Understanding plants' overactive immune system will help researchers build better crops

May 27 2009

Wild-type *Arabidopsis* is pictured on the left and srfr1-3 mutant with constitutively activated pathogen defenses and severely reduced biomass is on the right. Credit: Photo courtesy of Dr. Walter Gassmann.

A plant's immune system protects the plant from harmful pathogens. If the system overreacts to pathogens, it can stunt plant growth and reduce seed production. Now, University of Missouri researchers have identified important suppressors that negatively regulate the responses of the immune system in the plant species *Arabidopsis thaliana*. Understanding the immune system of plants would allow breeders to create better yielding crop plants.

"The immune system provides plants with strong protection from

pathogens," said Walter Gassmann, associate professor of plant sciences in the MU Christopher S. Bond Life Sciences Center and the College of Agriculture, Food and Natural Resources. "However, this response has the potential to be highly deleterious to the plant and needs to be tightly controlled. Certain suppressors protect the plant from responding to harmless stimuli and from overreacting to pathogens. If there is a mutation in these suppressors, the immune system can actually do more damage than good."

One way that plants fight pathogens is through effector-triggered immunity (ETI), which relies on the detection of pathogen effector proteins (proteins that are deployed by pathogens to interfere with the plant immune system). After the detection of a pathogen, specific proteins in the plant, known as resistance proteins, elicit an effective defense response. The plants' resistance proteins are regulated by suppressors to achieve minimal side effects to the plant while providing optimal responses to pathogens. However, when the ETI is overly activated, it can cause stunted growth and poor seed production.

In the study, MU researchers examined plants with genetic mutations that resulted in heightened plant immunity. By examining this mutation, researchers were able to identify specific genetic components that may negatively regulate the immune system and thus contribute to an appropriate immune response.

"The general control of effector-triggered signaling is poorly understood," Gassmann said. "Better insight into the immune system response will allow us to develop plants with more durable safeguards against pathogens."

Gassmann's research has been published recently in The *Plant Journal* and *Plant Signaling & Behavior*. The papers were co-authored by former post-doctoral researcher Soon Il Kwon, current graduate student Sang

Hee Kim, current post-doctoral researcher Saikat Bhattacharjee, and former visiting scientist Jae-Jong Noh.

Source: University of Missouri-Columbia (news : web)