Pathogen uses light to facilitate its invasion of wheat plants

April 12 2017, by David Stacey

Researchers at The University of Western Australia in collaboration with The Australian National University have discovered the deadly fungus Parastagonospora nodorum invades wheat plants by producing a herbicide compound (elsinochrome) which kills plant cells when they are exposed to light.

The discovery published in the *Environmental Microbiology* journal is important to increase the understanding of a significant cause of the destruction of wheat plants globally.

Wheat is a food staple that is grown more than any other commercial food in the world.

ARC Future Fellow from UWA's School of Molecular Sciences Dr Heng Chooi said scientists used genomics and synthetic biology tools to activate the production of elsinochrome in the fungus and observe its behaviour in wheat plants.

"To conserve energy, P. nodorum does not normally produce elsinochrome, however it does when infecting wheat plants," Dr Chooi said.

"This has made it difficult up until now to know the identity of such small molecules that are produced by the fungus when infecting wheat plants and understand their contribution to the disease."

Dr Chooi said similar light-activated herbicidal molecules were known to be produced by other fungal plant pathogens, but this was the first time that it had been identified from a wheat pathogen.

"This family of molecules, known as perylenequinones, generates reactive oxygen species that damages cell membranes and proteins," he said.

"When we deleted the gene in the fungus responsible for production of elsinochrome, we saw a reduced ability of the fungus to affect the wheat plant."

Associate Professor Peter Solomon from The Australian National University said it was ironic to consider that light, the very basis of plant life, was being used by this fungus to cause disease and ultimately kill the plants.

Dr Chooi said herbicidal compounds produced by plant pathogens also had the potential to be used as natural herbicides to control weeds.

"The study opens up new opportunities to find ways to stop the fungus from producing the herbicide compound or to make the wheat to become resistant and therefore less affected by the disease," he said.

More information: Yit-Heng Chooi et al. Functional genomics-guided discovery of a light-activated phytotoxin in the wheat pathogenvia pathway activation, *Environmental Microbiology* (2017). DOI: 10.1111/1462-2920.13711

Provided by University of Western Australia