



PhD exit seminar: Elucidating the response of wheat to the exposure of *Stagonospora nodorum* effectors

Wednesday 31 July 2013 1 – 2pm

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Slatyer seminar room R.N. Robertson Building (Bldg. 46), Linnaeus Way, ANU



Stagonospora nodorum is a necrotrophic fungal pathogen of wheat and is the causal agent of *Stagonospora nodorum* blotch (SNB). This disease is responsible for over \$100 million of yield losses in Australia annually. Recent studies have shown that this fungus produces a number of host-specific toxins or effector proteins that act in an inverse gene-for-gene manner to cause plant cell death. This discovery has revealed a level of sophistication present in necrotrophs that were originally considered unselective pathogens that kill plant cells with cell wall degrading enzymes and toxic compounds. The mechanism(s) by which these effectors induce tissue necrosis in susceptible hosts is yet to be fully elucidated.

We have applied a metabolomics approach to elucidate the cellular processes perturbed by effectors and provide insight into the mode-of-action. Metabolite profiling was employed to investigate the host response to SnToxA and SnTox3 in cultivars containing the corresponding sensitivity genes. Our data indicate that these effectors cause increases in plant secondary metabolites with

established antifungal activity and/or roles in plant defence. These metabolites were discovered to have significant effects on *S. nodorum* growth and sporulation *in vitro* and *in planta* at levels the plant is capable of producing. Sporulation is an attractive target for control of this pathogen, as multiple cycles of asexual sporulation are required to cause significant disease and yield losses in wheat.

Finally, we have preliminary evidence that the SnToxA-induced accumulation of plant defence metabolites may be suppressed in the presence of the pathogen itself. We suggest that at least one of the many small-secreted proteins produced by *S. nodorum* may have roles in suppressing plant defence. Current research is therefore focussed on the question of how this necrotroph survives plant defences during the initial stages of colonisation prior to host cell death and subsequent infection.

Presented by

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