A NOVEL PROTEINACEOUS PAMP FROM ASCOMYCETES INDUCES PLANT CELL DEATH IN SOLANACEAE

Barbara Franco Orozco1, Adokiye Berepiki1, Paul Birch2, Kostya Kanyuka3 and Anna Avrova4

1James Hutton Institute, Dundee, UK; 2University of Dundee, Dundee, UK; 3Rothamsted Research, Harpenden, UK
anna.avrova@hutton.ac.uk

Plant recognition of conserved microbial elicitors, also known as pathogen- or microbe-associated molecular patterns (P/MAMPs), initiates PAMP-triggered immunity (PTI). PAMPs are conserved across classes of microorganisms and are important to the microbial lifestyle. Although a number of microbial PAMPs have been identified the full repertoire remains unknown.

*R. commune*, the causal agent of scald, is one of the most destructive and economically important diseases of barley. It is a hemibiotroph with an extended asymptomatic phase. Following conidia germination on the leaf surface and cuticle penetration *R. commune* hyphae spread between the plant epidermal cells without directly penetrating them. Like several other important fungal pathogens of cereals, including *Zymoseptoria tritici*, *Magnaporthe oryzae*, and *Parastagonospora nodorum*, *R. commune* belongs to the Ascomycota. This phylum also contains major pathogens of dicots, such as *Sclerotinia sclerotiorum* and *Botrytis cinerea*, as well as the model fungus *Neurospora crassa*.

Sequencing of the *R. commune* transcriptome from an early time point during barley infection revealed a highly abundant transcript encoding a small secreted fungal protein with four cysteine residues of unknown function, which we called RcINS1 (Inducing Necrosis in Solanaceae). It is most highly up-regulated at the onset of barley infection with *R. commune*. RcINS1 and its homologues from different fungal species, including *Zymoseptoria tritici*, *Magnaporthe oryzae* and *Neurospora crassa*, produced using Pichia pastoris, exhibit PAMP activity triggering cell death in Solanaceae but not in other families of dicots or monocots. Using virus-induced gene silencing (VIGS) of known components of PTI in *Nicotiana benthamiana*, RcINS1-triggered cell death was shown to be BAK1 and SGT1 dependent. In contrast, CMPG1 and MAPKKKe were not involved in *N. benthamiana* response to RcINS1. Identification of the plant receptor involved in RcINS1 recognition in *N. benthamiana* will provide a valuable resource for engineering non-host resistance in monocots.