Researcher Discovers Pathway Plants Use to Fight Back Against Pathogens

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Plants are not only smart, but they also wage a good fight, according to a University of Missouri biochemist. Previous studies have shown that plants can sense attacks by pathogens and activate their defenses. However, it has not been known what happens between the pathogen attacks and the defense activation, until now.

A new MU study revealed a very complex process that explains how plants counter attack pathogens. This discovery could potentially lead to crops with enhanced disease resistance.

“There is a chemical warfare between plants and pathogens,” said Shuqun Zhang, associate professor of biochemistry in the College of Agriculture, Food and Natural Resources and the College of Medicine. “Normally, plants put effort into growth and development. However, when plants sense pathogens, they have to use some of their energy and resources to make secondary metabolites to fight disease. Until now, very little has been known about how this process is regulated.”

According to the study, plants first sense the attack of a pathogen, and then activate defense responses by triggering a complex signaling cascade in plants. One of the defense responses is the induction and accumulation of anti-microbial defense chemicals, known as phytoalexins.

In his study, Zhang found the specific signaling path, known as a mitogen-activated protein kinase (MAPK) cascade, in the plants that

ends when the defense chemical camalexin is created. Camalexin is essential for resistance to some plant diseases. Zhang used Arabidopsis, a small flowering plant and the first to have its entire genome sequenced, and Botrytis cinera, a fungal pathogen that causes grey mold disease in a number of plants including grapes and strawberries.

“By understanding at the molecular and cellular levels how plants protect themselves under adverse environmental conditions, such as pathogen attacks, we could eventually improve the disease resistance of crops,” Zhang said.

The study will be published in the March 31 online early edition publication of the *Proceedings of the National Academy of Sciences.*

Source: University of Missouri