RRES Press Release 24 April 2019 How fungi Taste KHK

How fungi “taste” wheat could hold key in crop disease fight : exploring how the hazardous FHB-causing fungus senses its surroundings during infections could help scientists give it a good licking

New research carried out at Rothamsted has examined how fungal cell surface receptors, which are like the taste receptors on our tongues, help Fusarium graminearum monitor and adapt to its host plant during infection.

The fungus is responsible for the world’s number one floral disease in cereals, Fusarium Head Blight (FHB), which attacks the grain and makes infected wheat dangerous to consume.

Rothamsted Plant Pathologist, Professor Kim Hammond-Kosack, said that G-protein coupled receptors - which monitor the status of their wheat host and allow the fungi to mount an appropriate biological response - are promising targets for controlling this and other fungal diseases.

“The options to control Fusarium floral infections in cereal crops are very limited at the moment. This is causing growers and processors in the food and feed industries a tremendous headache, and why Rothamsted has been looking to apply our considerable expertise in crop diseases to this problem.

“These results open up the possibility of devising novel ways to control FHB disease through either targeted drug development or by eliminating the signals these receptors perceive during a fungal attack.”

In a series of experiments the scientific team demonstrated that F. graminearum’s receptors are important in wheat infections. The team made a collection of fungal mutants lacking individual receptors and showed that the absence of one type of receptor, specific to fungi, allowed the wheat host to mount a stronger defence.

The team also showed that the removal of this receptor meant that the virulence on wheat was reduced, because various fungal processes required for infection were disrupted.

A former Rothamsted Research scientist who led the study said we still know very little about fungal G-protein coupled receptors.

Dr Neil Brown, who is now a lecturer at the University of Bath’s Department of Biology & Biochemistry, said: “G-protein coupled receptors have been studied extensively in humans, where around 40% of our pharmaceuticals target these human receptors, as they’re exposed on the cell surface, making them accessible to drugs, and they control important biological functions.

“Our results show that fungal receptors are important forFusarium infection of wheat. By learning more about the structure and function of these fungal-specific receptors, and the compounds they detect, we may be able to develop new approaches to control FHB and other plant pathogens.” UK outbreaks of FHB occur every few years, with the 2012 one leading to wheat crop losses of around 10%, whilst In other parts of the world such as the USA, Brazil and China, the disease causes severe crop losses and mycotoxin contamination problems for farmers at nearly every harvest.

[NON-CANONICAL FUNGAL G-PROTEIN COUPLED RECEPTORS PROMOTE FUSARIUM HEAD BLIGHT ON WHEAT](http://dx.doi.org/10.1371/journal.ppat.1007666) PloS Pathogens 2019