Phoma Stem Canker In Winter Oilseed Rape

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What is Phoma Stem Canker?

- Fungal Pathogen
- Known as 'Blackleg' in some countries
- Main causal agent is Leptosphaeria maculans (Lm)
- Less severe form caused by L. biglobosa (Lb)
- This disease (Lm) is now common in virtually all countries where Brassica napus (OSR, Canola) is grown
  - Major exception being China

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Symptoms are seen throughout the growing season

Initial infection in Autumn

Lodging and yield Loss through stem damage

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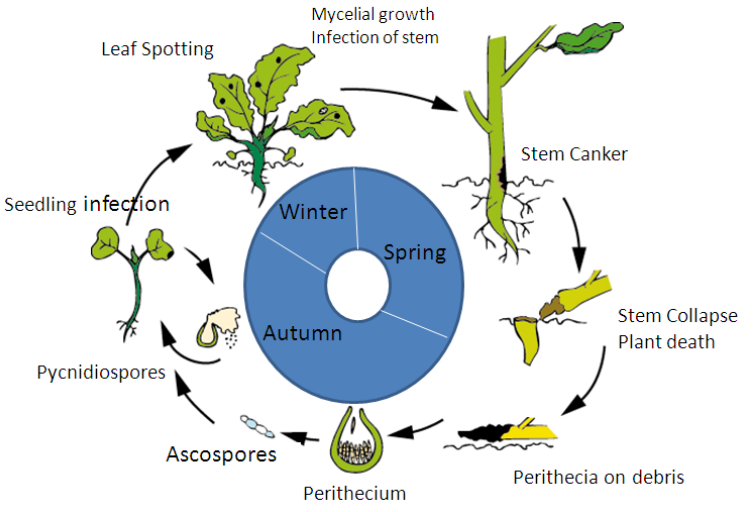
Disease Cycle



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Yield Loss

- Occasionally at the seedling stage
- Mainly via lodging and stem damage after flowering
- Catastrophic in some countries
- A major yield robber in others
  - over 50 million euros per season in UK (Fitt et al 2006)

Control Strategies

- Cultural – Aim to reduce inoculum level (from crop debris)
  - Longer rotations
  - Burying trash very quickly after harvest
  - But might not fit well with overall farm strategy
- Fungicides
  - Reduce amount of disease in autumn/early spring (WOSR)
  - May be difficult to get timing right
  - Not the easiest time of year to spray
  - Chemical 'toolbox' is reducing due to regulation/pathogen resistance
- Disease resistant varieties
- Combinations of the above

Varietal Resistance

- All WOSR varieties carry some base level of resistance
  - Seen if you compare with (for example) Chinese material
  - Total catastrophe through Phoma in WOSR in Northern Europe is probably unlikely
  - But quite severe yield loss is relatively common
- Breeding can definitely improve on the base level
  - Single gene resistance
  - Improved quantitative resistance
  - Combination of both

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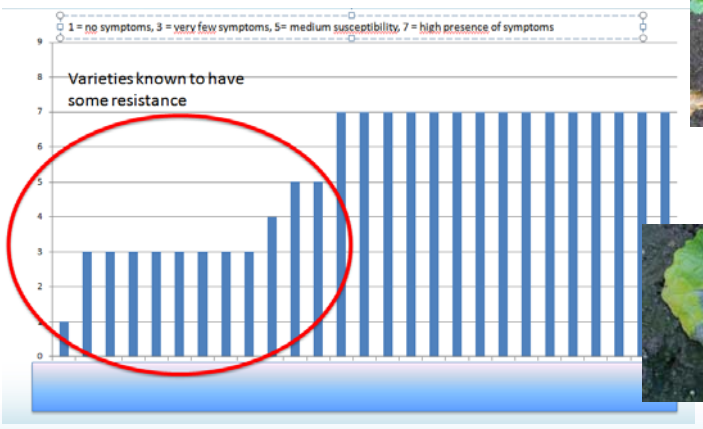
Assesment of phoma on leaves – Denmark 4/11/15



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Single Gene Resistance

- 9 avirulence genes identified in L. Maculans
  - (AvRLm1 – AvRLm9)
- Corresponding resistance genes (Rlm1 – Rlm9) discovered in Brassica napus (OSR)
- These genes provided good (total) resistance for a while but then broke down
  - Pathogen evolves to lose the AvRlmx 'signature'
  - Becomes avRLmx and is no longer 'recognised' by the plant
- However – one of these genes, RLm7 has behaved differently and has lasted much longer
  - Some leaf spotting but still strong stem canker resistance
  - Maybe avRLm7 pathogens are less 'fit'?

Quantitative Resistance

- Characteristics of the plant other than direct resistance mechanisms are responsible for disease tolerance/avoidance
- Many possible examples with regard to phoma
  - Longer leaf petioles (pathogen has further to travel to stem)
  - More lignified stem structure
  - Thicker leaf epidermis
  - More rapid leaf turnover
  - Etc. Etc.

Hybrid Varieties can have advantages in phoma resistance

- Can combine single gene resistance (e.g. RLm7) from one parent with good quantitative resistance from the other, whilst maintaining yield and other characteristics
  - Shown to help protect the single gene source (Brun et al 2009)
- Vigorous hybrid growth also means that the pathogen can struggle to get to the stem from the leaf infection

Conclusion

- Phoma is a major threat to OSR growers in Northern Europe
- Combining varietal resistance with good management practices can greatly reduce this risk


Thank you for
listening!
DEKALB