RD 2.1.3: Plant-pest interactions

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Aim:

To develop a better understanding of the plant-pest interactions that threaten arable crop production in Scotland and elsewhere.

Understanding the mechanisms that pathogens use to invade and colonise host plants, in parallel with the processes by which plants resist infection, will provide key insights to drive long term plant protection strategies.

Research will identify and characterise key factors that define the outcome of plant-pest interactions in the major Scottish crops.

We will establish how host-pathogen interactions are likely to be affected by temperature and other stresses in relation to future climate change scenarios.

Research Objectives

- Understanding mechanisms of pathogen-crop host interactions
- Achieving sustainable resistance during pathogen attack
- Targeting key host mechanisms controlling disease expression & yield response in cereals

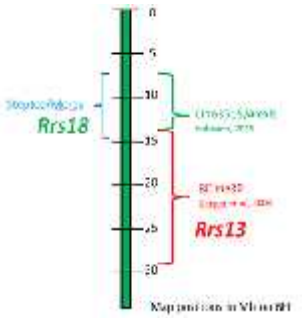
Focus on fungal pathogens *Rhynchosporium commune* and *Ramularia collo-cygni* in barley and *Phytophthora infestans* (oomycete), *Globodera pallida* (cyst nematode), potato virus Y, and *Pectobacterium atrosepticum* (bacterium) in potato.

Rhynchosporium

- Scald, caused by *Rhynchosporium,* is the most economically important barley disease in Scotland with a cost to the UK economy of £10.8 M/year
- The genetic basis of resistance to scald was not previously well defined
- The first draft barley genome sequence was used, together with resistance information from Syrian and Jordanian barley landraces, to map resistance gene *Rrs1* to chromosome 3
- We have identified three candidate markers for resistance and a novel resistance gene *Rrs18* on chromosome 6.

Barley susceptible (left) and resistant (right) to scald caused by *R. commune*.

Fine mapping of *Rrs1* identified three markers associated with *Rrs1* in barley cultivars and landraces.



Genetic map of barley chromosome 6H, showing positions of *Rrs13* and new scald resistance *Rrs18*.

Impact

- New markers for resistance to scald disease in barley
- Collaboration with commercial partners to further develop and exploit these markers as part of an Innovate-UK project
- Identification of new resistance-related genes for development of future markers

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