

IRRIGATION WATER CONSERVATION FOR THE MISSISSIPPI DELTA

Soybean producers in Mississippi irrigate the third most acres in the US, second only to Nebraska and Arkansas. The vast majority of these irrigated soybean acres are in the Delta.

The Yazoo Mississippi Delta Joint Water Management District ([YMD](#)) estimates number of irrigated acres and amount of irrigation water applied to the major crops grown in the Delta. Most of this water is pumped from the Delta alluvial aquifer.

Data for 2010 are shown in the below table. It is obvious that irrigation water applied to soybeans is a significant amount of the total amount of irrigation water applied in the Delta.

Crop	Estimated Irrigated acres	Estimated water use	
		Per acre (acre-ft.)	Per crop (acre-ft.)
Corn	297,300	0.8 (9.6 in.)	237,840
Cotton	170,518	0.7 (8.4 in.)	119,363
Rice	308,523	3.4 (40.8 in.)	1,048,978
Soybeans	904,808	1.1 (13.2 in.)	995,289
Aquaculture	38,573	3.0 (36 in.)	115,719
		Total	2,517,189

Data provided by Mark Stiles, YMD, Stoneville, MS.

Each year, the YMD also makes measurements throughout the Delta to estimate water volume changes in the alluvial aquifer. During the 2005-2010 period, the estimated change in the aquifer level averaged a loss of about 234,000 acre-ft/year; the change was negative in 5 of the 6 years. In fact, over the last 24 years that

these measurements have been made, 15 years have shown estimated declines in the aquifer level. Obviously, this is a matter of concern.

There are numerous practices and tools ([article](#) and [videos](#)) that can be applied to abate this decline in the aquifer and contribute to its sustainability. These include land leveling to zero grade, using PHAUCET to ensure uniform watering of irregularly-shaped fields and reduce runoff from irrigated fields, using surge valves to reduce water lost to deep percolation, recapturing runoff irrigation water, and using on-farm surface water storage ([OFWS video](#)) systems.

Two points about OFWS for irrigation purposes.

- Water captured in impoundment structures for future irrigation use provides positive downstream water quality benefits.
- Impounded water from winter rains can be used for early irrigations, thus reducing the amount of groundwater needed or used for irrigation during the season. This conservation measure is currently being evaluated to determine just what the savings will be for a given amount of land that is 1) irrigated, and 2) used for impounding water.

There are other options that can be considered for reducing the decline in the aquifer water level. First and foremost is the application of less irrigation water to meet crop needs. Consider the following.

- If soybean irrigation in the Delta is cut by 1 acre-inch each year, an estimated 75,666

acre-ft. of water will be conserved.

- If soybean irrigation in the Delta is cut by 2 acre-inches each year, an estimated 151,333 acre-ft. of water will be conserved.
- If soybean irrigation in the Delta is cut by 3 acre-inches each year, an estimated 227,000 acre-ft. of water will be conserved. This amount is essentially equal to the average drop in the aquifer over the last 6 years.

There is over [20 years of irrigation research data](#) from Stoneville to indicate that on average no more than 11.5 in. of irrigation water are required to achieve maximum yield when soybeans are planted before May 1. Also, if plantings are made in the first half of April, it is estimated that an average of about 7.5 in. of irrigation water will be required to achieve maximum yield. Both of these amounts are well below the 13.2 in. of irrigation water estimated to have been applied to soybeans in the Delta in 2010.

So simply managing planting date can minimize the amount of irrigation water needed to irrigate soybeans for maximum yield.

Another less-attractive option is irrigating with limited water. This concept is explained in an [article](#) on this site, and in an article published by [Colorado State University](#). It may be what the future will be if irrigation and crop management practices for water conservation are not widely adopted or are not successful on a wide scale in the Delta over the next few years.

Several research approaches are needed in the coming years to determine what route to take to reduce the amount of irrigation water applied to soybeans while still maintaining near maximum profitability, and to reduce dependence on water pumped from the alluvial aquifer.

- Determine the yield and economic effects of reducing seasonal irrigation amounts applied to soybeans over the usual irrigation period.
- Determine how and when irrigating with limited water will affect soybean yields and net returns.
- Develop and/or identify new technology and tools that can be used to increase irrigation efficiency.
- Determine the economic and water savings results from OFWS to offset irrigation water pumped from the Delta aquifer.

All of the above options and tools must be considered to reduce amount of water used for crop irrigation, and most may be necessary to achieve the long-term sustainability of the alluvial aquifer.

*Composed by Larry G. Heatherly, Rev. Nov. 2014,
larryheatherly@bellsouth.net*