RHS
Inspiring everyone to grow

Plant Society Workshop 2018

Plant Health Update

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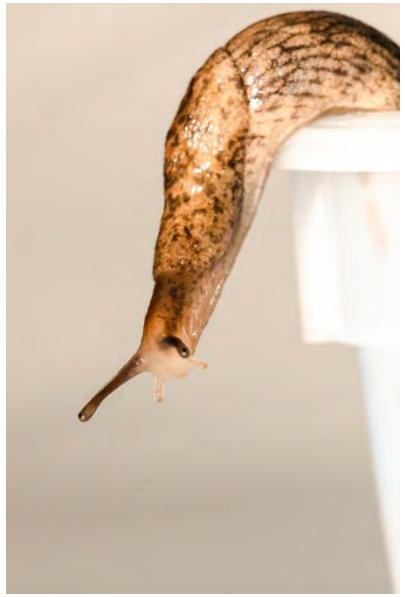
Plant health - the problem

Outline



- Plant health – the problem
- Plant health - mitigation
- Top 5 pests 2017

- Top 5 diseases 2017
- RHS pathology research – citizen science
- RHS pathology research – experiments

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Plant health - the problem

- Ornamental horticulture 1000's of plants from around the world
- New problems often spotted and often via RHS Gardening Advice Service
- Always inform/ work with authorities (APHA/ Plant Health and Seeds Inspectorate (PHSI))

Animal &
Plant Health
Agency

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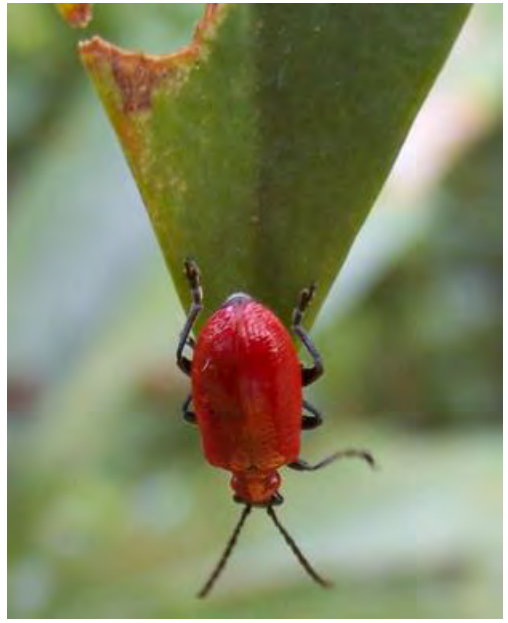
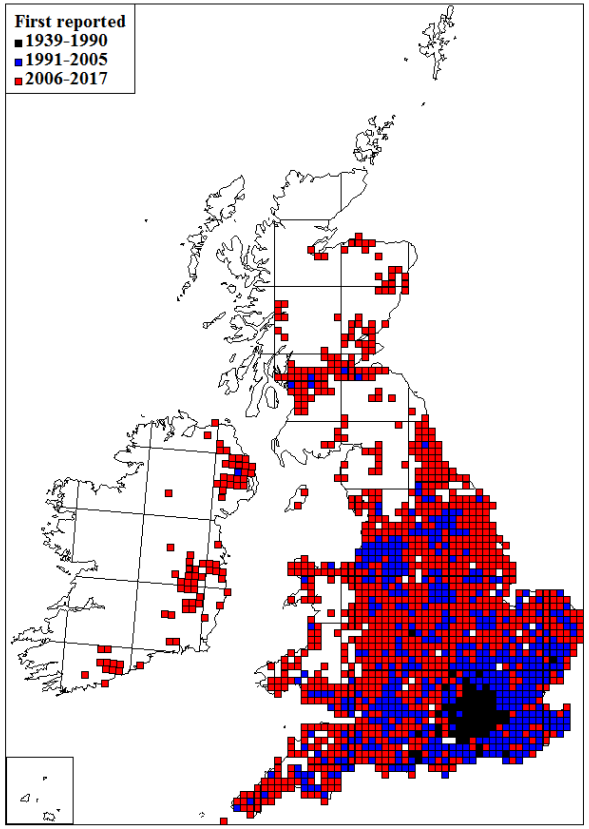
Plant health - the problem

- Rhododendron whitefly, *Dialeurodes chittendeni* - 1920s (named after F.J. Chittenden RHS Director)

Plant health - the problem

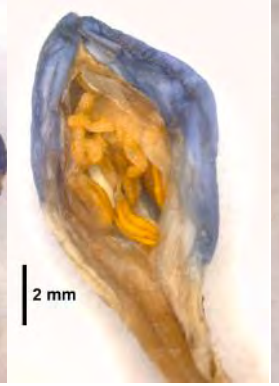
- Lily beetle, *Lilioceris lilii* –1940's





Plant health - the problem

- Agapanthus gall midge, *Enigmadiplosis agapanthi* – 2010's



Plant health - the problem

- Some serious effects on garden operations
- Oak Processionary moth, *Thaumetopoea processionea*
- Arrived UK 2007

Plant health - the problem

- Pathway of introduction (How they get here)
  - Natural spread
  - Plant imports (The home gardener – Fuchsia gall)
  - Other imports

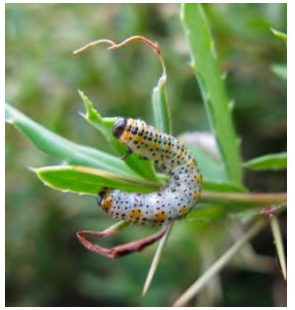
- Increasing trend

Agricultural and Forest Entomology (2007), **9**, 307–326

Recent non-native invertebrate plant pest establishments in Great Britain: origins, pathways, and trends

Richard M. Smith, Richard H. A. Baker, Chris P. Malumphy, Sue Hockland, Roger P. Hammon, Joe C. Ostojá-Starzewski and Dominique W. Collins

- By time in gardens often too late



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Plant health - the problem

Ash dieback, *Chalara fraxinea* – arrived 2012

Plant health in UK reviewed

Plant health - the problem

Xylella fastidiosa – bacterial disease

- 400+ hosts
- Symptoms include leaf scorch, wilt, dieback and plant death
- Major problems in mainland Europe
- Leafhopper vector
- Not in UK

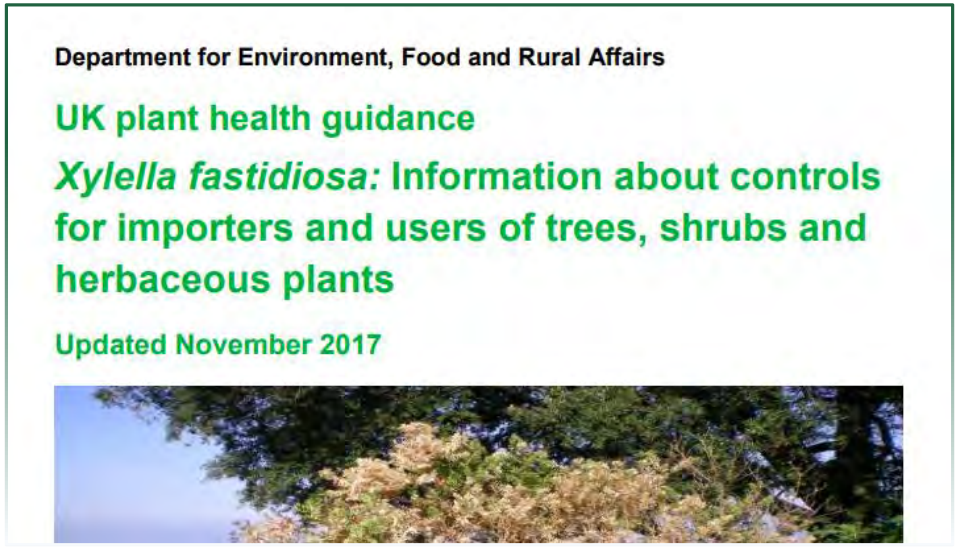
Philaenus spumarius (J. Michaelson)

Donato Boscia, CNR, Bari; John Hartman, University of Kentucky; Agnès POIRIER, EPPO

Plant health - mitigation

Commercial plant imports

- Plant passports and other regulations
- Plans to deal with outbreaks



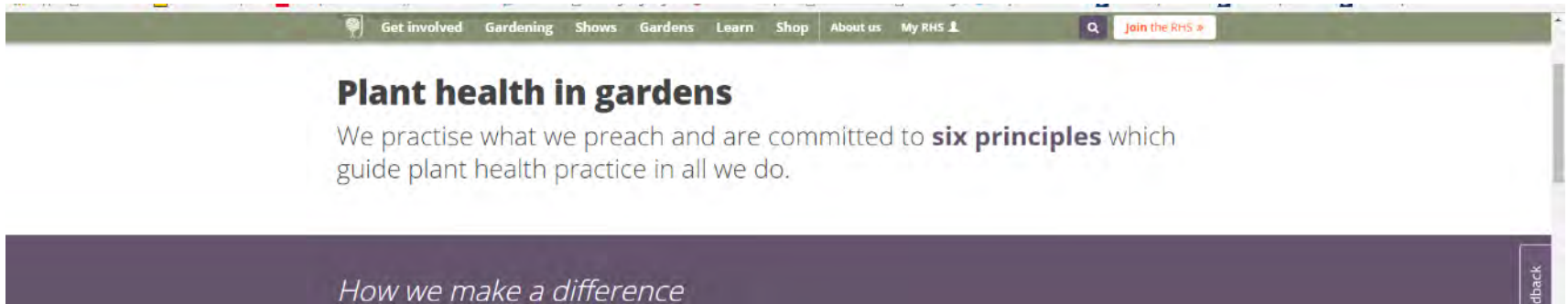
What can gardeners do?

- Do not bring (high risk) plants or cuttings back from abroad
- Be aware of provenance of plants purchased or obtained
- Monitor for symptoms on recently obtained plants

Plant health - mitigation

RHS 2018 - Six plant health principles:

- Provide guidance to protect the sustainability of gardens and horticulture
- Assess risks prior to undertaking activities and identify mitigations
- Adopt practices across RHS that minimise risk
- Prioritise and undertake research to generate knowledge necessary to manage risks
- Communicate and exchange knowledge to enable informed decisions
- Work collaboratively, internally and externally to contribute to the management of plant health risks to the UK and help develop the skills necessary to manage the risks



Plant health - mitigation

RHS Shows 2018

- Ban plants particularly susceptible to *Xylella*, from being exhibited at RHS Shows (unless UK sourced and grown).

- Incorporate evaluation of plant health risk into judging at RHS Shows; provide training and support for judges.

- Request the Animal and Plant Health Agency to inspect plants at RHS Shows.

- Review and implement plant health policies for RHS Shows, including revising guidance, training exhibitors and staff, review planting lists, undertaking inspections etc.

- Future: hold, in isolation, all imported semi-mature trees for at least 12 months prior to use.

Plant health - mitigation

Show policy delivery 2018

- Plant Health team provided 15 training sessions for contractors, designers, exhibitors and judges at RHS Shows (>750 people)

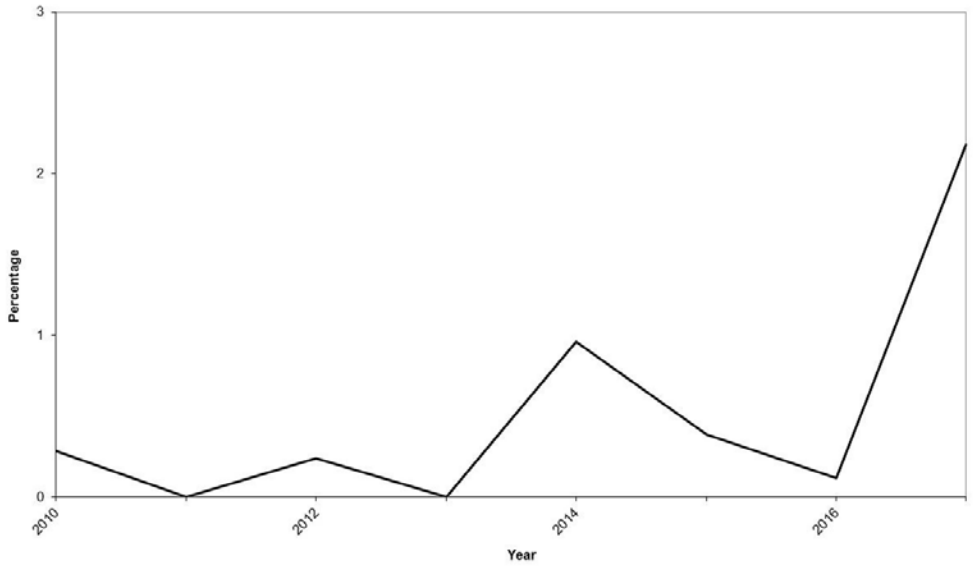
- Plant health inspections took place during Chelsea, Chatsworth and Hampton Court Palace Flower Shows (Plant Health team working with APHA)

- Exhibitors demonstrated good awareness of plant health concerns and showed greater knowledge of plant provenance. Many high risk hosts of *Xylella* had been substituted, e.g. pomegranate in place of olive

- Plant health garden at Chatsworth show in collaboration with BBC GQT

Top 5 pests 2017

5: Alder leaf beetle (New to top 5)

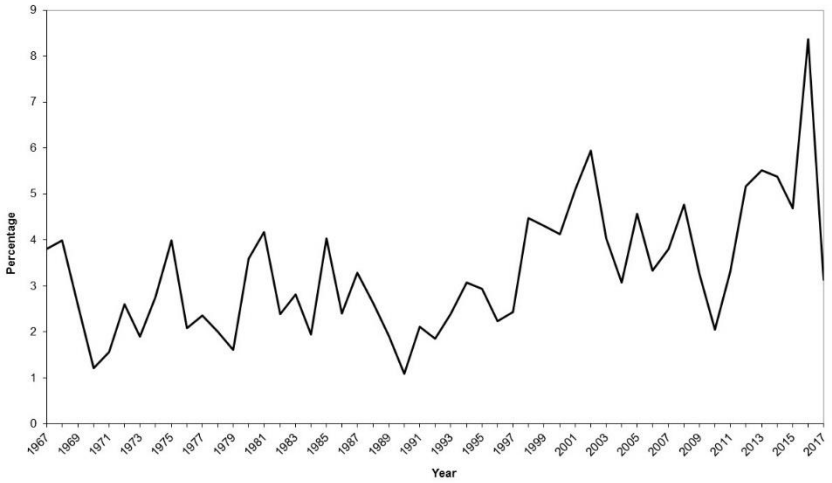


Alder leaf beetle as a percentage of pest enquiries received by RHS Gardening Advice (2010 to 2017).

Control: Not usually necessary

Top 5 pests 2017

4: Slugs and snails (2016 = 1)



Slug enquiries as a percentage of pest enquiries received by the RHS Gardening Advice (1967 to 2016).

Subject of RHS Research programme

Control: Pellets, nematode (slugs only), resistant plants, barriers, manual removal

Top 5 pests 2017

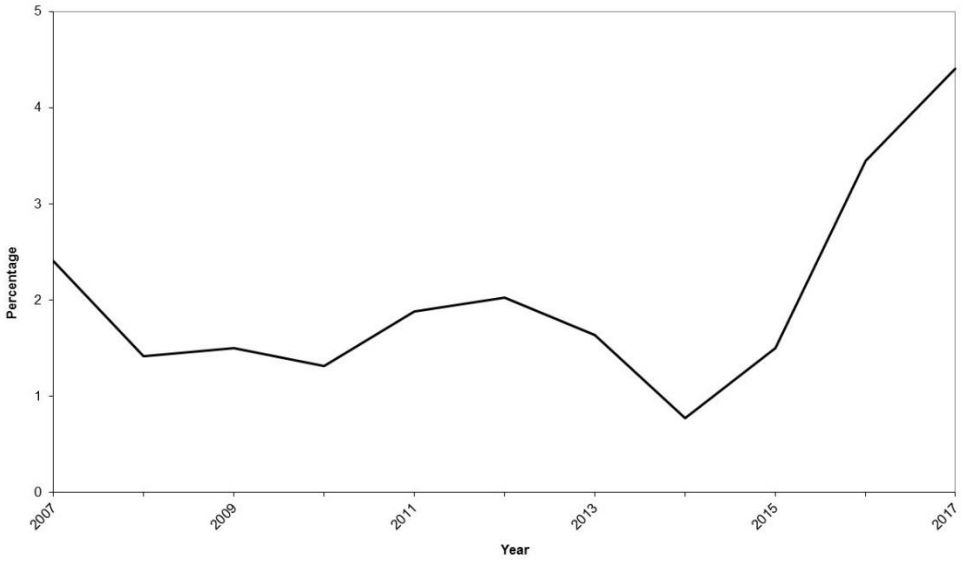
3: Vine Weevil (2016 = 2)

Vine weevil enquiries as a percentage of pest enquiries received by the RHS Gardening Advice (1967 to 2017).

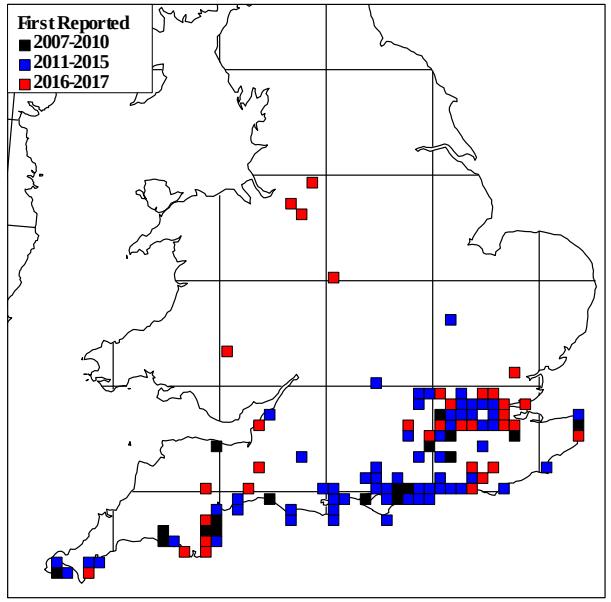
Control: Adults, manual removal/barriers, nematodes (adults & larvae), pesticides

Top 5 pests 2017

2: Fuchsia Gall mite (2016 = 3)



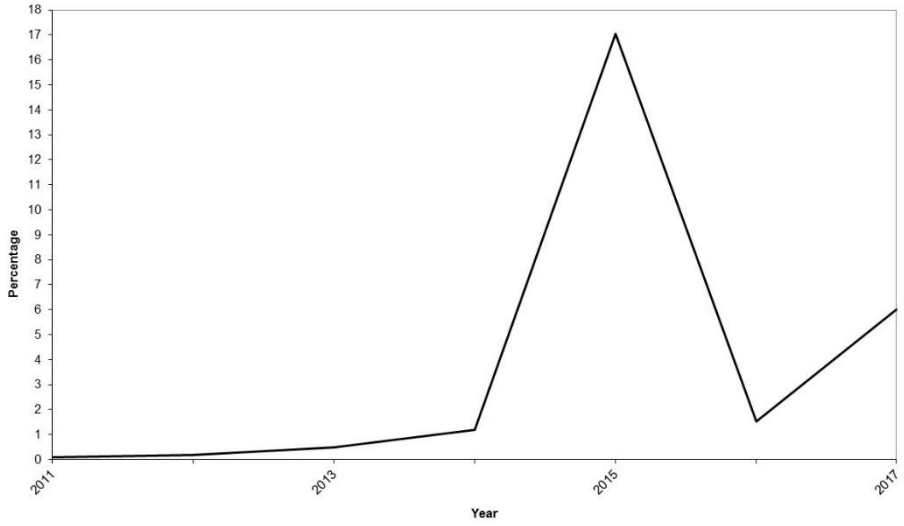
Fuchsia Gall mite as a percentage of pest enquiries received by RHS Gardening Advice (2007 to 2017).



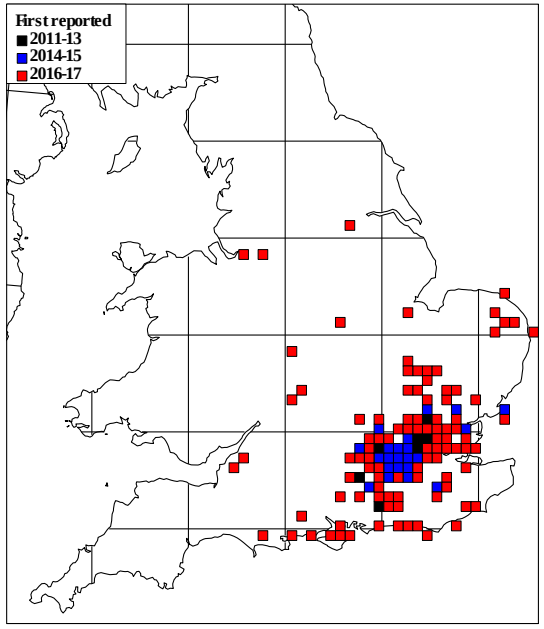
Control: Cut plant back, likely to reoccur

Top 5 pests 2017

1: Box tree moth/ webber (2016 = 7)



Box tree moth enquiries as a percentage of pest enquiries received by the RHS Gardening Advice (2011 to 2017).



Submit sightings: Search: RHS Box tree moth

Control: Pesticides?

Top 5 diseases 2017

1: Honey Fungus

- #1 for 22 years
- Root rot then dieback
- Woody & herbaceous hosts
- Brown-ish, clumps, pale gills & spores, ring on stem
- White fungal sheets under bark, bootlaces

Top 5 diseases 2017

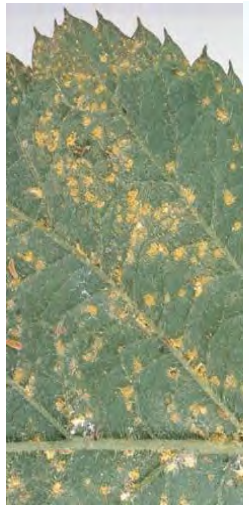
2: *Phytophthora* root rots

3: Rusts

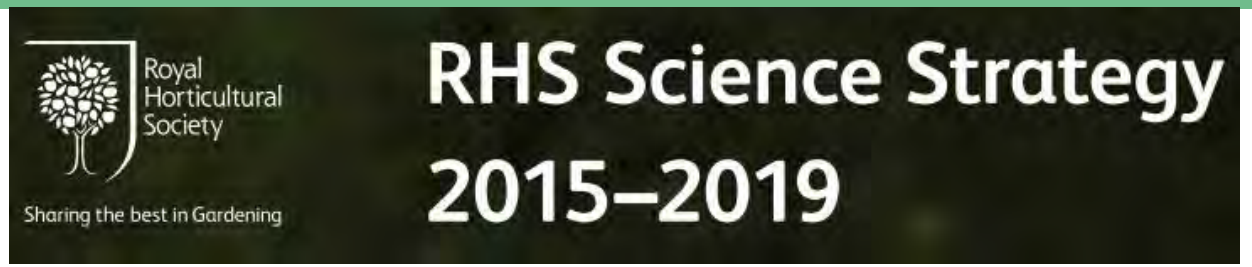
4: Powdery mildews

5: Box blight

…10: Kerria Leaf & Twig blight



RHS Plant Health Research



- **Monitor** plant pests and diseases in gardens
- Improve **detection** & **ID** of plant pests & diseases
- Advance **control & management** strategies for pests & diseases in gardens
- Encourage good stewardship of nature in gardens for **environmental benefit**

- Validate current advice
- Develop new tools to improve future advice

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Citizen Science

- Asking the general public to gathering data for scientific purposes
- Different levels of engagement
- Different levels of pre-existing knowledge

Forestry Commission

Tree Alert
Tree Pest & Disease sighting reporter

iRecord

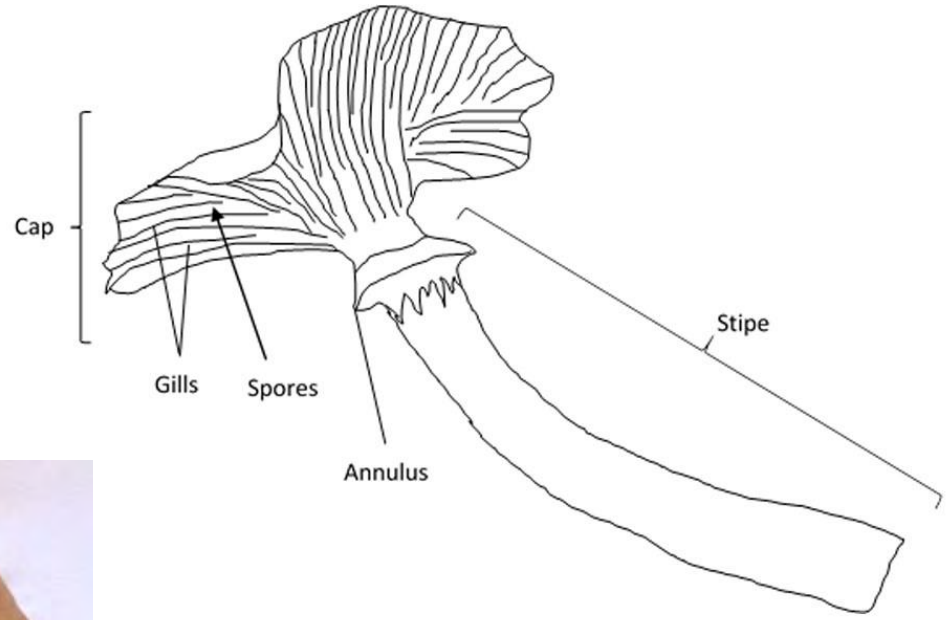
OPAL

treezilla
the monster map of trees

Observatree
monitoring tree health

RHS Honey Fungus Hunt

- Spot mushrooms
- Make a spore print
- Take photos
- Note the context
- Submit online



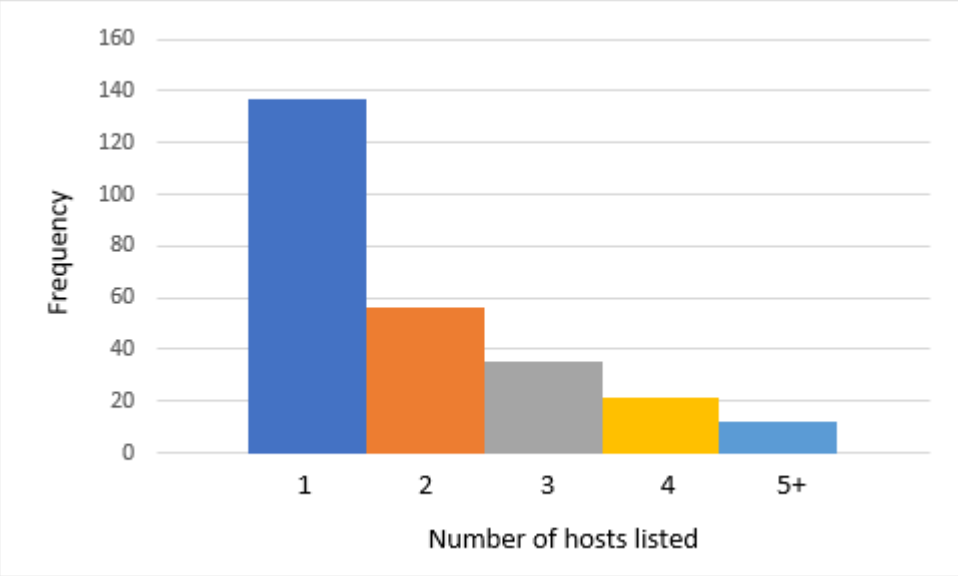
Results

www.rhs.org.uk/honey-fungus-hunt

- 170 records with pics
  - 90% correctly identified
- Always in a clump
- >90% caused disease:
  - 81% saw canopy symptoms
  - 25% saw mycelial sheets under bark
  - 25% saw bootlaces
- *Prunus* (10%), *Betula* (9%), *Malus* (7%), *Salix* (5%)
- Apple & oak had mushrooms but no disease

Results & Impact

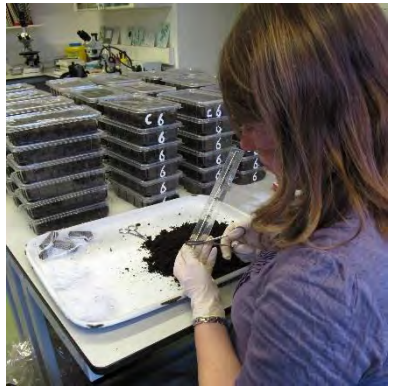
- Spread of disease in lines along old roots
- Common for stumps not to be removed
- 50% single host … so far!



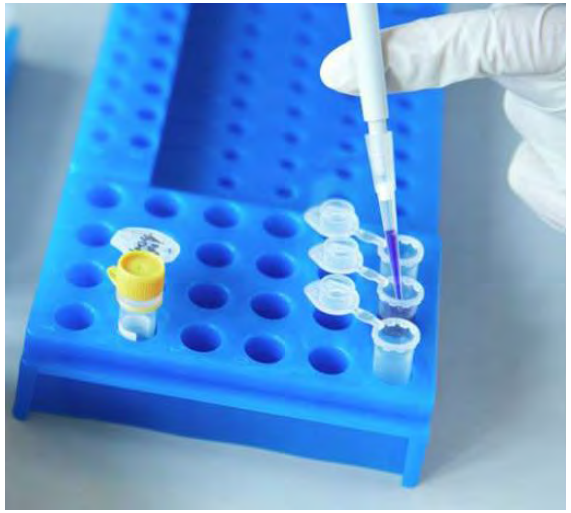
- Molecular ID for first incidences
- Encourage checking under bark of dead plants
- Explore methods of stump management

Pathology Experiments

- Honey fungus:
  - Severed rhizomorphs
  - Multi-species attack of privet
  - Beneficial root fungi
  - Improving artificial inoculation

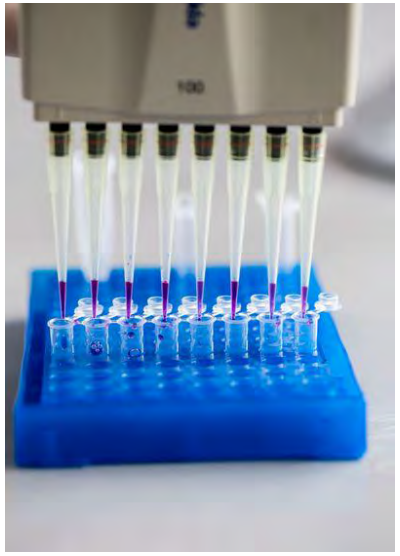


- Molecular diagnosis
- Diversity of UK *A. mellea*
- Stumps & infected soils



Molecular Diagnostics

- 7 species in UK, 3 in gardens:
  - *Armillaria mellea* (83%)
  - *A. gallica* (16%)
  - *A. ostoyae* (1%)
- Pathogen & saprophyte



Multi-species Experiment

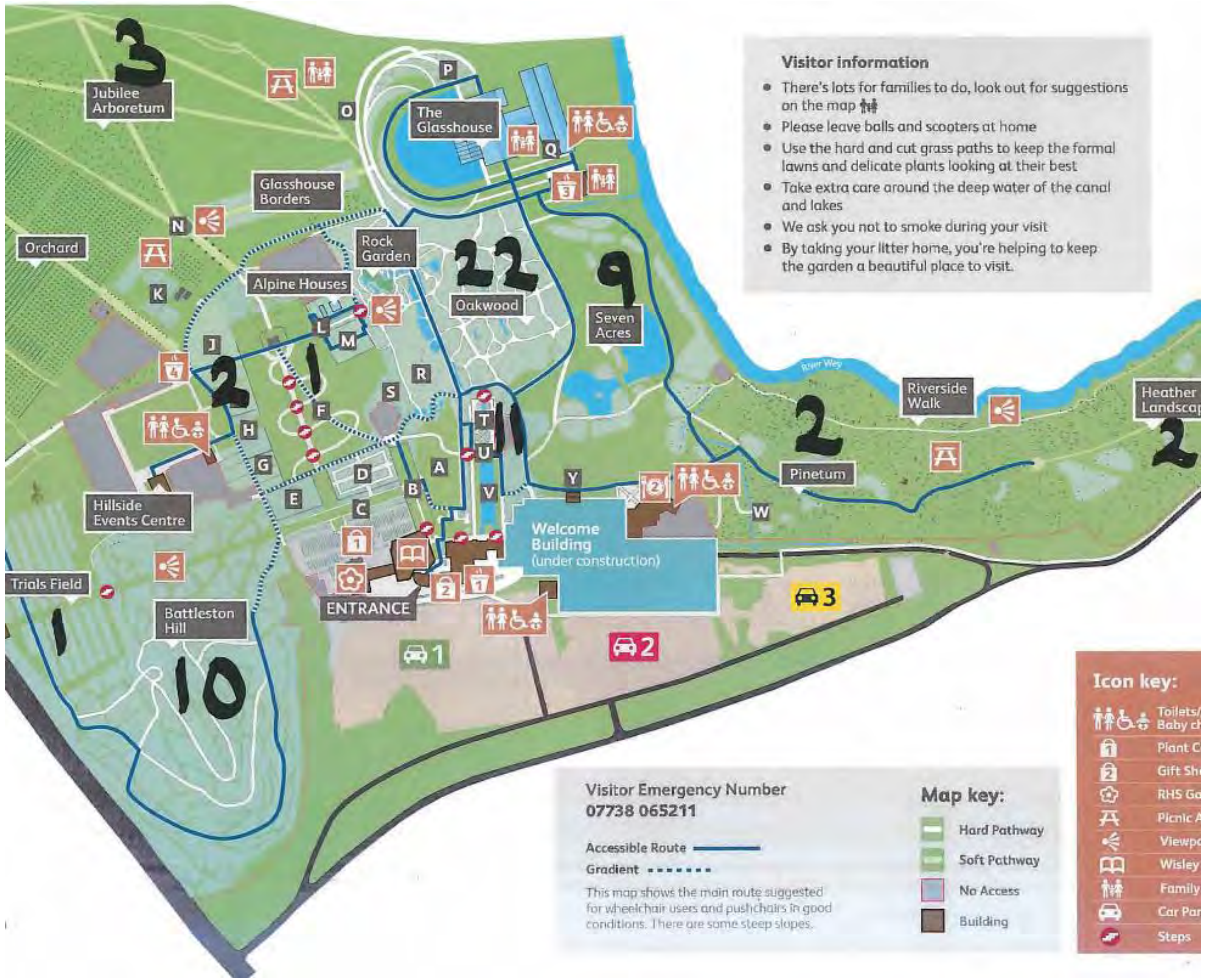
A. gallica
(saprophyte)

A. mellea
(pathogen)

Finding Beneficial Fungi

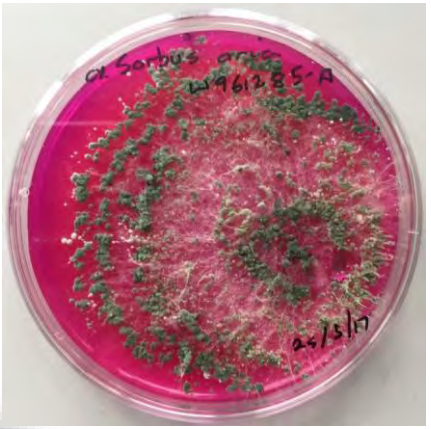
At Wisley:125 records, 48 host genera

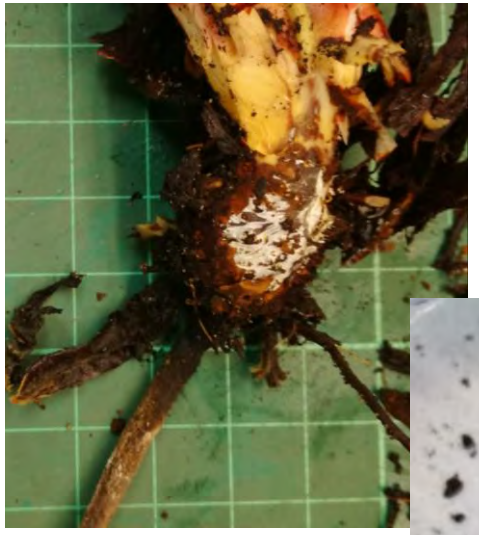
Most common hosts	No. records	Host list rating
Rhododendron	14	***
Hamamelis	8	*
Viburnum	7	***
Malus	6	**
Acer	5	**
Quercus	5	*
Sorbus	4	**
Syringa	4	**
Magnolia	3	*
Pinus	3	(almost)

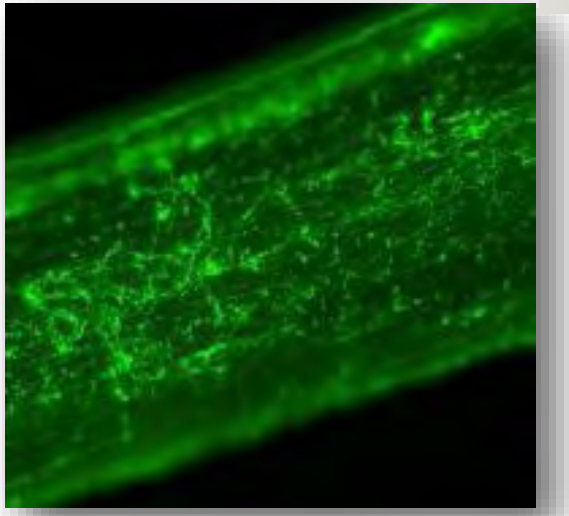


Testing Beneficial Fungi

- *Trichoderma* endophytes







- 19 isolates 0/3 died
- 13 isolates 1/3 died
- 5 isolates 2/3 died
- 1 isolate 3/3 died