New Disease Reports

First report of virulence to the septoria tritici blotch resistance gene *Stb16q* in the Irish *Zymoseptoria tritici* population

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In June 2019 high levels of septoria tritici blotch (STB), caused by the fungal pathogen *Zymoseptoria tritici* were observed in Recommended List evaluation plots of winter wheat cv. Cellule (Fig. 1) in the Republic of Ireland. Levels of STB were unexpected as Cellule has the STB resistance gene *Stb16q* and previous evaluations confirmed its high level of resistance (Table 1). Septoria tritici blotch is the most destructive disease of winter wheat in Western Europe and control is heavily reliant on fungicides (O'Driscoll *et al*., 2014). Due to increased regulations on the use of fungicides in Europe varietal resistance is regarded as key to managing STB, with 21 resistance genes identified and mapped (Brown *et al*., 2015). Amongst these, *Stb16q* is unique, providing high levels of resistance equally at both the seedling and adult plant stages (Ghaffary *et al*., 2012). As such it is important to determine if the levels of disease observed in 2019 were due to the emergence of virulence to *Stb16q*.

A collection of *Z. tritici* isolates were established from infected leaf samples of the *Stb16q*-resistant cv. Cellule (n=10) and the moderately susceptible cv. Costello (n=10). All isolates were from fungicide-untreated commercial crops or trial plots. To determine if those isolates retrieved from Cellule exhibited virulence on Cellule when compared to those isolated from Costello, glasshouse seedling assays were performed. Two-week old seedlings of both Cellule and the susceptible cv. KWS Lumos were inoculated with spore suspensions (10^6 spores/ml) of each isolate until runoff; placed in a clear polyethylene bag for 48 hr and subsequently moved into a glasshouse. Levels of disease were assessed 21 days post inoculation. The experiment was conducted twice. A beta generalised mixed-effects model (block and source cultivar as fixed and test cultivar as a random component) was fitted to the data and the estimated marginal means were separated using Tukey's Honest Significant Difference (α=0.05). All isolates infected the susceptible variety, with no differences observed between isolate collections (Fig. 2). Significant differences (P<0.0001) were observed between the collections in their ability to cause infection on Cellule, with almost no disease detected following inoculation with Costello isolates (Figure 2). High levels of disease were observed on Cellule following inoculation with the Cellule isolates, confirming the presence of virulence to *Stb16q* in the Irish *Z. tritici* population. Whilst the prevalence of virulence in the wider *Z. tritici* population is unknown, its presence in the population must be taken into account when considering cultivating varieties reliant on *Stb16q* as the source of STB resistance.

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References

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Figure 1

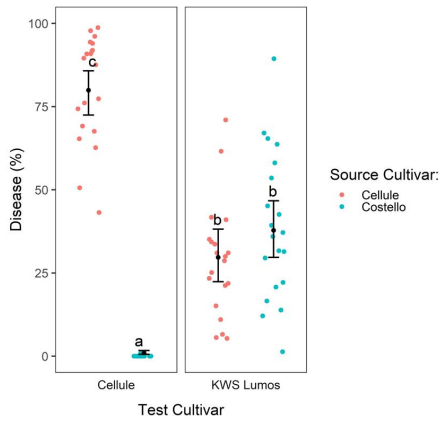

Figure 2

Table 1. Septoria tritici blotch resistance ratings for winter wheat cvs. Cellule and JB Diego in National List trials in 2017 and Recommended List trials in 2018 and 2019.

Year	Trial[1]	Assessment[2]	Kildalton[3]		Moorepark	
			JB Diego	Cellule	JB Diego	Cellule
2017	NL	1	n.d.	n.d.	5	8
		2	n.d.	n.d.	3	6
		3	n.d.	n.d.	3	6
2018	RL	1	6.5	8.5	5.75	7.5
		2	6.25	8.25	4.5	7
		3	6	8.25	4	5
2019	RL	1	6.75	7.25	4	3
		2	4.5	3	4	2
		3	n.d.	n.d.	3	1

[1]Data retrieved from the Irish National List (NL) and Recommended List trials (RL) conducted by the Irish Department of Agriculture, Food and the Marine.
[2]Disease assessments conducted on 2-3 occasions from May onwards.
[3]Disease scored on a whole plot basis using a 1-9 scale, 1 representing extreme susceptibility and 9 complete resistance.

Figure 3

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