Researchers find missing link in plant defense against fungal disease

April 19 2011

Botrytis bunch rot, a disease caused by the fungal pathogen *Botrytis cinerea,* can devastate grape vineyards. Yet other plants can repel the invader and protect themselves by mounting a form of chemical warfare against the fungi through the production of antimicrobial substances, called phytoalexins.

Scientists at the University of Missouri report on a discovery in a key component in the signaling pathway that regulates the production of phytoalexins to kill the disease-causing fungus *Botrytis cinerea.*

"When the mustard plant Arabidopsis detects the fungus Botrytis cinerea, it produces a phytoalexin, called camalexin, in response," said Shuqun Zhang, professor of biochemistry and senior author of the study. "Camalexin acts as sort of an antibiotic against the specific fungus, allowing the plant to successfully defend itself."

In previous work, Zhang and his colleagues showed a signaling pathway, known as MAPK cascade, triggers the transcription activation of genes that make camalexin in Arabidopsis. This study shows that the target of this signaling cascade is the WRKY33 transcription factor.

Arabidopsis plants lacking the gene are unable to synthesize camalexin and are more susceptible to the Botrytis cinerea fungus.

The finding provides an important missing link in the chain of molecules that tells the plant to mount an appropriate defense against an invading

microbe.

"Phytoalexins are one important way plants defend themselves naturally against pathogens. Knowing how plants regulate this defense response may allow us to naturally enhance pathogen tolerance in plants," Zhang said.

More information: The study, titled "Phosphorylation of a WRKY transcription factor by two pathogen-responsive MAPKs drives phytoalexin biosynthesis in Arabidopsis," is highlighted in the April 15 online early edition publication of *The Plant Cell*.

Provided by University of Missouri-Columbia