

Role of the fungal cell wall in plant pathogen interactions and virulence

Supervisory team:

Main supervisor: Dr Steven Bates (University of Exeter)

Second supervisor: Dr Mike Deeks (University of Exeter)

Dr Jason Rudd (Rothamsted Research), Prof Ken Haynes (University of Exeter)

Host institution: University of Exeter (Streatham)

Project description:

Food security is one of the most pressing challenges currently facing humanity. The world population is predicted to reach nine billion by 2050, requiring food production to increase by 50% against a backdrop of climate change and the loss of arable land. Despite agricultural advances plant pathogens still account for losses of 10-16% in the global harvest, making the need for new control strategies urgent. *Zymoseptoria tritici* is the major cause of wheat loss in the UK, and a major target for the cereal fungicide market. Throughout the infection process *Z. tritici* remains outside, but in close contact with, the host cell. Therefore the *Z. tritici* cell wall must form intimate contacts with the host; as such our central hypothesis is that the *Z. tritici* cell wall plays a vital role in virulence, host recognition and disease. To address this hypothesis we have three specific objectives:

[1] to undertake the first analysis of *Z. tritici* cell wall structure;

[2] to determine the importance of cell wall components in virulence through constructing a series of gene deletion strains lacking the enzymes required for their synthesis;

[3] to determine the relative role of cell wall epitopes in triggering the plant defence response.

Through this project we will therefore fully characterise the cell wall in this important plant pathogen, and determine the importance of cell wall epitopes in both plant infection and the triggering of the plant defence response. Understanding how the pathogen is recognised, and an effective defensive response mounted, could ultimately lead to the development of novel strategies for providing durable plant resistance.