Water Saving Irrigation: A Vital Step in Improving the Sustainability of Rice (*Oryza sativa*) Production in the Mississippi Delta.

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The 2002 Yazoo-Mississippi Joint Water Management District (YMD) water use survey data suggest that Mississippi rice producers use on average 9,600 m^3 water ha^{-1} yr^{-1} (38 A-in yr^{-1}). Rice accounts for only 14% of the irrigate crop area in Mississippi but consumes approximately 40% of the water dedicated to crop irrigation. Slow aquifer recharge rates combined with intense agricultural withdrawals have resulted in a 27 cm yr^{-1} (10.5 in yr^{-1}) average decline in the alluvial aquifer in parts of the Mississippi Delta.

In 'conventional' rice cultivation, water is distributed through levee gates. This requires that each preceding paddy be overfilled to deliver water to each subsequent down-slope paddy. An artifact of levee-gate water distribution is that rice fields remain filled beyond holding capacity for a large portion of the growing season, resulting in negligible rain-holding capacity. Therefore, conventional rice water management may result in excessive water consumption, tailwater runoff, and non-point source pollution.

This project aims to reduce water use and non-point source pollution in rice production by coupling **multiple-inlet irrigation with intermittent flooding**. Multiple-inlet irrigation uses gated polypropylene pipe to distribute water to each paddy individually. With intermittent flooding, the paddy water is allowed to naturally decline through evapotranspiration until approximately ½ of the soil surface of each paddy is exposed. Extension and research personnel have introduced the combined irrigation practices to Arkansas and Mississippi producers and are adapting the practices to the grower's requirements so as to better understand soil and climatic effects on season-long water use, pumping costs, pest levels, and rough rice yields.

In 2002, adjacent production fields in Coahoma County were managed using either **multiple-inlet irrigation with continuous flooding** or **multiple-inlet irrigation with intermittent flooding**. Mid-season leaf tissue analyses from each flooding system suggest that intermittent flooding did not affect rice fertility requirements. Flood management also did not affect weed, insect, and disease pests. **Multiple-inlet irrigation with continuous flooding** consumed 7,100 m^3 water ha^{-1} yr^{-1} (28 A-in yr^{-1}). This represents a 27% reduction in water consumption compared to the Mississippi average. **Multiple-inlet irrigation with intermittent flooding** consumed 4,600 m^3 water ha^{-1} yr^{-1} (18 A-in yr^{-1}) and represents a 50% reduction in water consumption compared to the state average. Continuously flooded rice production yielded 10,300 kg ha^{-1} (183 bu A^{-1}). Intermittently flooded rice yielded 10,600 kg ha-1 (189 bu A^{-1}). These preliminary results suggest that multiple-inlet irrigation with intermittent flooding could reduce the amount of water consumed in rice production, reduce production costs, increase rain-holding capacity and, therefore, decrease non-point source runoff, while maintaining acceptable rice yields.