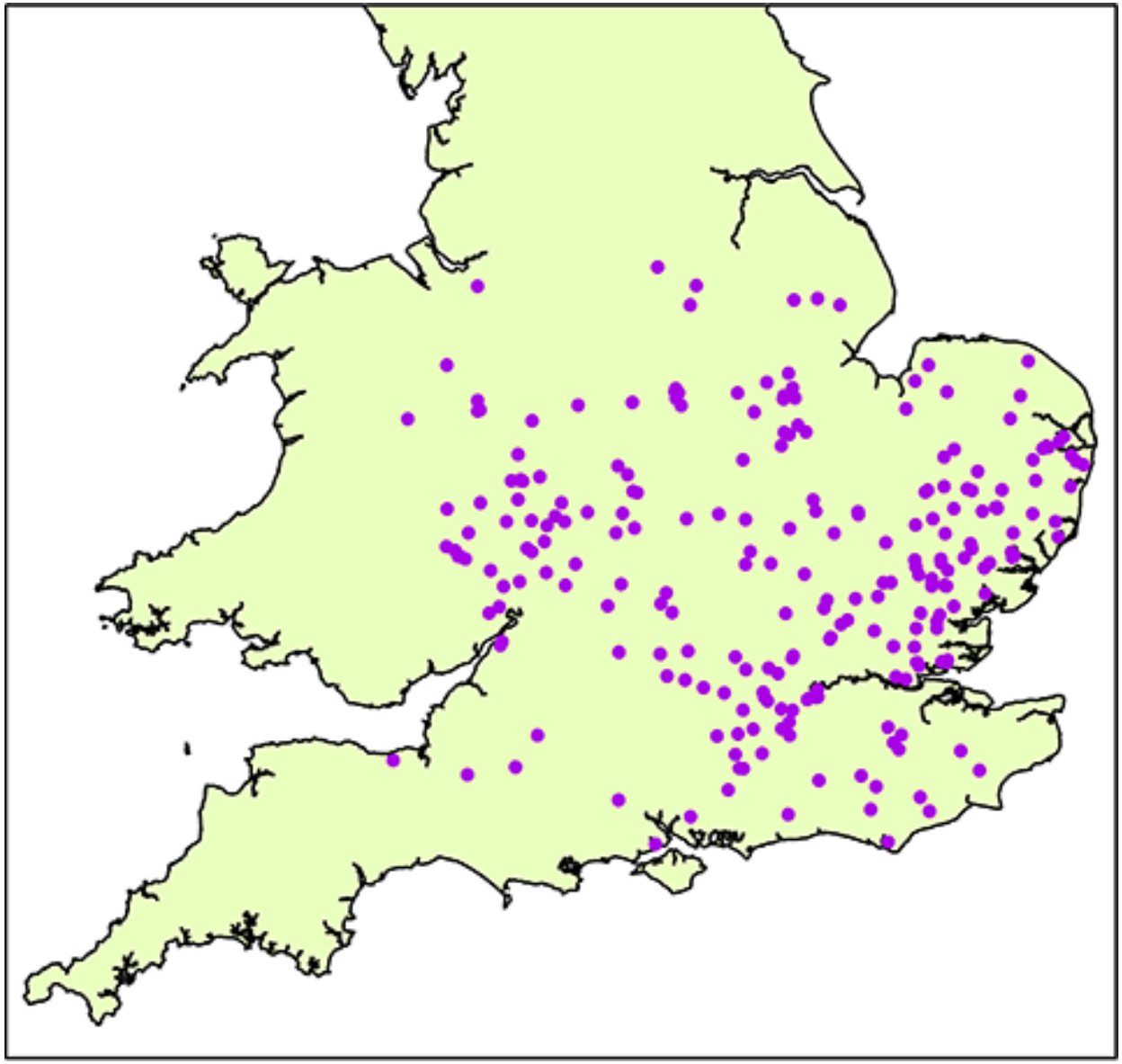
Acute oak decline (AOD) is a condition affecting several thousand oak trees, mostly across East Anglia, the Midlands and Southern England as far west as Somerset.

Insect attack, particularly by the buprestid beetle, *Agrilus biguttatus*. ‘D'-shaped exit holes of Agrilus might occur in close proximity to some stem bleeds. *Agrilus* beetles not a cause of acute oak decline, but they are thought to be 'opportunistic' on the weakened trees

(a) - bleeding

(b) Lesion below the bark

Confirmed cases Acute Oak Decline in 2015



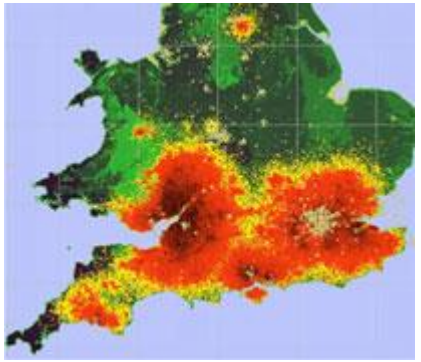
- Some trees are recovering
- Those severely affected die within 4-5 yrs
- Project called “Purpose” launched in 2016 – consider best treatment approaches: University of Reading, Oxford, York, the Centre for Ecology and Hydrology, Forest Research, and the James Hutton Institute

Brown and White Rot

- Brown rot – attacks cellulose
- Leaves a brittle, cracked brick effect – timber value lost
- White rot attacks all the wood – spongy mass
- Often only discovered when fruiting parts are visible
- Honey fungus
- Not all fungus problematic!

Notifiable Diseases - fungi

1. **Sudden Oak Death** - *Phytophthora ramorum*



- Native oaks not as susceptible as American oaks
- Rhododendron – host
- Since 2009 – Japanese Larch

Symptoms:

- Wilted, withered shoot tips with blackened needles
- Infected shoots shedding their needles
- Prematurely bleeding cankers exuding resin on the upper trunk and branches

Causes:

- spreads easily in moisture and water such as moist air currents, mists, fog and watercourses
- Contaminating spores can also be spread by animals and on footwear, vehicle wheels, machinery and equipment

Outlook:

- Globally it has more than 150 host species.
- Ability to switch species a concern
- Species affected: Oak spp; Larch; Sweet chestnut, Horse chestnut; Beech

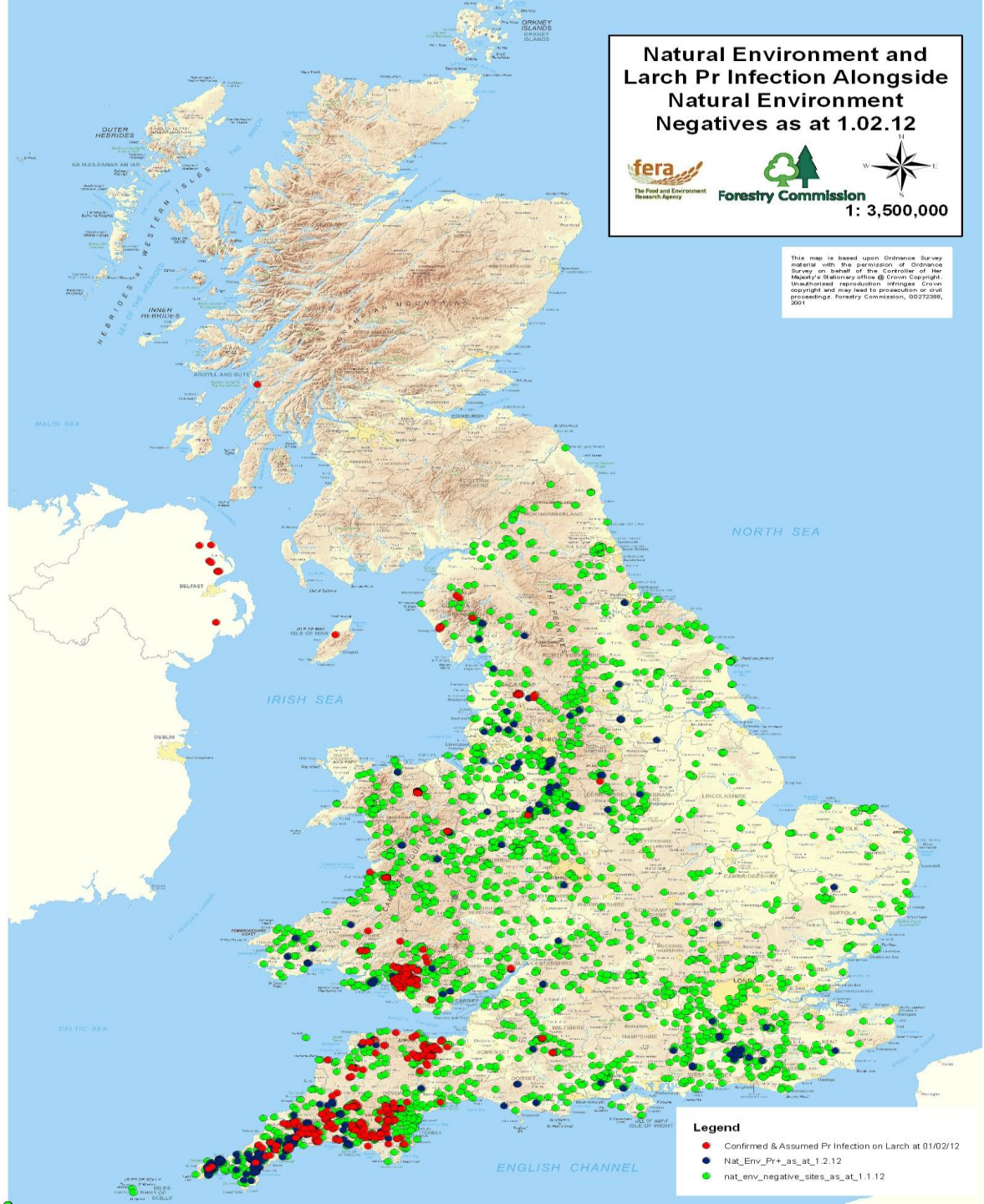
Management:

- Basic housekeeping – cleaning boots/vehicles/restricting site access
- Fungicides to suppress spread. None kill the pathogen
- Tree removal - Licence from Forestry Commission to remove off site
- Plant Health Notices

Chestnut trees (*Castanea sativa*), until 2015 were found infected if exposed to heavy inoculum pressure by their close proximity to heavily infected plants of other species, usually larch trees or rhododendron shrubs. However, in 2015 infected sweet chestnut trees were found at a small number of sites in South-West England, mostly in Devon and Cornwall

Symptoms:

- Crown dieback
- Epicormic growth wilting
- Wilting, blackened leaves


Natural Environment and Larch Pr Infection Alongside Natural Environment Negatives as at 1.02.12
fera
The Food and Environment Research Agency
Forestry Commission
1: 3,500,000
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NORTH SEA
IRISH SEA
ENGLISH CHANNEL
CELTIC SEA
MALIN SEA
Legend
Confirmed & Assumed Pr Infection on Larch at 01/02/12
Nat_Env_Pr+_as_as_at_1.2.12
nat_env_negative_sites_as_at_1.1.12

Ash dieback – *Chalara fraxinea*

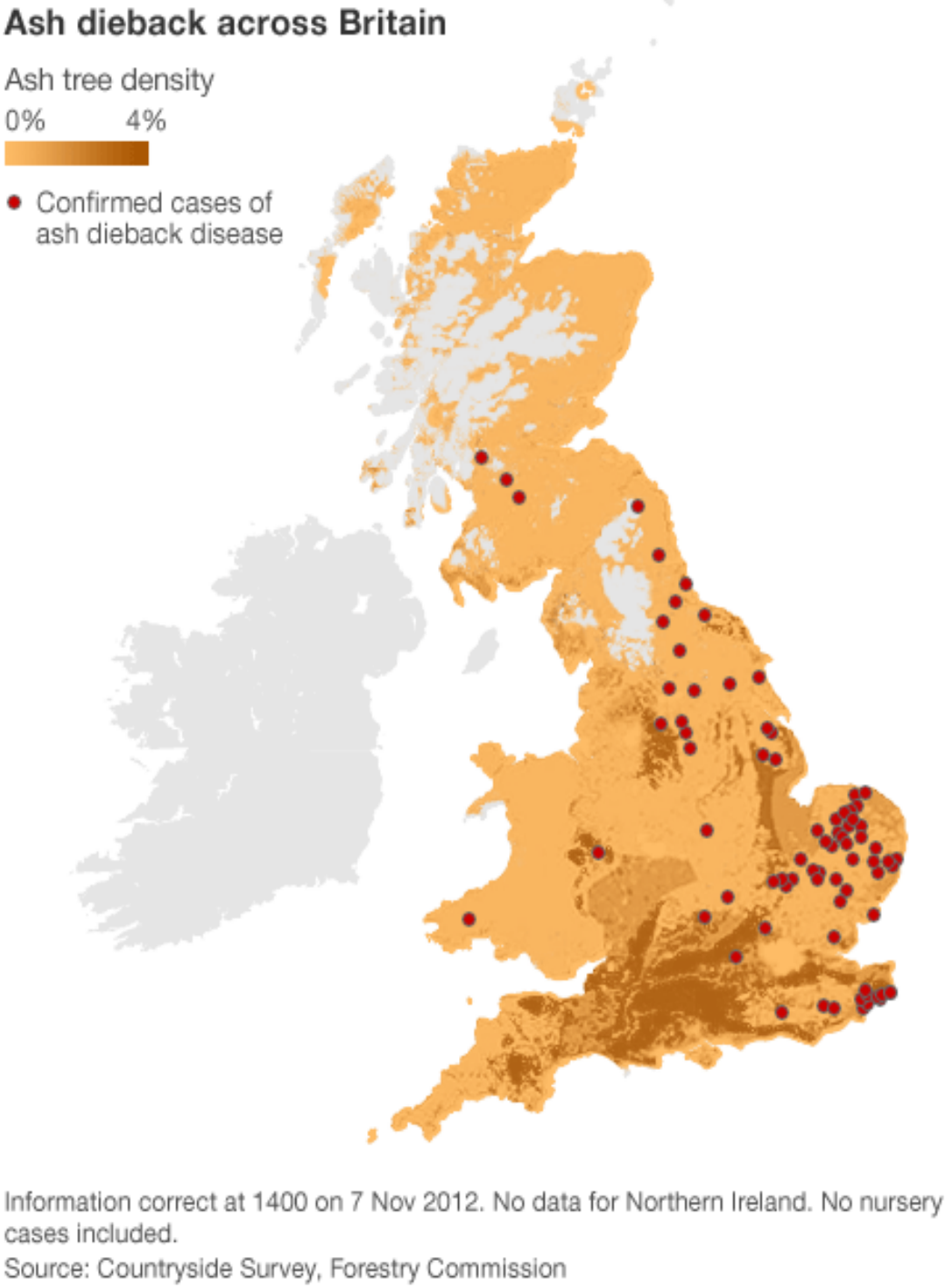
- UK's 3rd most abundant tree
- >400 years
- Supports specialist deadwood species – lesser stag beetle
- 14% nationally rare and scarce lichens
- Upland mixed woodlands – listed as a priority habitat under the Biodiversity Action Plan

Signs of ash dieback

Disease confirmed in UK (Oct 2012) 20 years after its arrival in eastern Europe

A real danger to UK's 80 million ash trees – could change landscape – Dutch Elm disease

- Spread via wind-blown spores
- Spread across Denmark in just 3 years
- Economic consequence
- 2% naturally resistant
- Now in 184 sites around Britain
- Globalisation of plant trade to blame
- First mature tree cases in Carmarthenshire spring 2017



Chalara fraxinea

- Treated as a quarantine pest
- Ban on import & movement of ash trees
- Report suspected cases (Forestry Commission)
- Young/newly planted trees most vulnerable

Notifiable Diseases - fungi

2. **Red Band Needle Blight -** *Dothistroma septosporum*

- Corsican Pine & Lodgepole Pine
- Defoliates – climatic change – wet, warm spring & summers

Nordmann Fir *Abies nordmanniana*
principally affected in UK

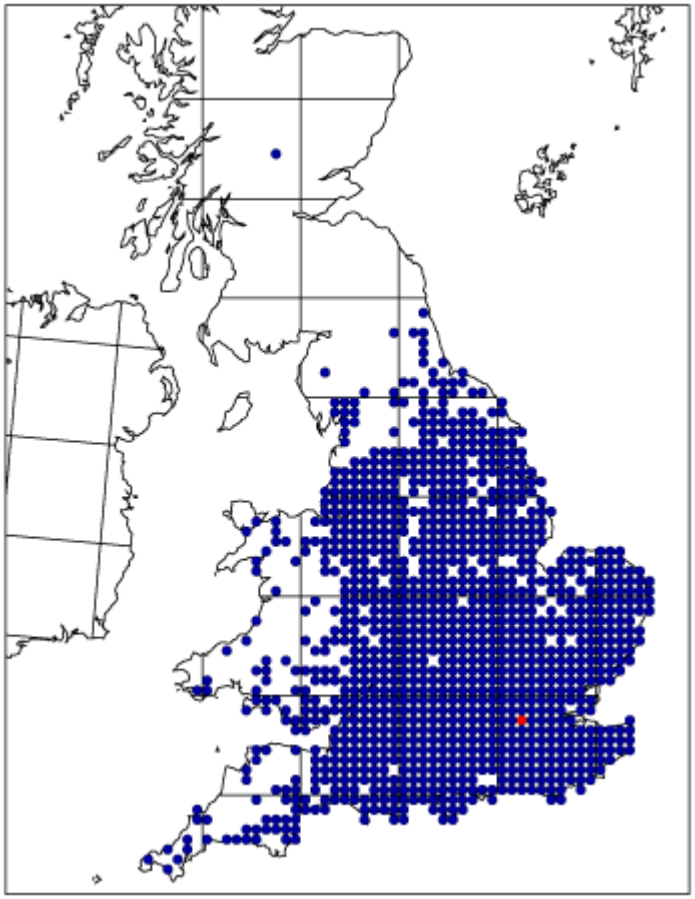
- Tan bands develop after shoots elongate
- Turn reddish brown before shedding
- Can be confused with needle rust, sunburn, herbicide burn or moisture stress

Current season double needle necrosis (CSDNN)

- Imported from the Caucasus – seeds of Nordmann firs
- Fungus – *Sydowia polyspora*
- No fungicide treatment
- 150 growers across UK currently affected
- First spotted in UK 5 years ago

Oak Processionary Moth
Thaumetopoea processionea

Horse chestnut leaf miner - (Cameraria ohridella)



- First reported in UK 2002 in Wimbledon
- Larvae burrow into leaves
- Don’t kill tree but can make the tree vulnerable to other infections
- No requirement to report

Statutory Notification Scheme for importing solid woodfuel (firewood) – January 2017

To protect against imported threats to tree health

Requires importers bringing certain types of firewood into England and Scotland from outside the UK to provide the Forestry Commission with at least three days' prior notification of its arrival if it is coming by sea, road or rail, and four hours' notice if it is arriving by air. The Welsh Assembly Government is expected to introduce a similar regulation.

The regulation covers solid wood fuel in the form of logs, billets, twigs, faggots and similar forms. All relevant consignments, irrespective of size or weight, must be notified.

Exercise:

Divide up into 2 groups, each of which will be considering a different academic paper:

a) Paper 1: Plant assemblages in British beech woodlands within and beyond native range: Implications of future climate change for their conservation.

For Discussion -
Consider the UK's approach to planting strategies given the changing climate. Should we consider adaptation of plants over native vs non native arguments?

a) Paper 2: Tree disease and pest epidemics in the Anthropocene: A review of the drivers, impacts and policy responses in the UK

For Discussion –
Given the impact of pests and diseases to UK woodlands, past, present and fuure, critique current policy, identifying possible solutions.

NEXT WEEK:

- Monday – Oxwich Bay Dunes (optional)
- Thursday – Craig y Nos Country Park (Compulsory)
- Friday – Varteg Hill (Optional)