Researchers JAZ(zed) about plant resistance discovery

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The mystery of how a major plant hormone works to defend plants against invaders has been revealed, thanks to collaborative research efforts by Michigan State University and Washington State University.

While scientists have known for years that a common plant hormone, jasmonate, plays a crucial role in plant development and function, the steps that convert the hormone's signal into genetic and cellular action have remained elusive. MSU scientists Sheng Yang He and Gregg Howe were part of two back-to-back discoveries that solved the mystery, described in the July 18 online issue of the journal *Nature*.

Jasmonate is the last major plant hormone to have its signaling process revealed. Initial research by WSU researchers identified the family of proteins – dubbed JAZ proteins – that are critical to plants receiving and responding to the jasmonate signal.

"In a healthy environment, these JAZ proteins are doing their job – they're blocking all the defenses and signals, because they are not needed," said Howe, an MSU professor of biochemistry and molecular biology. "But when a plant becomes stressed by an insect or pathogen, the plant needs to respond very quickly if it's going to be successful in warding off the attacker."

Independent of the WSU work, Howe and He used Arabidopsis, a common lab plant, and tomato plants to determine how the JAZ proteins work. Their experiments showed that the jasmonate signal causes direct

interaction between JAZ proteins and a second protein complex, SCFCOI1, that works to eliminate the JAZ protein so that the plant can mount a defense response.

Based on the research findings, there is strong evidence to suggest that Howe and He might have identified the SCFCOI1 protein complex as the receptor for jasmonate.

“We found that when jasmonate is present the COI1 and JAZ proteins bind together,” said He, an MSU professor of plant biology, plant pathology, and microbiology and molecular genetics. “This opens the way for the plant to turn on the necessary genetic or cellular response.”

As part of their research, Howe and He have proposed a model for how this interaction works.

“Now that we know what the active signals are and have identified the key regulatory proteins – the JAZ proteins – involved, the hope is to either genetically modify plants or develop compounds that mimic the jasmonate hormone,” Howe said. “The research may help scientists engineer plants for increased resistance to insects and pathogens.”

Researchers at both universities will continue to work on other critical aspects of this research.

“Understanding how the jasmonate system works will shed light on all the processes in which the hormone is involved, notably plant reproduction and defense,” said John Browse, head of the WSU Institute of Biological Chemistry research team.

“This study represents a significant advance in our understanding of a major plant hormone and how it works,” He said. “We are excited to be part of this collaborative effort and look forward to extending the

understanding and application of this important work."

Source: Michigan State University