

Final Project Summary

Project title	Investigating a potential new variant of <i>Zymoseptoria tritici</i> , causal agent of septoria leaf blotch, and implications for UK winter wheat varieties		
Project number	21120045	Final Project Report	PR604
Start date	May 2016	End date	March 2019
AHDB funding	£71,667	Total cost	£85,135

What was the challenge/demand for the work?

Septoria leaf blotch (also known as septoria tritici) is the most economically damaging disease of winter wheat in the UK and is caused by the fungus *Zymoseptoria tritici**.

Fungicides, host resistance and other agronomic approaches are used, in combination, to control the disease. However, there is a heavy reliance on fungicides. Recently, varietal resistance to septoria has improved. For example, the AHDB Recommended List for cereals and oilseeds (RL) 2019/20 now includes the varieties KWS Extase and LG Sundance, with disease ratings of 8.1 and 7.9, respectively (where 1 = susceptible and 9 = resistant).

In 2013, the winter wheat variety Cougar was added to the RL with a disease resistance rating of 7. It stood apart from the majority of varieties that had moderate levels of resistance (ratings of 5 or 6). It showed consistently high levels of resistance until 2015, when moderate levels of disease were observed. Given previous experience of sudden changes in varietal resistance in the wheat-rust pathosystem, it was essential to investigate the risk posed by this change.

*The pathogen is also known as *Mycosphaerella graminicola* and formerly known as *Septoria tritici* (still used as its main common name today).

How did the project address this?

Septoria tritici isolates collected in 2015 were different to other historical isolates. To investigate these differences, this project sought to:

1. Phenotype the new isolates on seedlings and adult plants of Cougar and other RL varieties.
2. Sequence the new isolates, using the Illumina Hiseq 2500 platform, in order to:
 - a) Establish potential differences between Cougar isolates and historic isolates.
 - b) Initiate comparative genetic studies between *Z. tritici* (and/or closely related species) to shed light on potential differences in virulence in the new isolate
 - c) Identify polymorphisms (genetic differences) between isolates to begin to develop resources for genotyping/pathotyping and subsequent diversity analysis
3. Test the new isolates for resistance to different fungicides

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What outputs has the project delivered?

Isolates classed as 'Cougar' (virulent on Cougar) and 'non-Cougar' (avirulent on Cougar) types were used in seedling and adult plant tests. This showed that the only variety consistently susceptible to the Cougar isolates was Cougar itself. This demonstrated that the risk posed to other varieties, such as LG Sundance, from these isolates is no higher than for any other isolate. This was confirmed also by genotyping of isolates, where the different categories of isolates were unable to be distinguished from one another. Fungicide sensitivity testing also confirmed a low risk from these isolates, with no unexpected mutations present.

Who will benefit from this project and why?

This is a positive result for growers. It means that cultivar resistance can continue to be deployed as part of an integrated disease management strategy. For researchers, the findings pave the way for further exploration of the host-pathogen interaction. It is important to understand how and why virulence to resistance varieties arises and what can be done to prevent it.

If the challenge has not been specifically met, state why and how this could be overcome

Lead partner	NIAB
Scientific partners	John Innes Centre, Rothamsted Research
Industry partners	Limagrain UK, RAGT Seeds, KWS UK, Elsoms Wheat, DSV UK, Syngenta
Government sponsor	

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