

# Rice research gets an insight into plant reactions to the environment

By Kathleen Phillips, AgriLife

One might say plants don't have a leg to stand on, but that may actually give them a leg up on the animal kingdom when it comes to environmental adaptability.

"Plants are rooted in the ground. They can't move away when it gets too hot, too dry or too wet," said Dr Lee Tarpley, Texas AgriLife Research plant physiologist in Beaumont, Texas. "If we can understand how plants respond to the environment, that would give us some clues on how to breed plants more capable of adapting to extremes."

Take rice. More than 558 million tonnes are produced annually in some 100 nations. It's a staple on which human survival depends in many developing countries, so assuring a harvest is vital.

"As a rice plant grows, its structure changes based on its age, what kind of weather it has faced, the use of chemicals if any, and what it inherited as a plant variety," Lee explained.

Yet with so many variables possible across numerous varieties worldwide, researchers have not had a way to analyse enough samples to target particular plant responses for improvement in breeding programs.

## Metabolite screening

In his research, Lee has identified biomarkers in rice – 17 markers thus far that can follow changes in metabolism rapidly across a large number of plant samples. The technique is called metabolite screening. Lee has developed procedures for six of these markers so that researchers can begin using them to help diagnose the plant's needs.

"Perhaps we will be able to use these procedures in the lab to screen how tillering occurs and how metabolism changes in that process," Lee said. "Then we might understand how to change this to help a plant yield more rice."

A tiller is the stem of the plant where flowers appear before developing individual grains of rice. A rice plant may have

about 15 tillers, each with about 200 flowers, according to University of California – Davis statistics.

Lee noted that metabolite screening is also used in animals – including humans – to diagnose certain diseases. A urinalysis, for example, may measure 20 metabolites to look for changes from a normal range.

This study in rice is new, he said, because in the past scientists have only considered a few aspects of rice metabolism. So while one aspect might be understood, its interactions with other aspects were not included in breeding decisions.

Likewise, Lee added, other research has attempted to examine all of a plant's metabolites. But screening for such a large number was also difficult. That's why Lee decided to zero in on 17 major metabolites in rice.

He plans to continue working out the processes for the remaining biomarkers so that the information can be used in crop breeding as well as for managing crop environments in the field. ■



Metabolite screening of rice may pave the way for higher yielding varieties of rice and other crops.