

Movement of Disease through Machinery and Materials

Dr Kate Entwistle

The Turf Disease Centre, Waverley Cottage Sherfield Road, BRAMLEY, Hampshire, RG26 5AG, UK

Telephone: +44 (0)1256 880246

Mobile: +44 (0)7879 468641

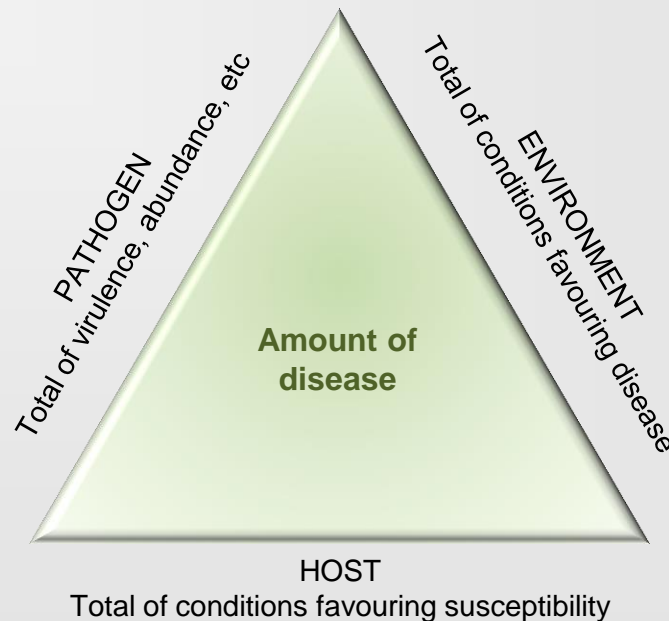
Email: Kate@theturfdiseasecentre.co.uk



Disease can not develop without a pathogen

HOWEVER

The presence of a pathogen does not automatically mean that there will be disease!



Moved naturally by wind, rain, traffic, maintenance

We need to understand the diseases that could potentially affect our turf, including their causes

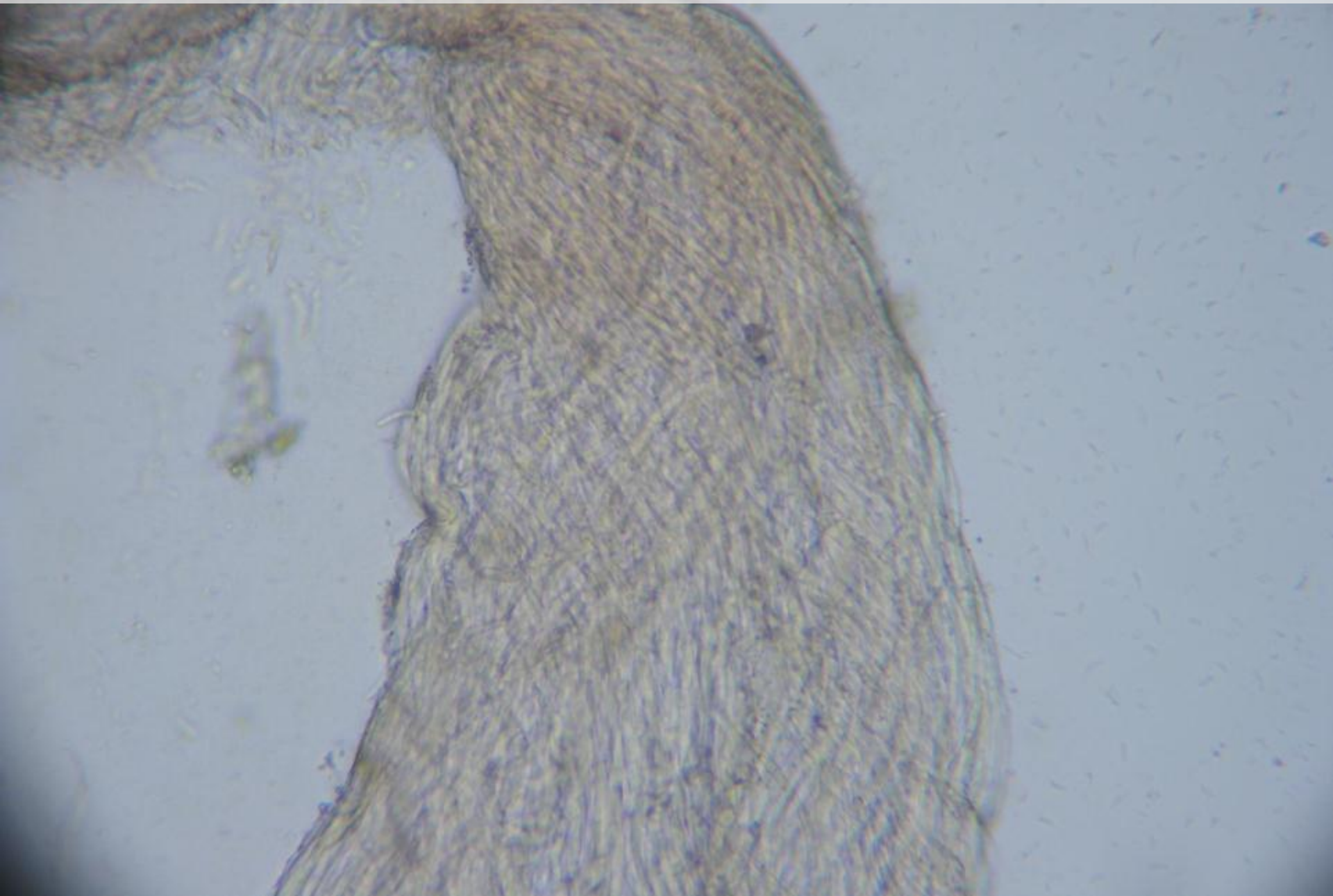
We need to know how these pathogens are moved around

We need to think about the potential of unwanted introductions

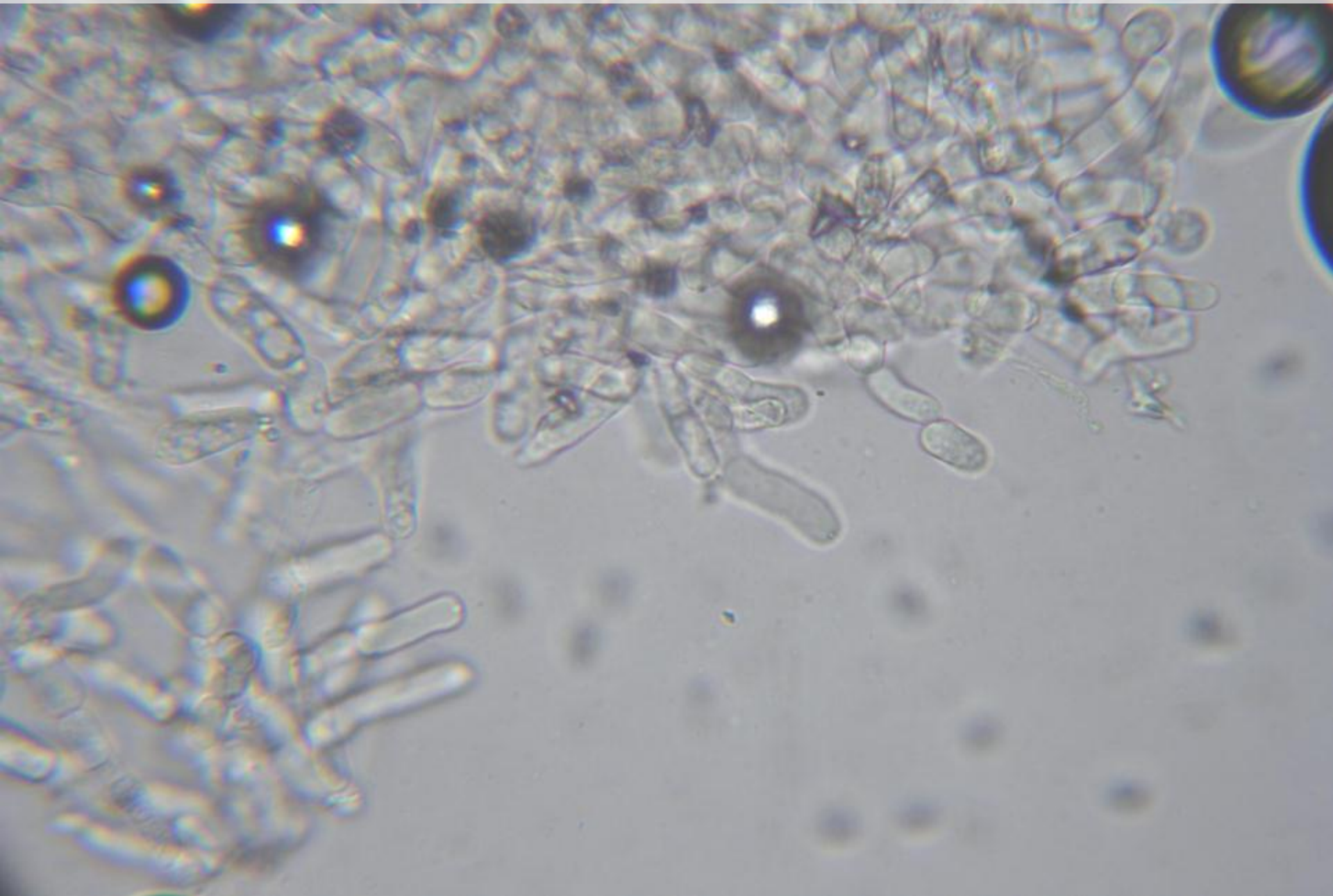
We can easily visualise the movement of some pathogens



Sclerotia, Mycelium, Hyphae



Mycelial strands break into 'spore-like' pieces



Spores on leaf tissues



Movement in water





Plant health issues – at national and site level

Arboricultural Association

Dr John Morgan
Head of Plant health
Forestry Commission



- EU and national legislation
- Action plan driving tree health policy
- Interim FC tree health strategy
- 'Other' important pests and diseases
- Pests that we need to be prepared for
- Guidance about biosecurity

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Arboricultural Association presentation



Potential UK problems

- Citrus Longhorn Beetle (*Anoplophora chinensis*)
- Asian Longhorn Beetle (*Anoplophora glabripennis*)
- Pine Wood Nematode (*Bursaphelenchus xylophilus*)
- Ash dieback (*Chalara fraxinea*)
- Emerald Ash Borer (*Agrilus planipennis*)
- Bronze birch borer (*Agrilus anxius*)
- Spruce budworm (*Choristoneura occidentalis*)
- 8-toothed European spruce bark beetle (*Ips typographus*)

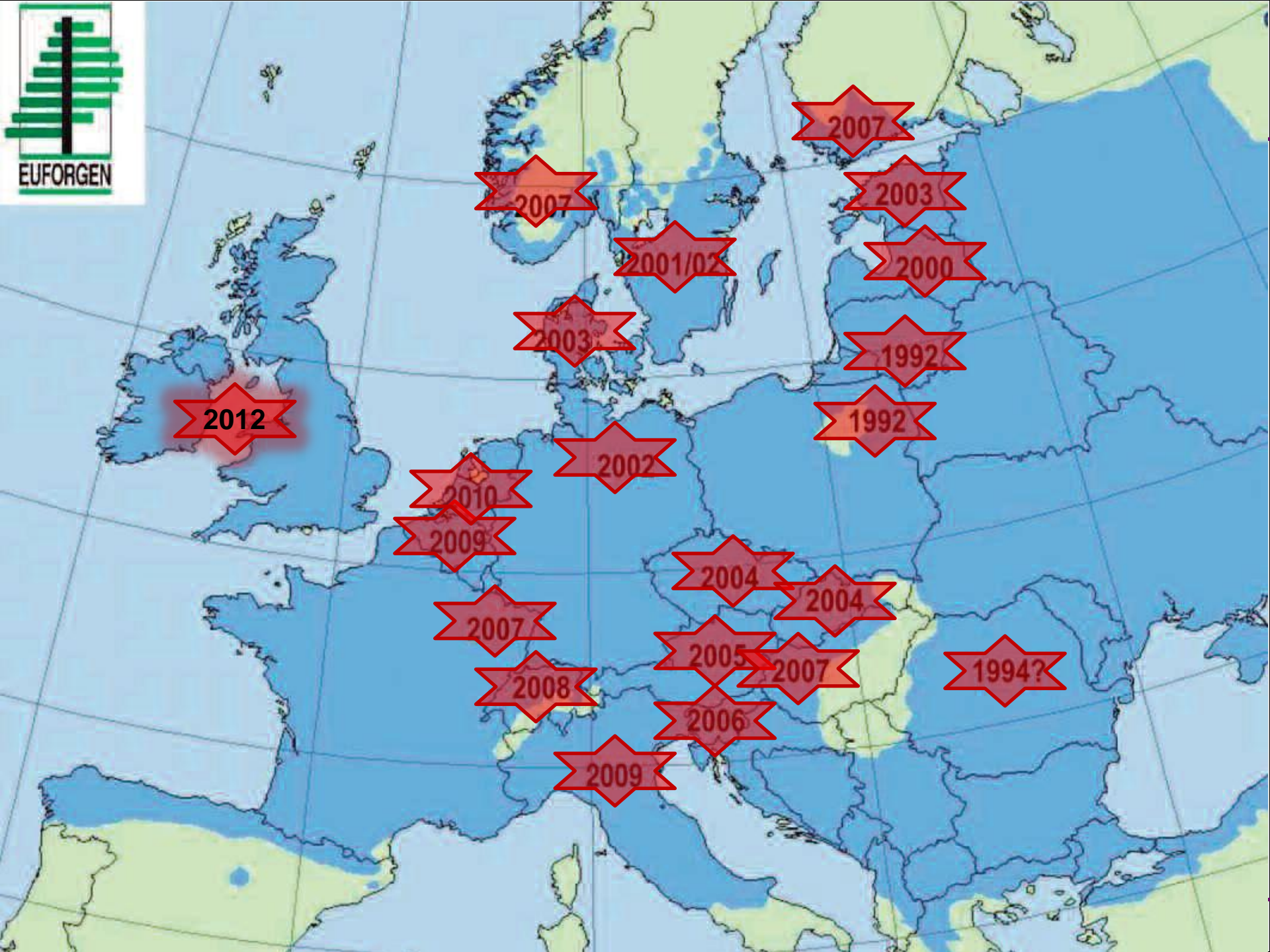


What are biosecurity measures?

- Biosecurity measures are the precautionary steps taken to reduce the risk of transmission of harmful organisms
- Measures must address the 'movement pathways' for organisms
- Good biosecurity practice is a way of working that minimises the risk of contamination and the spread of pests and invasive plants
- The level of biosecurity control must reflect the level of risk of spreading pests between different locations
- We are setting a good example by adopting measures that are highly visible to others

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Arboricultural Association presentation





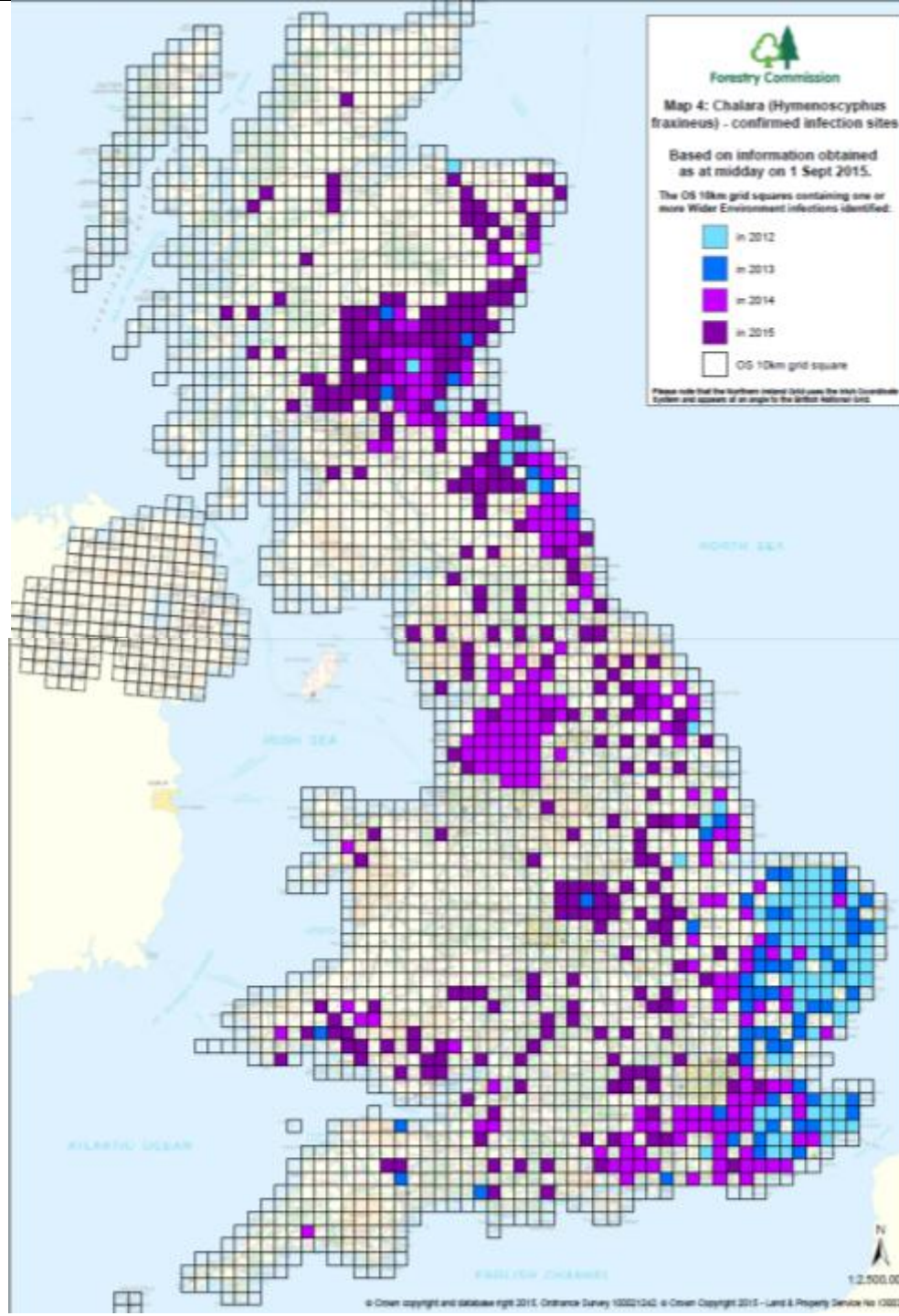
Map 4: Chalara (*Hymenoscyphus fraxineus*) - confirmed infection sites

Based on information obtained
as at midday on 1 Sept 2015.

The OS 10km grid squares containing one or
more Wider Environment infections identified:

-  in 2012
-  in 2013
-  in 2014
-  in 2015
-  OS 10km grid square

Please note that the Northern Ireland Grid uses the Irish Coordinate System and appears at an angle to the British National Grid.



So what has this got to do with turfgrass?

Emergence of new problems from existing populations.

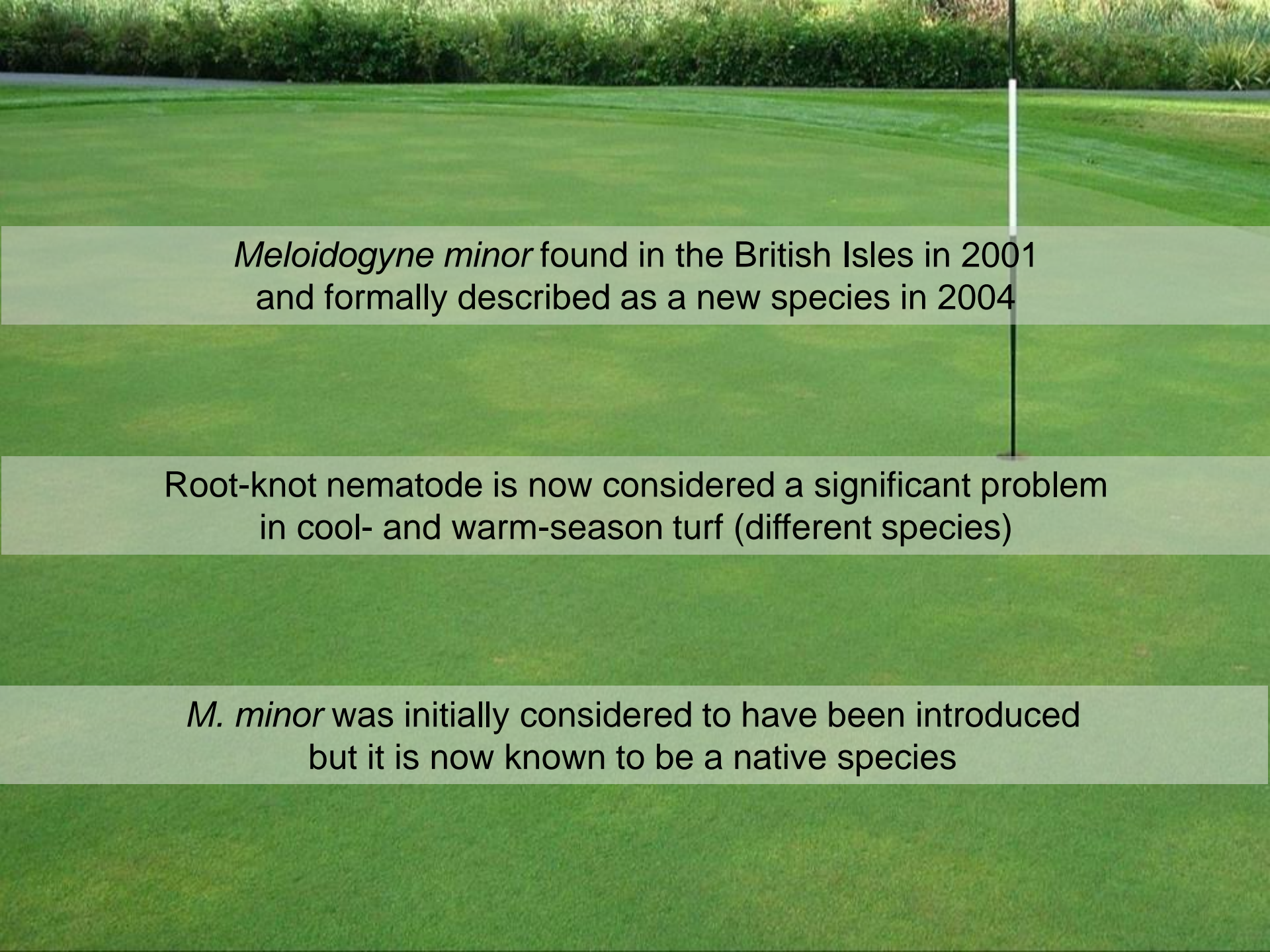
Accidental introductions.

Are we creating conditions that are favourable for new disease development?

Are we creating problems for ourselves by not thinking?

Turf production field with superficial basidiomycetes





Meloidogyne minor found in the British Isles in 2001
and formally described as a new species in 2004

Root-knot nematode is now considered a significant problem
in cool- and warm-season turf (different species)

M. minor was initially considered to have been introduced
but it is now known to be a native species

Plant parasitic nematodes can be readily introduced in sand topdressing and in construction materials



Plant parasitic nematodes can be readily introduced in sand topdressing and in construction materials

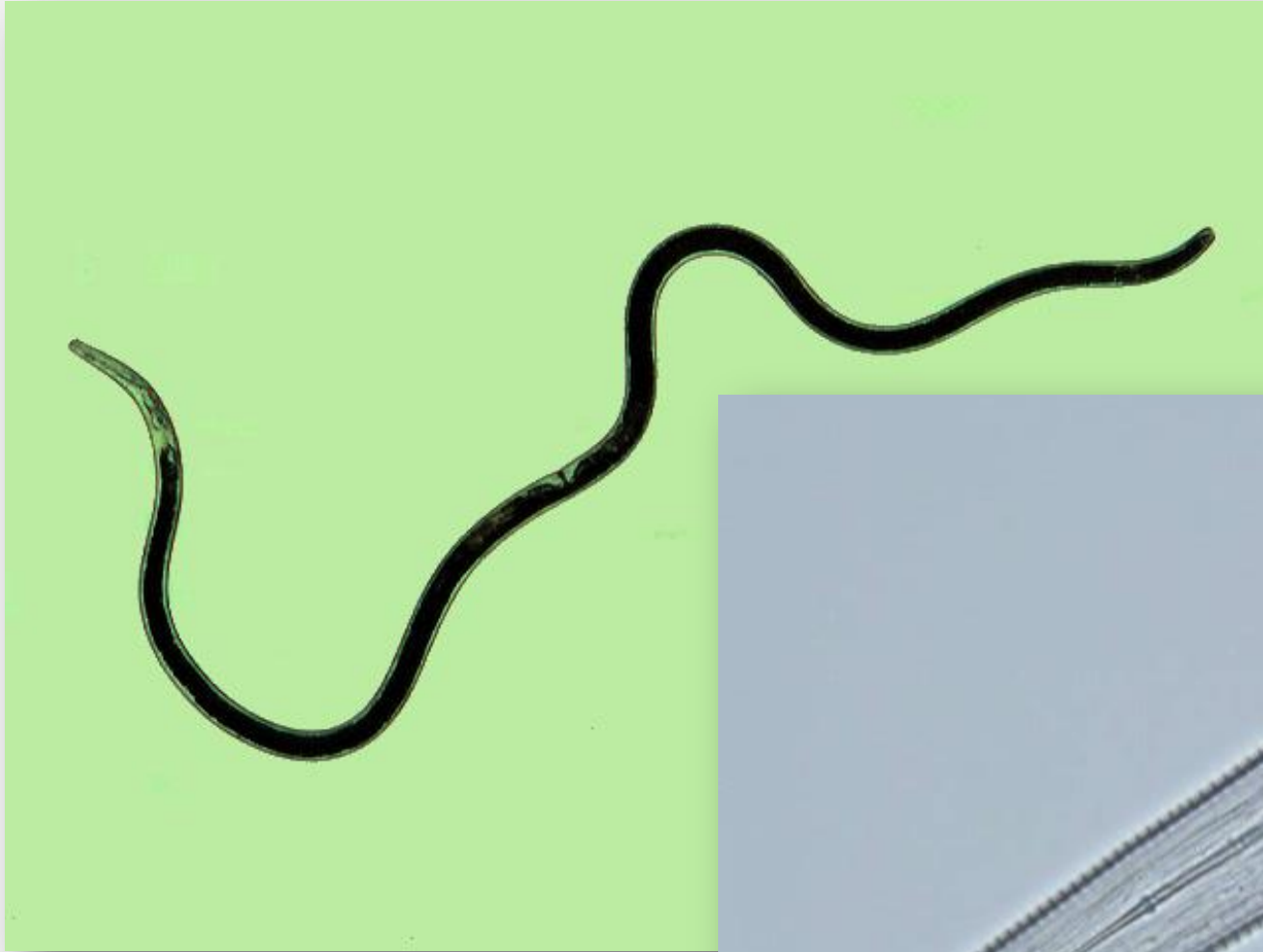
Numbers of nematodes in 100cm³ soil from 5 samples of turf sod from north west Europe tested between 2007 and 2013

| | Ireland TS2007 | Ireland TS2008 | England TS2010 | The Netherlands TS2011 | Germany TS2013 |
|--------------------------|-------------------|-------------------|-------------------|------------------------------|-------------------|
| Bacterial/fungal | 2358 | 355 | 1733 | 528 | 7138 |
| <i>Tylenchus</i> | 0 | 7 | 13 | 0 | 54 |
| <i>Heterodera</i> | 328 | 19 | 3 | 0 | 109 |
| <i>Pratylenchus</i> | 0 | 0 | 16 | 56 | 0 |
| <i>Longidorus</i> | 0 | 0 | 0 | 6 | 0 |
| <i>M. minor</i> | 13 | 2 | 0 | 0 | 0 |
| <i>Meloidogyne naasi</i> | 0 | 0 | 2 | 5 | 0 |
| <i>Hemicycliophora</i> | 0 | 0 | 0 | 0 | 0 |
| <i>Helicotylenchus</i> | 10 | 63 | 5 | 63 | 52 |
| <i>Rotylenchus</i> | 0 | 0 | 0 | 0 | 191 |
| <i>Tylenchorhynchus</i> | 45 | 12 | 21 | 0 | 0 |
| <i>Heterodera</i> cysts | 21 | 0 | 0 | 0 | 1 |
| <i>Meloidogyne</i> galls | 0 | 0 | 2 | 1 | 3 |

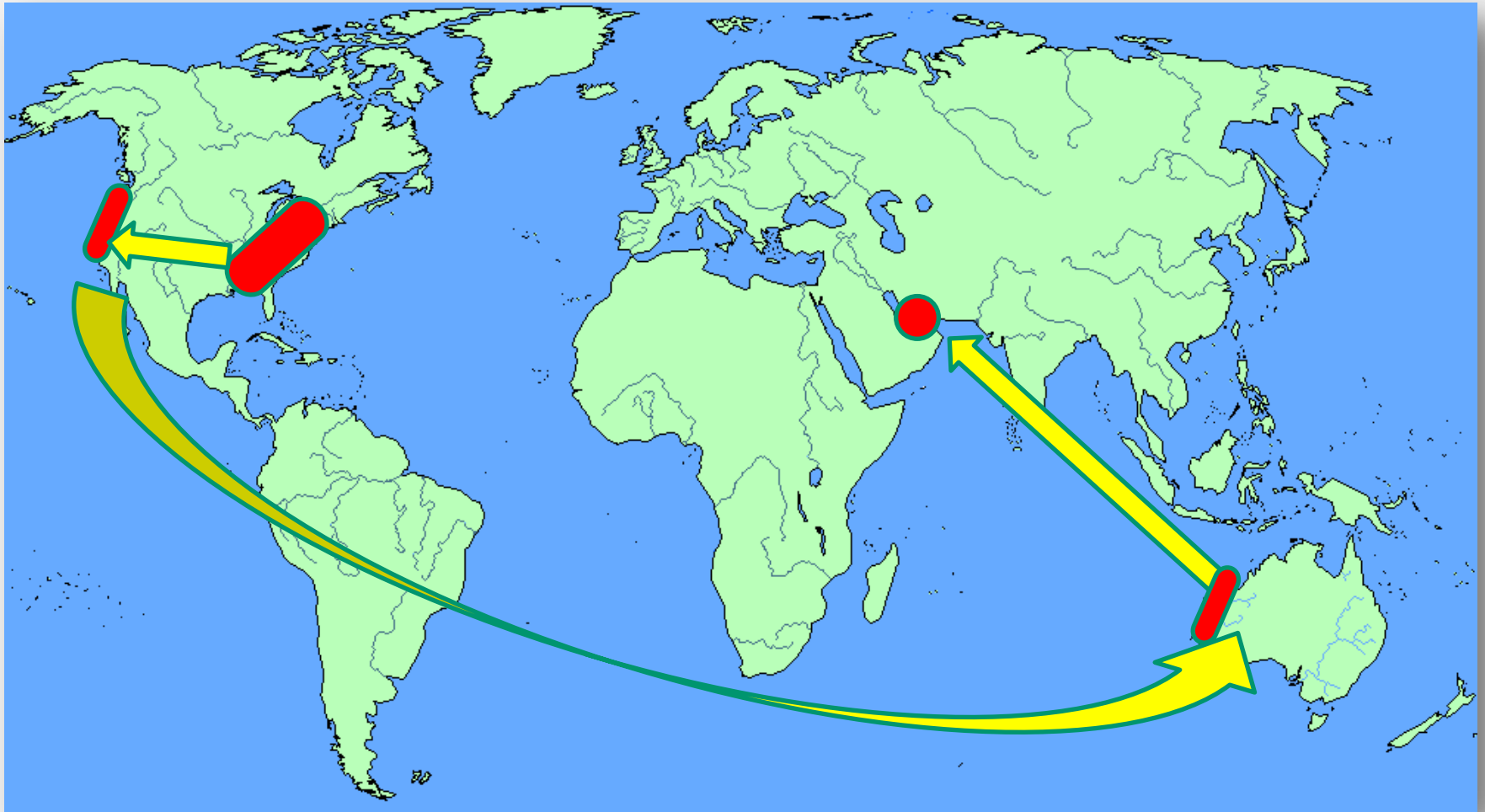
Case Study: Severe nematode damage on a Dubai golf course after renovations with Bermudagrass sprigs



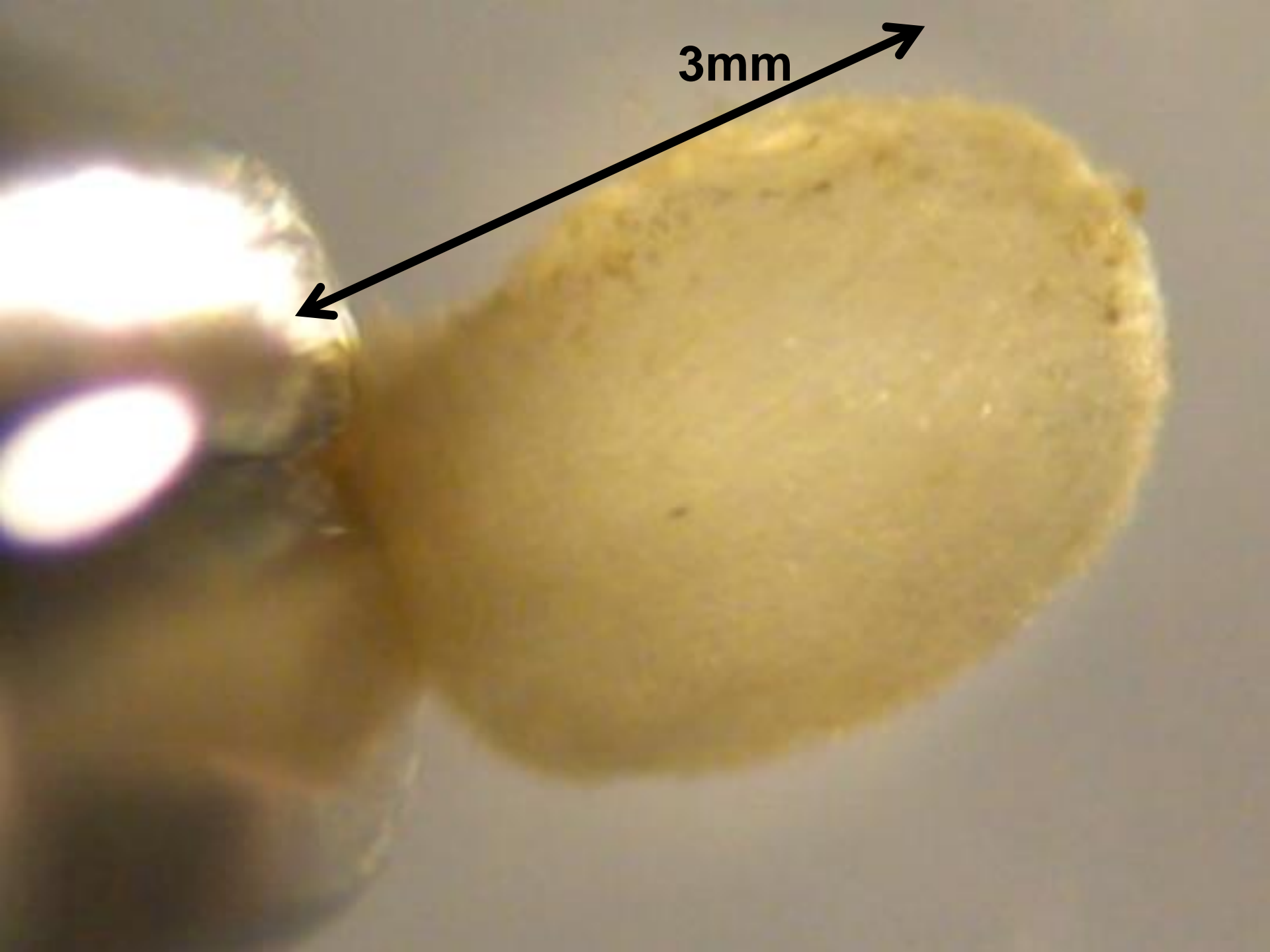
Belonolaimus longicaudatus, sting nematode (2 to 3mm)



How did Sting nematodes reach Dubai?



Transfer of Sting nematodes from Georgia/Florida to California (early 1990s)
California to Australia late 1990s early 2000s
Australia to Middle East late 2000s



3mm







Stem Gall Nematode (*Anguina pacifica*)





A. pacifica on *P. annua*
along the Pacific coast of
Northern California







New problems will develop from native pests...

...through climate change, new host introductions, maintenance changes

Accidental introductions will occur....

...through movement of rootzones during construction

...in topdressings and sand used in renovation

...in turf and sprigs

...on shoes (possibly)

...on machinery

We need to be more aware of the potential movement of pests and diseases, to minimise the chance of devastating turf loss

Thank you

Questions

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Office: +44 1256 880246 Mobile: +44 7879 468641

kate@[theturf-diseasecentre.co.uk](mailto:kate@theturf-diseasecentre.co.uk)