

Aphanomyces Root Rot in the UK

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Why grow peas?

- Pulses in general are economically valuable, contributing to farm profitability, and the food supply chain
- Contribute to sustainable intensification
- Do not require organic nitrogen fertiliser, help reduce greenhouse gas emissions from agriculture and are a low carbon source of protein
- Provide residual nitrogen for the following crop

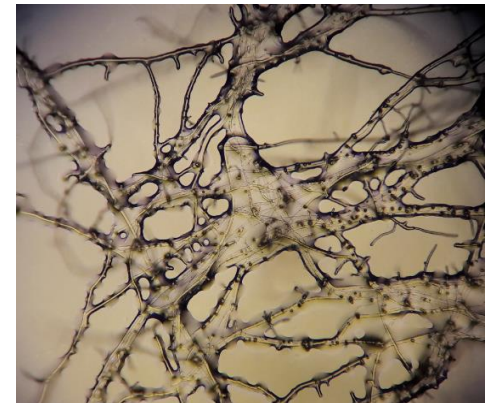
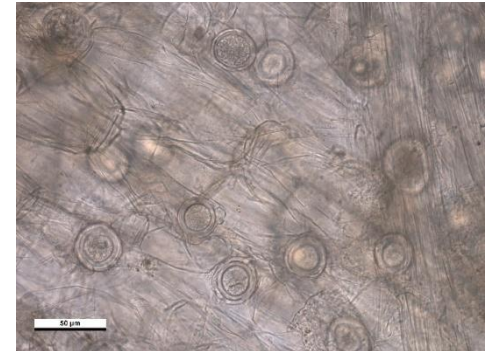


Issues affecting pea production in UK

- Increasing volatility of UK weather patterns – Peas are highly affected by both dry and wet spells of weather
- Crop protection against viral and fungal diseases, and insect pests
- Soil health and soil borne diseases
- The growing threat of *Aphanomyces euteiches* in the UK

Aphanomyces euteiches

- *Aphanomyces* root rot, caused by *Aphanomyces euteiches* is one of the most damaging diseases of pea (*Pisum sativum*)
- Host range includes dry bean, field pea, lentil, faba bean, and various forage legumes
- Oomycete and a strict soil borne pathogen surviving as oospores, for up to 10 years in the soil. It completes its entire lifecycle in the host roots and surrounding soil.



Aphanomyces euteiches

- The disease is spread through the movement of infected plant material and infected soil by heavy machinery
- The pathogen favours high soil moisture content and poor drainage
- Favours heavy clay soils of between 35% and 40%
- High degrees of compactness will also enhance the development of *A. euteiches*
- Results in reductions in pod weight and seed numbers
- Yield losses due to infection range from 42% to 86%



Symptoms

- Peas are susceptible at any point in their development and life-cycle, and infection can develop anywhere from the roots to the epicotyl
- The disease becomes apparent roughly 3 to 4 days after the infection has taken place, especially if the soil moisture is high
- These lesions spread rapidly, resulting in a honey/straw coloured root system
- Leading to stunted growth, wilting symptoms and chlorosis of the leaves, leaving a patchwork of yellow crops across the field.







Disease Management

- To date there is no effective fungicides nor fully resistant pea
- *A. euteiches* may also maintain on alternative hosts, such as weeds and pasture legumes
- Currently only cultural methods of control to exist such as crop rotations – These rotations should be long 6-8 years
- The use of bioassays to detect any potential inoculum in the soil

1st Aim

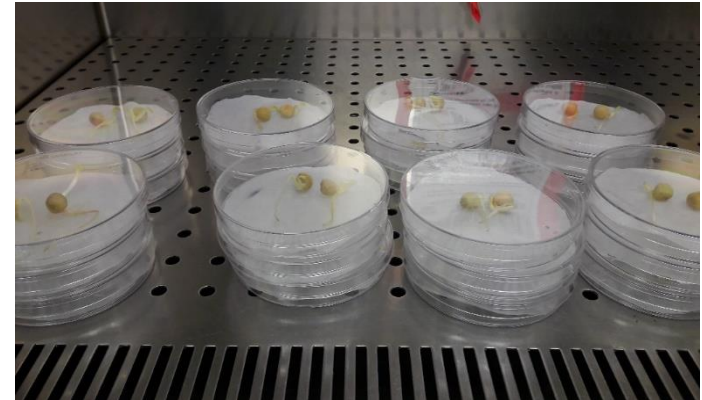
- Development of a molecular detection method – faster turn around, higher throughput, potentially less false negative

2nd Aim

- Determine the distribution of *A. euteiches* across the pea growing regions of the UK

Baiting Experiment

- Germinated peas were baited using soil collected from 68 different field locations across the pea growing region
- Peas are left in soil for between 2-9 days
- Peas were visually scored (scale of 0 – 5) and the presence/absence of oospores was determined

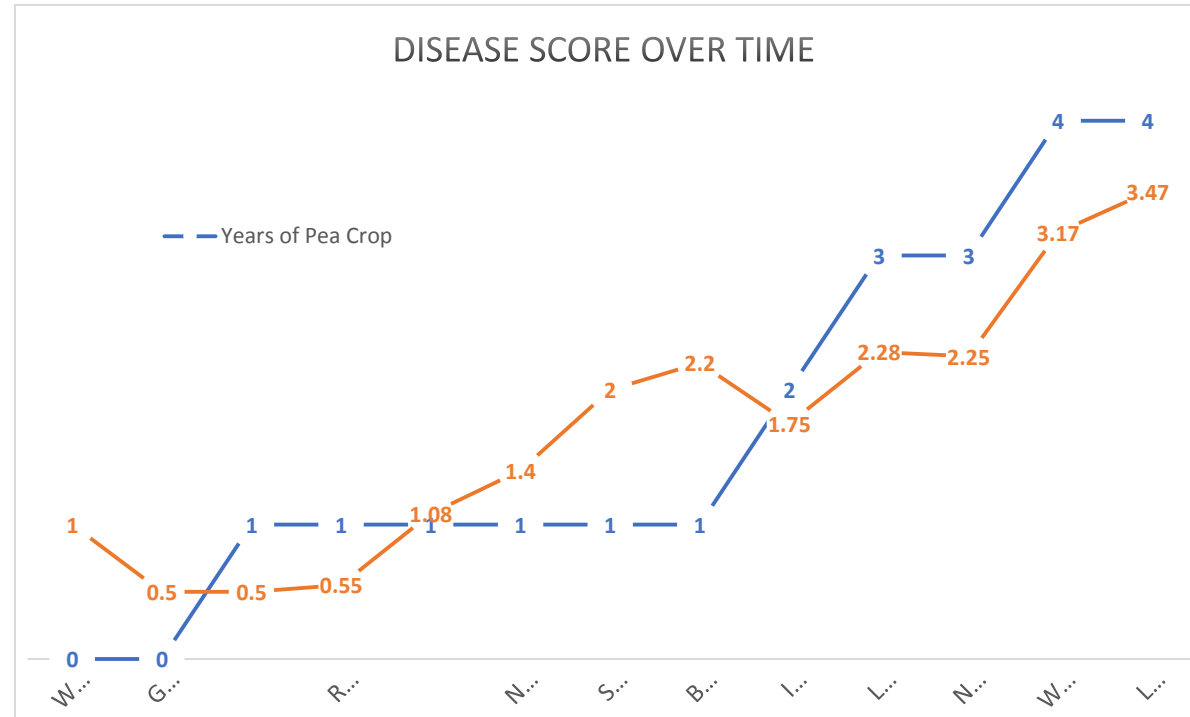


Distribution Mapping

- In total, 68 fields were sampled over 2 seasons
- *A. euteiches* was found in over 60% of fields sampled
- The results shown here indicate that *A. euteiches* has spread across all pea growing regions of the United Kingdom.
- The distribution of *A. euteiches* across a 600 km growing region may indicate that it has been present in soils for several years.
- This preliminary result indicates that *A. euteiches* is present in commercial field pea crops in the UK and is not restricted to fields with a history of frequent field pea cultivation.
- Red markers fields in which peas should not be grown for at least 10 years



- One of the biggest factors affecting the build-up of *A. euteiches* inoculum levels within a given field is the cropping history of the field, more importantly, the number of pea crops in recent history.
- With every pea crop in a rotation, the chances of *Aphanomyces* root rot infection increases



Current Research – Targeted Approach

- A further 17 field sites across the UK
- Sampled from fields pre-drilling and during flowering
- Comparing areas with high disease burden and low
- Comparing; compaction, water content, disease score, weather data, particle analysis

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