New research looks at pathogenic attacks on host plants

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Two Kansas State University researchers focusing on rice genetics are providing a better understanding of how pathogens take over a plant's nutrients.

Their research provides insight into ways of reducing crop losses or developing new avenues for medicinal research.

Frank White, professor of plant pathology, and Ginny Antony, postdoctoral fellow in plant pathology, are co-authors, in partnership with researchers at three other institutions, of an article in a recent issue of the journal *Nature*. The article, "Sugar transporters for intercellular exchange and nutrition of pathogens," was led by Li-Qing Chen from the department of plant biology in the Carnegie Institution for Science at Stanford University.

The project involves the identification a family of sugar transporters, called SWEETS, which transport glucose between plant cells. These transporters are also important because they are targeted by pathogens trying to obtain plant sugar for nutrition.

"It's remarkable," White said. "These bacteria are able to regulate the plant genes directly by inserting proteins into the plant cells. The proteins take over the transcription of the SWEET gene, and the plant, as a consequence, becomes susceptible to bacterial disease."

White and Antony focused specifically on rice bacterial disease and tried

to understand what makes rice susceptible and what makes it resistant to specific pathogens. The K-State researchers discovered three resistance genes in rice that can be mutated in order to build the resistance of the rice against a pathogen. One of these resistance genes -- Xa13 -- is included in the *Nature* article and was discovered by White's lab in 2006.

"We've identified the genes that bacteria can induce to cause the plant to be susceptible," White said. "We've identified them as critical for disease from a pathogen standpoint. For the plant, these genes are involved in normal development. However, once the pathogen takes control of expression, it makes the plant susceptible."

White and Antony also have an article appearing in the December issue of the journal The Plant Cell. They collaborated with researchers from Iowa State University to investigate a second susceptibility gene and its role in the spread of disease.

White's laboratory has been working on such rice research for 15 years, but started collaborating with the Stanford researchers earlier this year.

"We have been trying to understand what the pathogen wants from the host, how the pathogen gets it, and how the host tries to defend itself," Antony said.

Although the research is important in the field of plant genetics, it has broader applications as well. Because researchers have a better understanding of how to control pathogen food supplies, they can use this research to reduce crop diseases and subsequent losses. The plant research may also apply the findings to humans or animals because both use similar sugar transporter genes to transfer glucose, leading to new possibilities for medicine and diabetes research.

White and Antony are in the midst of a three-year, $3-million National

Science Foundation grant, and have also been funded in their research by the U.S. Department of Agriculture's National Research Initiative program through the Cooperative State Research, Education and Extension Service.

Provided by Kansas State University