PR7.14

Secreted oomycete proteins in *Phytophthora* rot of garden pea

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Host-pathogen interactions rely on secreted proteins. Studying the secretome is therefore a suitable way to identify genes implicated in pathogenicity. Here, we present a project to investigate the interaction between pea and a root-rot pathogen, a mostly uncharacterized *Phytophthora sp.*, by identifying proteins secreted by pea and oomycete during infection. To this end, *Phytophthora sp.*-infected pea roots are used to produce dual organism cDNA libraries. These libraries are screened for cDNA sequences encoding relevant proteins that are then further characterized. Of interest are both enzymes to breakdown tissue into nutrients and other proteins that function directly in virulence. Through the secretome studies we will deepen the understanding of the novel *Phytophthora* species and its function as causal agent of an economically important pea disease.

PR7.15

Functional analysis of homologues of the *Cladosporium fulvum* Avr4 and Ecp2 effectors present in other (pathogenic) fungal species

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Cladosporium fulvum is a non-obligate biotrophic fungus of the Dothideomycetes class that causes leaf mould of tomato. During infection, *C. fulvum* secretes effectors that function as virulence factors in the absence of cognate Cf resistance proteins and induce effector-triggered immunity in their presence. Recently, homologues of the *C. fulvum* Avr4 and Ecp2 effectors were identified in species of Dothideomycetes, including *Mycosphaerella fijiensis* the causal agent of the black Sigatoka disease of banana. We have demonstrated that the *M. fijiensis* Avr4 is a functional orthologue of the *C. fulvum* Avr4 that binds to chitin and triggers a Cf-4-mediated hypersensitive response (HR) in tomato, suggesting that a common recognition site in the two effectors is recognized by the Cf-4. Using a targeted mutational approach, we are examining whether the chitin-binding domain present in these two effectors represents this recognition site. Three homologues of the *C. fulvum* Ecp2 are found in *M. fijiensis,* two of which induce different levels of necrosis or HR in tomato lines that lack or contain a cognate Cf-Ecp2 protein. Therefore, Ecp2 is suggested to promote virulence by interacting with a putative host target, causing host cell necrosis. Using a yeast-two-hybrid assay we will try to isolate Ecp2-interactors from tomato to further unravel the role of this effector in virulence. Finally, we are expanding our searches for Avr4 and Ecp2 homologues in fungal species outside the class of Dothideomycetes. Preliminary data suggest that Ecp2 is widely distributed among fungal species but has significantly diverged after speciation of these fungi.