New gene that helps plants beat the heat

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Michigan State University plant scientists have discovered another piece of the genetic puzzle that controls how plants respond to high temperatures. That may allow plant breeders to create new varieties of crops that flourish in warmer, drier climates.

The MSU researchers found that the gene bZIP28 helps regulate heat stress response in *Arabidopsis thaliana*, a member of the mustard family used as a model plant for genetic studies. This is the first time bZIP28 has been shown to play a role heat tolerance. The research is published in the Oct. 6 issue of the *Proceedings of the National Academy of Sciences*.

"We also found that bZIP28 was responding to signals from the endoplasmic reticulum, which is the first time the ER has been shown to be involved with the response to heat," said Robert Larkin, MSU assistant professor of biochemistry and molecular biology and corresponding author of the paper. "We're finding that heat tolerance is a more complex process than was first thought."

Previous research has shown that the nucleus, the "brain" of the cell, and cytosol, the fluid inside cells, play a role in how plants respond to heat. The endoplasmic reticulum, a membrane in the cell that consists of small tubes and sac-like structures, is mainly responsible for packaging and storing proteins in the cell.

According to Christoph Benning, MSU professor of biochemistry and molecular biology and a member of the research team, the scientists were looking for genes that turn other genes on and off and are tied to

cell membranes. These membrane-tethered gene switches are seen in animals but hadn't been studied in great detail in plants.

"The bZIP28 protein is anchored in the endoplasmic reticulum, away from its place of action," Benning explained. "But when the plant is stressed by heat, one end of bZIP28 is cut off and moves into the nucleus of the cell where it can turn on other genes to control the heat response. Understanding how the whole mechanism works will be the subject of more research."

Plants with an inactive bZIP28 gene die as soon as temperatures reach a certain level.

Source: Michigan State University