Researchers uncover mechanisms of plant infection

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(Medical Xpress) -- Researchers from the Virginia Bioinformatics Institute at Virginia Tech and a team of international colleagues have identified the functions of a large family of virulence proteins used by a dangerous group of plant pathogens that includes the soybean pathogen Phytophthora sojae and the Irish potato famine pathogen, Phytophthora infestans.

This research is featured on the cover of the latest issue of the top plant research journal *The Plant Cell*.

Brett Tyler and members of his research group, along with Chinese researchers from Nanjing Agricultural University and Northwest A&F University, examined the functions of a huge family of virulence (or effector) proteins in P. sojae. They discovered that the proteins are capable of suppressing a important process in plant immunity called programmed cell death.

Programmed cell death is an in-built suicide mechanism that kills infected plant tissue and fills it with toxins so the pathogen can no longer feed on it. Plants have evolved several redundant pathways to trigger programmed cell death to evade pathogen attempts to block the process, but Tyler's team discovered that Phytophthora pathogens produce more than 160 virulence proteins in a carefully coordinated strategy to block all attempts by the plant to launch its immune response.

"Phytophthora pathogens cause billions of dollars in damage to

agriculture, forestry and natural ecosystems every year," said Tyler. "This study reveals why these pathogens are so fiendishly successful at destroying huge numbers of plant species. The results of the study will guide future studies on blocking the action of these virulence proteins."

Many pathogens produce effector proteins which can enter host cells to make them receptive to infection, but oomycete pathogens like the Phytophthora species have amplified this strategy to an astonishing degree, producing from 300 to 500 more of these effectors, depending on the species. In the article just published however, the research team identified a shorter list of around 50 proteins that the pathogen appears most dependent on.

"The good news is that the pathogen's dependence on these proteins creates a vulnerability that we can target in trying to protect plants against infection," said Tyler. "We already have some promising leads in how to block this entire family of virulence proteins."

The research is the fruit of a long-standing collaboration between Tyler's team at Virginia Tech and a team from the Nanjing Agricultural University led by Professor Yuanchao Wang. The collaboration began in 2004 with mutual visits by Tyler and Wang, and has steadily expanded since then.

The present study began in 2007 and involved close cooperation among 13 researchers from Nanjing and six from Virginia Tech. Another of Tyler's colleagues, Professor Weixing Shan from Northwest A&F University, also made important contributions. Tyler holds guest (adjunct) professor appointments at both universities.

The research was supported by funding from the Agriculture and Food Research Initiative of the United States Department of Agriculture's National Institute of Food and Agriculture, the U.S. National Science

Foundation, and by several grants to Wang and Shan from the Government of China, including an international cooperation grant.

The Plant Cell is published by the American Society of Plant Biologists, and focuses on research with broad appeal to plant biologists across the globe. Founded on the key ideas of getting exciting research in a high quality format to as many scientists as possible, the journal ranks first in plant science research.

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