

Identification of new virulent races in *Leptosphaeria maculans* populations on oilseed rape in the UK

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INTRODUCTION

- Phoma stem canker disease of oilseed rape caused by *Leptosphaeria maculans* is often controlled in the UK by deploying race-specific *R* genes.
- However, *R* gene-mediated resistance is often rendered ineffective in 2-3 years due to *L. maculans* population changes from avirulent to virulent.
- For effective use of host *R* genes, there is a need to monitor emergence of new virulent races of *L. maculans* and prevent them from spreading into new regions.

MATERIALS & METHODS

- Winter oilseed rape field experiments at different sites in 2015/2016, 2016/2017 & 2017/2018 cropping seasons with twelve cultivars.
- Single pycnidial (from leaf lesions) (Fig 1) and single ascospore isolates (from stem samples) (Fig 2) were obtained.
- Changes in frequencies of avirulent alleles of different effector genes in *L. maculans* populations investigated by inoculation of conidial suspensions on cotyledons of a differential set of cultivars.

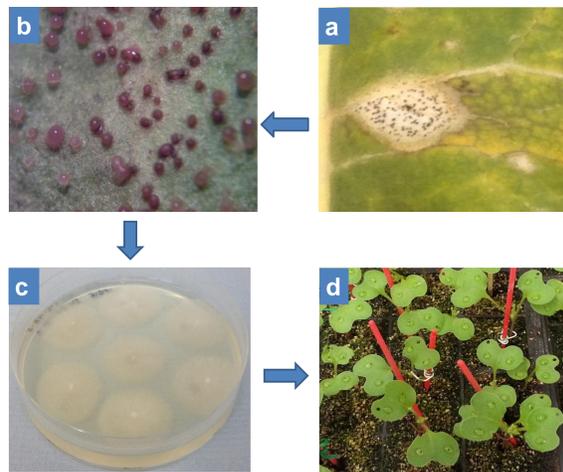


Fig 1: Single pycnidial isolates of *Leptosphaeria maculans*. Leaf lesions (a) incubated for pycnidial production (b). Cirrus from a single pycnidium cultured on a PDA plate (c). Conidial suspensions made from isolates inoculated onto a differential set of cultivars (d).

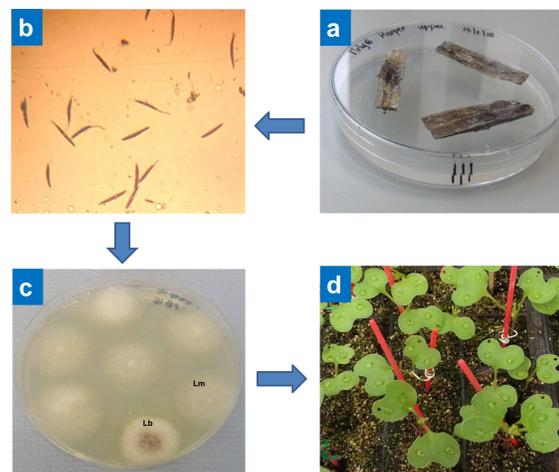


Fig 2: Single ascospore isolation of *Leptosphaeria maculans*. Stem pieces with mature pseudothecia (a) attached to lid of Petri-dish. Water sprayed on stem pieces to induce ascospore release. Single ascospores (b) cultured on PDA plates. *Leptosphaeria* isolates observed at 7-days post isolation (c). Conidial suspensions made from the isolates inoculated onto a differential set of cultivars (d).

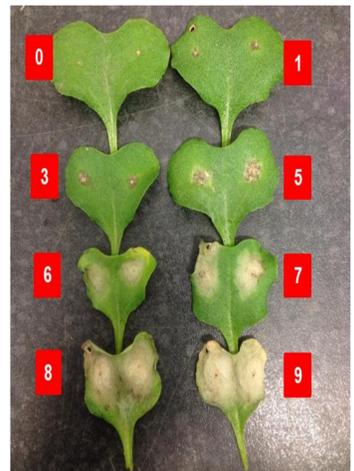


Fig 3: The 0-9 scale used to score the disease on cotyledons of *B. napus* at 17-days post inoculation.

RESULTS

- There were variations in frequencies of avirulent alleles of different effector genes in *L. maculans* populations between sites and cropping seasons (Fig 4). All the isolates from different sites were avirulent against *Rlm7* in the 2015/2016 season (a). In the 2016/2017 season (b) 6.8% of isolates were virulent towards *Rlm7*, whereas the frequency of isolates virulent towards *Rlm7* had increased to 16.3% in the 2017/2018 season (c). For single ascospore isolates from the 2016/2017 season (d), 25% of them were virulent towards *Rlm7*.

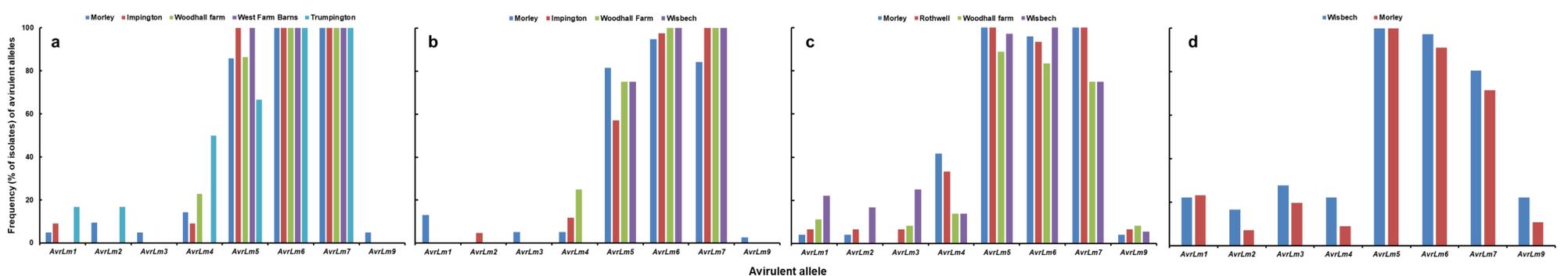


Fig 4: Frequencies (%) of avirulent alleles in *Leptosphaeria maculans* populations from leaves at different UK sites in 2015/2016 (a), 2016/2017 (b) and 2017/2018 (c) cropping seasons and from stem samples at two UK sites in the 2016/2017 cropping season (d).

CONCLUSIONS

- The *AvrLm7* allele was predominant in the UK *L. maculans* populations until 2015/2016; however, the frequency of isolates virulent towards *Rlm7* has increased in 2016/2017 and 2017/2018. This suggests that the *Rlm7* resistance gene that has been widely used in the UK oilseed rape cultivars is at risk.
- There is a need to continue monitoring regional distribution of *L. maculans* populations in UK to guide effective deployment of *R* genes.

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