EFFICIENT USE OF IRRIGATION RESOURCES

Water use has become a hot issue in the Delta region of the Mississippi River basin. The total annual rainfall in the Mississippi Delta region is more than required for optimum plant growth; however, rainfall distribution during the summer months can be scarce[1]. Periodic summer droughts make irrigation necessary to avoid crop failure. Two approaches to help increase the supply of available water for crop use are to 1) maximize infiltration and storage of moisture in the soil; and 2) increase supplemental irrigation capacity. Because irrigation applications are costly and time consuming, the efficient use of irrigation is a main objective for crop production in the region.

Materials and Methods

In 2012, the Monsanto Learning Center in Scott, Mississippi began investigating ways to utilize irrigation more efficiently. Conversation with local university and agricultural engineers, pointed to the fact that silt loam soils commonly found throughout the region, are known to become compacted and sealed. Consequently, movement of irrigation water into the root zone is limited. In some fields, much of the rainfall and supplemental irrigation being applied may merely run over the ground and flow directly into the ditches. Deep tillage in the fall can be used to help store rainfall for the following season.

The question becomes, are there benefits to in-season deep tillage? Discussions with a local agricultural engineer revealed an in-season tillage system that was utilized in the early 1990's which provided effective water utilization and reduced the number of pivot irrigation applications needed. The innovative engineer designed and constructed a deep tillage parabolic subsoiler for use in crop. The equipment was used to break the compaction layer of the silt loam soil, allowing the irrigation water to penetrate to the root zone and eliminate irrigation frequencies.

For the initial study, many possible tillage systems were explored.
The following parameters were used:

- Tillage to run 10 to 12 inches deep
- Tillage to provide minimal soil displacement
- System must be adaptable to commonly used implements
- The system could be used in conjunction with other operations

A subsoiler was constructed for this trial with the use of M1 Winged Anhydrous Knives manufactured by Nichols Tillage Tools® mounted on an Orthman® toolbar directly behind the buster (Figure 1 - 3). The subsoiler was adjusted to run 10 inches deep and could be used in conjunction with the buster to allow for furrow irrigation. An on-farm trial was initiated in 2012 with a portion of the pivot irrigated field left untreated as a check. In-season deep tillage was run just prior to cotton layby herbicide application with the constructed parabolic subsoiler.

The Learning Center was assisted by Jason Krutz, Associate Research/Extension Professor specializing in irrigation at the Mississippi State Delta Research and Extension Center. Irrigation sensors were installed to measure infiltration rates in the treated and

Figure 1 - 3. A subsoiler was constructed with the use of M1 Winged Anhydrous Knives manufactured by Nichols Tillage Tools® mounted on an Orthman® toolbar.

Continued on next page

Technology Development & Agronomy by MONSANTO

EFFICIENT USE OF IRRIGATION RESOURCES

from previous page

untreated areas of the field. Unfortunately a sensor failed during the trial, eliminating data collection. This study will again be conducted in 2013.

Summary Comments

Even though irrigation sensor data was not collected, the following observation and evaluations were made.

- The infiltration rate appeared to be much higher in the tillage portion of the trial. Water did not pool as much in the tillage portion of the demonstration, versus the areas of the field that did not receive in-season tillage.
- In the areas of the field that did not receive in-season tillage, excessive pooling occurred where compaction was made by the tires of the high-clearance sprayer during the layby applicaiton.

The information discussed in this report is from a single site, non-replicated, one-year demonstration. This informational piece is designed to report the results of this demonstration and is not intended to infer any confirmed trends. Please use this information accordingly.

Source: [1]The Yearbook of Agriculture 1957: Soil. The Mississippi Delta Region. United States Department of Agriculture. 524-527.

Technology Development & Agronomy by MONSANTO