Research paves way for new generation of fungicides

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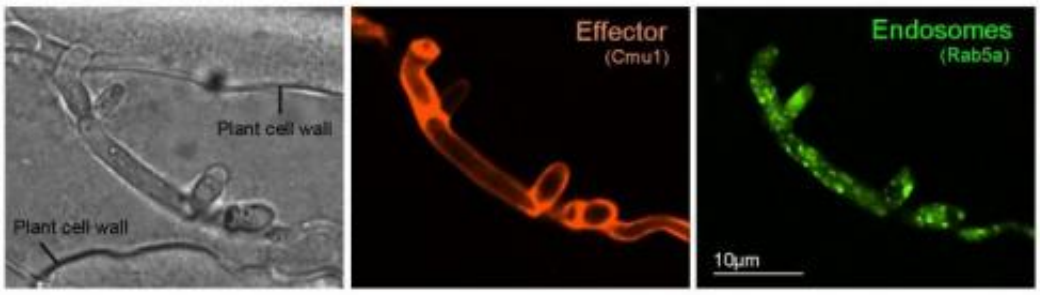

Effector proteins enable the fungi to escape the plant's immune system and allow the fungal cells to enter the plant unrecognized. Credit: University of Exeter

Plants that come under attack from pathogens have an automatic immune response. Fungi get around this plant immunity by injecting proteins into the host plant cells. These 'effector proteins' enable the fungi to escape the plant's immune system and allow the fungal cells to enter the plant unrecognised.

Exeter scientists have now shown that signalling organelles, known as 'early endosomes' act as long distance messengers in the fungi. They travel rapidly along long tube-like cells between the plant-invading fungal cell tip and the fungal cell nucleus. This rapid communication between the point of invasion and the fungal cell nucleus enables the fungus to produce the effector proteins that help evade the plant's immune response from the moment the fungus enters the host tissue.

This signalling mechanism occurs very early in the fungal infection process, at a time when the fungi are most accessible to fungicide treatment. Disabling the process could result in a new generation of fungicides that are able to act before the fungus has damaged the plant.

Professor Gero Steinberg from the University of Exeter said: "Pathogenic fungi are a major threat to our food security – they can devastate crops and cost billions of pounds worth of damage. In fact, losses of wheat, rice, and maize to fungal pathogens, per year, are the same as the annual spend by US Department of Homeland Security – some 60 billion US dollars. As fast growing microbes, fungi adapt rapidly to anti-fungal treatments and so we need to develop new fungicides all the time. Our research has led to a better understanding of the mechanisms by which the intruder attacks and overcomes the plant defence. In order to efficiently protect crops, we must better understand molecular mechanisms like these that occur in the very earliest stages of infection."

Speaking about the research, Deputy Vice Chancellor, Professor Nick Talbot said "The University of Exeter is committed to tackling fundamental research questions to help control plant diseases, which threaten our food supply. We have built a very strong team of researchers studying fungal biology and plant pathology. This exciting discovery by Prof Steinberg's group provides a new potential route to disease control."

More information: The paper, 'Long-distance endosome trafficking drives fungal effector production during plant infection', is published in the journal *Nature Communications*.

Provided by University of Exeter