THE ENEMY OF MY ENEMY


Rich Maxey

UTIA RESEARCH SHOWS THAT PLANTS WIELD GENETIC WEAPONS FOR SELF DEFENSE

The enemy of my enemy is my friend. This ancient proverb is known as a model for international diplomacy. It also enjoys status as a viable strategy for survival in nature. Sharks are known to ignore pilot sh as a potential meal because the smaller predator feasts on parasites that plague the bigger sh. In the plant kingdom, futuristic research at the UT Institute of Agriculture is proving that some plant species, too, though rooted in the ground, are genetically wired to rely on ying insect friends for protection.

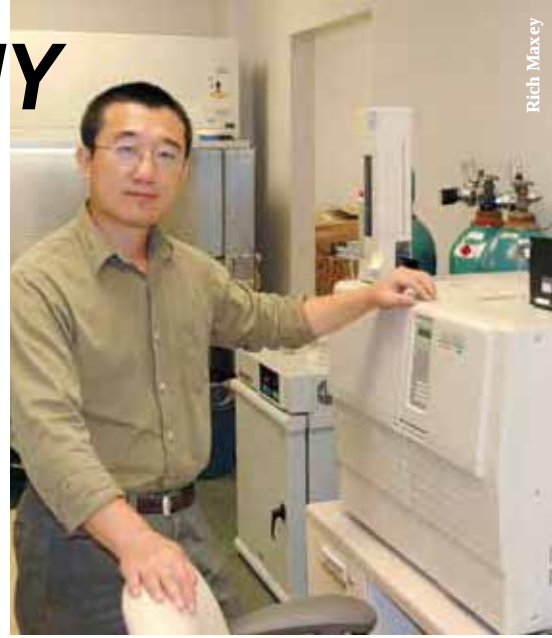
Take rice, fall armyworms, and parasitic wasps: Dr. Feng Chen and his previous Ph.D. student Joshua Yuan, along with a team of collaborators from the Department of Entomology and Plant Pathology and the Max Planck Institute for Chemical Ecology in Germany, have proven that chemicals emitted by injured rice plants serve as calls for help.

The scientists showed that female wasps "smell" chemicals given off by rice plants that have been munched on by hungry fall armyworms and y toward the plants in search of the armyworms. When found, the unfortunate armyworm is killed and its carcass used as a host for the wasp's eggs. In other words, the rice plant signals that it needs protection, and the wasp bene ts by nding a suitable host for her eggs. The armyworm doesn't fare so well, but the situation is a classic example of indirect defense.

Identifying chemical compounds associated with indirect plant defense and isolating their genetic origins are hot topics in plant research. This work holds great potential for scientists to discover natural, biological pest controls for commercial cereal crops like maize, wheat, and sorghum. Biocontrols are attractive to producers and consumers as they can reduce production costs for growers, who won't need as much expensive pesticide, and therefore reduce the amount of chemicals introduced to the environment.

"The chemical signals released by the injured rice plants are received by the wasps in a manner similar to pheromones. They are both 'infochemicals,'" says Chen.

Using a state-of-the-art integrated genomic approach, Chen and his co-authors identi ed and characterized a number of critical genes for synthesizing such infochemicals in rice. The study lays a foundation for further understanding of indirect defense in rice and other cereals. The team's ndings also provide important knowledge and tools for examining whether genetic modi cations can help a plant's ability to synthesize infochemicals and therefore help commercial-scale populations naturally protect themselves. Synthetically producing the natural compounds and applying them as "natural" pesticides may also prove to be economically and environmentally sound.


Rich Maxey

Dr. Feng Chen

"We worked with rice because it is the only cereal crop whose genome has been fully sequenced," says Chen. "The rice plant can serve as a model for other commercial crops commonly produced in Tennessee like corn, wheat and other grasses," he explains.

Chen's work in integrated genomics may enhance the natural protections for important cereal crops, such as switchgrass, in Tennessee as well as solve potential problems with energy crops before they become an issue.
–Patricia McDaniels