

# Progress Report

## Validation of an On-Farm Rice Drying Model

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*Post-Harvest Area*

*Report of Work Conducted in 2005; First Year of Two-Year Project  
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Work on this project began in the summer of 2005. This report addresses the first two objectives of the project:

**1. *Develop a system for measuring air temperature and relative humidity at various elevations and locations within farm-scale bins during drying.*** Structural support systems to be placed inside drying bins were designed and built to perform two functions:

- a. Secure temperature and relative humidity sensors (Hobo, Onset Computer Corporation, Bourne, Mass) at strategic locations throughout farm bin during loading, subsequent drying, and unloading.
- b. Collect a sample of rice for moisture content (MC) and property measurement at each of the sensor locations as the bin is being unloaded.

Four such systems were constructed with seven sensor/sample collection trays included per system.

**2. *Measure air conditions at selected in-bin locations and of ambient and bin plenum air during drying runs using various in-bin rice drying systems at several Arkansas farm locations.*** Two farm drying bins were selected for testing during the fall of 2005. The first was a 42-ft diameter bin owned by Mr. Chris Isbell at Humnoke, AR. The second was 48-ft diameter bin owned by Mr. Marvin Hare at Newport, AR. In the Isbell bin, two sensor support systems were installed and the bin filled. That bin is loaded as of the time of this writing and thus the sensors and samples have not yet been retrieved. For the Hare bin, two additional sensor support systems were installed. The bin was loaded and the rice dried, the sensors and samples were then retrieved and the sensor data downloaded. Subsequently, the sensors were reset and the same bin was reloaded with green rice and the rice dried. The sensors and samples were again retrieved. Thus, two replications were performed in the Hare bin this fall.

At both locations, pressure ports were installed on the fan exhaust air plenum of both systems and the pressure developed by the drying fans was measured; from these readings and the manufacturers' fan curves, the drying air flow of the fans will be deduced. Additionally at both locations, Hobo sensors were used to measure the outside air temperature and relative humidity throughout the drying experiments.

Objective 3 will comprise using this data and the airflow data to simulate temperature and MC profiles in the bins using an internet-based farm drying program available at "<http://beaumont.tamu.edu/RiceSSWeb/>". The predicted values will be compared to those measured in both farm drying systems to estimate model accuracy.