

Update on diagnostics for lettuce Fusarium wilt and discussion on sampling and monitoring



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Fusarium oxysporum

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- One of the most economically damaging fungal plant pathogens causing vascular wilts and root rots: produce long-lived chlamydospores
- **Special forms exist that are specific to different hosts**
(*formae speciales* - f. spp.)
- Wide range of plants affected including: onion, leek, tomato, lettuce, pea, bean, potato, brassicas, strawberry, apple, pepper, celery, coriander, spinach, banana, oil palm, carnation and narcissus
- Non-pathogenic *F. oxysporum* are abundant in soils



Examples of *Fusarium* in the UK

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Leek



Daffodil



Onion



Pea



Statice



Asparagus



***Fusarium oxysporum* f. sp. *lactucae* (FOL)**

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- Identified in Japan, USA, Italy, France, Portugal, Spain, Argentina, Belgium, Netherlands, Brazil, Iran, Korea, Taiwan and now UK
- 4 races exist (races 2 and 3 only found in Japan / Taiwan)
- New race (race 4) identified in the Netherlands in 2014/5
- Races are defined by differential resistance / susceptibility to a set of lettuce lines
- No resistance to race 4 in commercial varieties





Credit: Thomas
Gordon, UC Davis



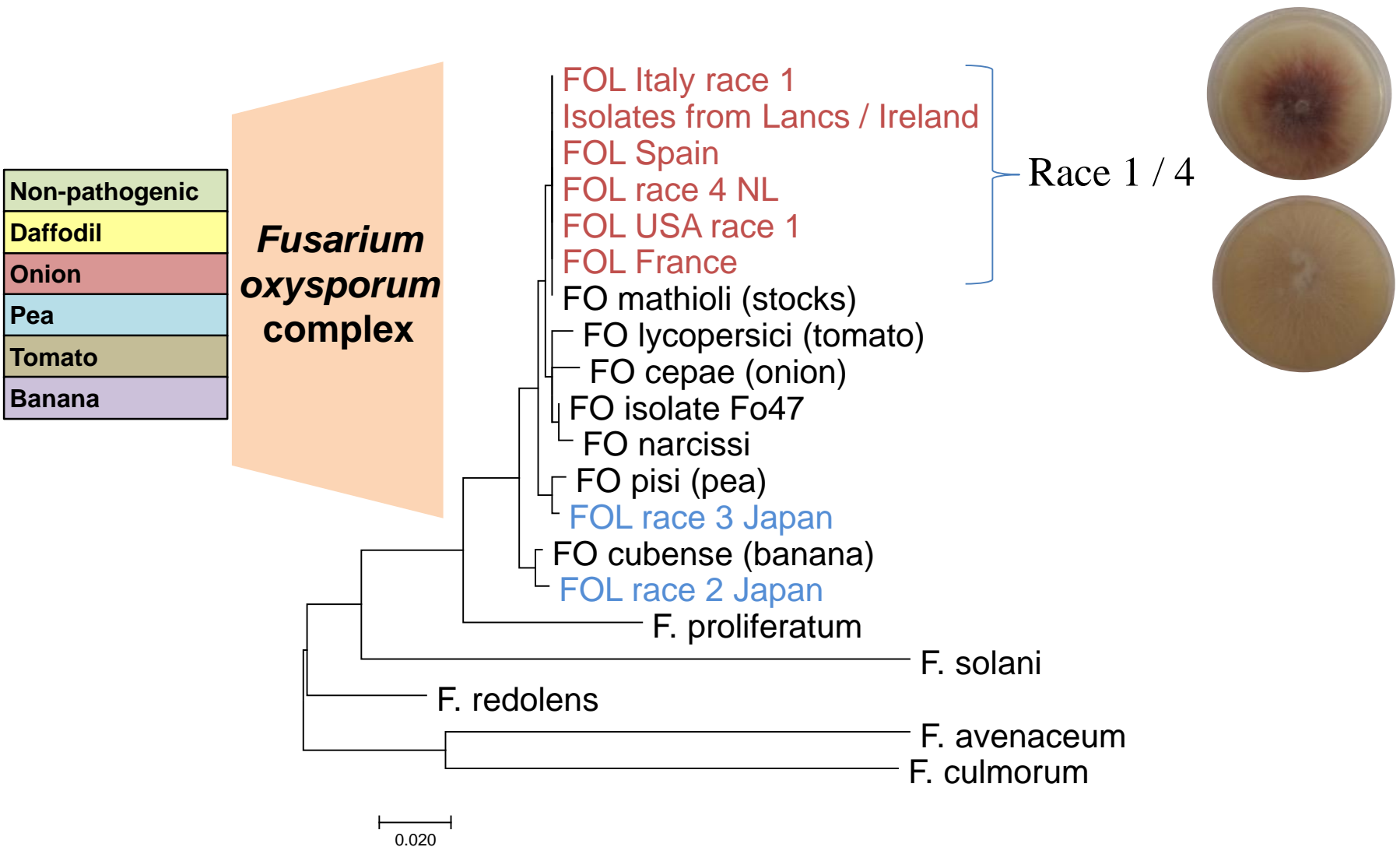
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***Fusarium* identification**



EF- α Tree: *Fusarium* species

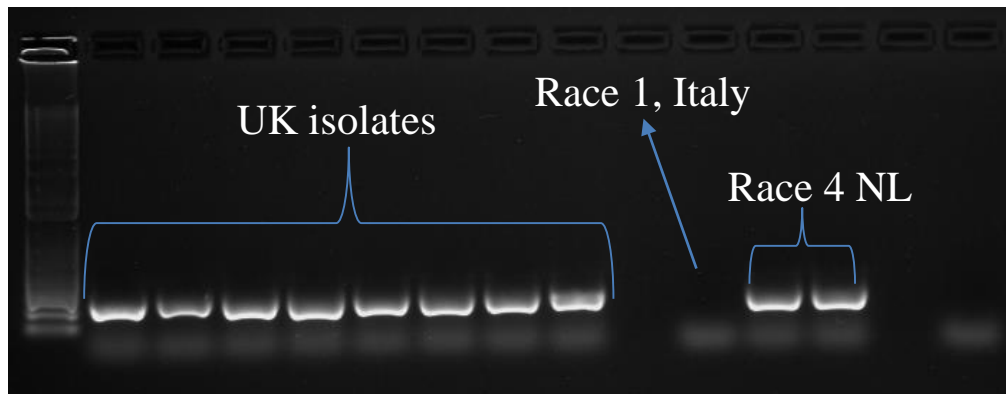
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Molecular ID of FOL race 4

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- Isolate pathogen from inside infected tap root
- Extract DNA using a rapid method
- PCR using primers from Italian publication (Plant Pathology **66**: 677–688)



Update on UK samples

- Samples received from:
 - 3 sites in Ireland
 - 2 sites in Lancashire
- From butterhead / little gem types
- All samples received confirmed as race 4
- Outbreak confined to Ireland and Lancs?



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**UK
samples**



UK samples

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Monitoring

- Monitor crop closely for any possible symptoms
- Remove suspect plants / soil
- Cut plants in half and examine inner tap root for any browning / reddening



Sending samples

- Select plants with earlier (but obvious) symptoms and send immediately after digging up
- Send whole, intact plants with roots attached
- Wrap roots in damp tissue if possible
- Place in individual plastic bags
- Send suspect samples for diagnosis:
 - Andrew Taylor / Alison Jackson, Warwick Crop Centre, University of Warwick, Wellesbourne, Warwick, CV35 9EF
 - We are currently offering free molecular diagnosis
 - Need to confirm all outbreaks are caused by race 4

Comparing symptoms

Symptoms	Fusarium	Verticillium	Sclerotinia	Botrytis
Stunting	YES			
Plants collapse	YES			
Initial foliar symptoms on younger or older plants	YES			
Vascular discoloration in taproot and crown	YES			
External crown and root tissue soft and rotted	NO			
Fungal mycelium and sclerotia on crown	NO			

From: Crop Protection **73**: 45-49

Some initial observations

- Importance of hygiene
- CP124 – Disolite and Unifect G worked well against stocks Fusarium and Pythium (better than Jet 5)
- Butterhead very susceptible – no resistant material in breeding companies
- Soil disinfestation with Basamid (or similar product) or steaming for infected sites
- Prestop may help control
- Importance of temperature
- Pak choi or similar break crop may help control (not spinach)
- Hydroponic production now used in NL – still not risk free!
- How did it get here? Main theories are seed or imported plant material from NL
- Concern of potential spread to field production
- Confined to Lancs / Ireland?

Acknowledgements

The logo for Warwick University, featuring a stylized 'W' above the word 'WARWICK' in blue capital letters.

- John Clarkson
- Alison Jackson
- Maria Lodovica Gullino
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- Everyone who has sent
samples so far

The logo for AHDB Horticulture, featuring the letters 'AHDB' in large green capital letters above a green wavy line, with the word 'HORTICULTURE' in smaller green capital letters below.