

Gauges Can Reduce Water Use In Rice Production

STONEVILLE, MISS.

Mississippi growers can reduce water use in rice production with the help of newly designed flood gauges, according to recent Mississippi State University research.

"The flood gauges are most helpful after rice canopy closure when it is difficult for producers to determine the presence or absence of water in rice paddies," said Joe Massey, an associate professor in MSU's plant and soil sciences department.

As a rice field fills with water, the flood gauge indicator rises out of the field and displays a color corresponding to flood depth. Red indicates "add water," yellow means "prepare to add water," blue signifies "full flood" and green means "losing money from overpumping."

The Mississippi Rice Promotion Board sponsored Massey's research with the gauges in 2007.

Justin Dulaney, a rice producer in Coahoma County whose fields were involved in Massey's study, said the gauges allowed him to monitor overpumping from a distance.

A newly designed flood gauge by Mississippi State University helps rice producers conserve water by allowing them to monitor flood depth from a distance. Red indicates "add water," yellow means "prepare to add water," blue signifies "full flood" and green means "losing money from over-pumping."

Photo by Joe Massey/MSU
Department of Plant and Soil Sciences

"I could pull up to my well, step out with a set of binoculars and check each field that I was pumping on with that one well. I could tell if I needed to shut off or keep pumping," Dulaney said. "I knew what I needed to do at the motor when I got there. It's a very time-saving device."

Massey's research into flood gauges is part of his continuing project to compare water and energy savings using less-than-full, or intermittent, flooding instead of conventional flooding in rice production.

Water conservation is important since irrigated crop production creates some of the greatest demands on the Mississippi Delta's groundwater supply, Massey said.

"According to research by the Yazoo-Mississippi Delta Water Management District in Stoneville, relatively minor reductions in water used to grow rice and other irrigated crops could essentially eliminate the deficit we occasionally have from pumping more water from the ground than is naturally recharged," Massey said.

The long-term goal of Massey's research is to maximize the use of rain when it falls so groundwater reserves will meet irrigation needs during dry periods.

"We don't want to take away from water resources needed by future generations," Massey said.

Massey's research has shown that less-than-full irrigation can reduce the amount of water needed to grow a successful rice crop by up to 50 percent compared to the conventional method of continuous flooding. Massey began the research in 2003. Actual savings depend on how carefully producers manage their fields to capture rainfall.

"During dry years, there is less rain to catch, so savings are reduced. However, managing the

rice flood to maximize the distance between the water level and the top of the gate in a levee tends to reduce overall water use by minimizing overpumping and, therefore, runoff losses," Massey said. "By maintaining this distance, or freeboard, and keeping rice paddies less-than-full, there is space in the paddy to catch and hold rainfall."

Massey said less-than-full flooding resembles the "drop-fill" method used successfully in catfish production to reduce water and energy inputs.

"Our research has shown that less-than-full irrigation, when combined with multiple-inlet irrigation, can be successfully adapted to commercial rice production systems in Mississippi," Massey said. "Multiple-inlet, or side-inlet



irrigation that allows a rapid reestablishment of flood, is critical to the success of less-than-full flooding."

Massey used flood gauges in less-than-full irrigation systems in 2007 to help producers monitor rice floods. The associate professor also is researching the remote and automatic shutoff of water pumps to save producers time.

Nathan Buehring, Extension rice specialist based at MSU's Delta Research and Extension Center in Stoneville, said unfamiliarity with less-than-full flood management and the labor needed for initial setup have hampered Mississippi rice producers' adoption of the technique.

"There is extra labor needed at a busy time of the year to set up this type of irrigation system," Buehring said. "However, less labor is needed to manage the system once it is established. As fuel and energy costs rise, I think more producers will be interested in intermittent flood management, especially as more information and data are generated through Dr. Massey's research."

Massey said his plan for 2008 is to place mechanical flood-depth gauges and automatic pump controllers on additional grower fields for evaluation.

Producers interested in testing a mechanical flood gauge on their field in 2008 may contact Massey at (662) 325-4725. A limited number of the gauges will be available. Δ