**10-week Summer Studentship opportunity at Rothamsted Research, Harpenden, Herts, UK**

## Microscopic characterisation of the growth and development of a *Fusarium graminearum* mutant severely compromised in disease causing ability.

Fusarium ear blight (FEB) infections of cereal crops cause considerable losses to grain quality and contaminate grain with mycotoxins (www.scabusa.org; www.cropmonitor.co.uk). The main causative agent of this disease globally is *F. graminearum* (*Fg*). To understand how *Fg* causes disease on wheat, various single gene deletion mutants have been identified which arrest at different infection stages. One mutant which lacks a specific kinase is non-pathogenic, but is still able to produce mycotoxins. An initial microscopic study indicates that this *pk* mutant has a unique pattern of growth and hyphal branching.

The first objective of this project is to characterise and compare the fungal growth patterns of this *pk* mutant and the wild-type strain on both mycotoxin inducing and non-inducing condition *in vitro*. A range of microscopy and histochemical staining techniques will be used to explore the position of the fungal nuclei, the plane of cell division, the composition of the cell walls and the vacuole. Using time lapse microscopy, the overall patterns of colony growth and development will be compared. By using the metamorph software specific growth patterns will be quantified. Growth on wheat floral tissue will also be explored.

The second objective of this project is to add a specific chemistry at various concentrations to the wild-type *Fg* strain to determine if the identical phenotypes can be induced *in vitro*. This chemistry is thought to inhibit the same protein kinase. Wheat ear inoculation experiments will be done with the wild-type strain + /- the chemistry at appropriate concentrations and then compared to the infection phenotype of the *pk* mutant.

This project will give the summer student the opportunity to learn a wide range of microbiological, microscopy and plant pathology techniques, and how to interpret the different data types generated. Towards the end of their stay at Rothamsted, the student will be given the opportunity to give an oral presentation on their findings to the wheat pathogenomics team at their weekly laboratory meeting.

**References:**

Cuomo et al., (2007) The genome sequence of *F. graminearum* reveals localised diversity and pathogen specialization. Science 317, 1400-1402.

Beacham, A. M., Antoniw, J. and Hammond-Kosack, K. E. (2009) A genomic fungal foray. The Biologist 56, 98-105.

Baldwin, T. K., Urban, M., Brown, N. and Hammond-Kosack, K. E. (2010a) A role for topoisomerase I in *Fusarium graminearum* and *F. culmorum* pathogenesis and sporulation. Mol. Plant-Microbe Interact 23, 566-577.

Brown, N. A., Urban, M., van de Meene, A. M. L. and Hammond-Kosack, K. E. (2010) The infection biology of *Fusarium graminearum*: Defining the pathways of spikelet to spikelet colonisation in wheat ears. Fungal Biology 114, 555-571.

**How to apply?**

Interested undergraduate students, in the middle year(s) of their degree course, should contact in the 1st instance either Dr Allison van de Meene (allison.van-de-meene@bbsrc.ac.uk) or Prof Kim Hammond-Kosack (kim.hammond-kosack@bbsrc.ac.uk).

The intention is that the student selected by **early March**, will then apply for funding from the British Society of Plant Pathology. The application form must be submitted to BSPP by **1st April 2011**.