Impulsive micromanagers help plants to adapt, survive

August 14 2012

Jen Lau is an MSU biologist who studied how plants and microbes work together to help plants survive the effects of global changes. Credit: Photo courtesy of MSU

Soil microbes are impulsive. So much so that they help plants face the challenges of a rapidly changing climate.

Jen Lau and Jay Lennon, Michigan State University biologists studied how plants and microbes work together to help plants survive the effects of global changes, such as increased atmospheric CO_2 concentrations, warmer temperatures and altered precipitation patterns. The results, appearing in the current issue of the Proceedings of the National Academy of Sciences, showed that microbes in the ground not only interact with plants, but they also prompt them to respond to environmental changes.

"We found that these changes in the plants happen primarily because of what global changes do to the belowground microbes rather than the plant itself," said Lau, who works at MSU's Kellogg Biological Station. "Drought stress affects microbes, and they, in turn, drive plants to flower earlier and help plants grow and reproduce when faced with drought."

The team conducted a multi-generational experiment that manipulated environmental factors above and below ground while paying close attention to the interaction between the plants and microbes in the soil. Close examination of this particle partnership revealed some interesting results.

Researchers already knew that drought stress reduced plant growth and altered their life cycle. The team was surprised, though, to observe that the plants were slow to evolve and, instead, microbes did most of the work of helping plants survive in new, drier environments. This happened because the microbes were quick to adapt to the changing environment.

This newfound aspect of their relationship gives plants an additional strategy for survival, Lau said.

"When faced with environmental change, plants may not be limited to traditional 'adapt or migrate' strategies," she said. "Instead, they may also benefit from a third approach – interacting with complementary species such as the diverse microbes found in the soil."

Provided by Michigan State University