AGRONOMY

UTILIZING COMMERCIALLY AVAILABLE SOIL MOISTURE SYSTEMS IN FURROW IRRIGATED COTTON FIELDS.

Lyle Pringle

"ON AVERAGE, ONE WELL-PLACED SOIL MOISTURE SENSOR SITE SHOULD BE SUFFICIENT FOR SCHEDULING IRRIGATIONS ON THE SAME OR SIMILAR SOILS UNDER OUR PRESENT SCHEDULING RECOMMENDATIONS."

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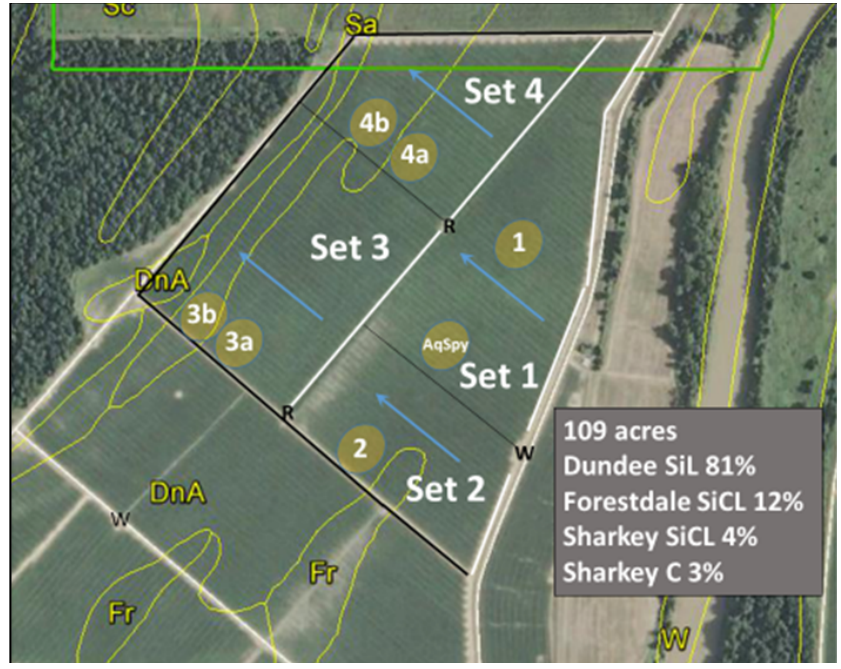
The need for irrigation conservation is being recognized as an important part of our future as water levels in our shallow well aquifer continue to drop in the Mississippi Delta and irrigation acreage continues to increase. Improving irrigation uniformity and irrigation scheduling can increase irrigation efficiency and reduce fuel consumption. Soil-based moisture sensors with their associated dataloggers, telecommunications and software systems can get the data from the field and to the producer to aid in irrigation decisions in a timely, and more user-friendly format. Considering costs of these systems and that these systems are site specific, the minimum number of sites needed to describe a field or area and the proper placement of these sites, considering soils, needs to be determined. From a research standpoint, multiple sensors in a field would give a more accurate measure of soil water status to make an irrigation scheduling decision. From a more practical standpoint, using one sensor site within an irrigation set has been shown to aid in making more efficient irrigation decisions as compared to several producer's normal scheduling routine in previous on-farm cotton irrigation initiation demonstrations and in "RISER" fields in corn and soybean. The question becomes, can this one sensor site effectively be used to schedule irrigations for all other field or sets irrigated by the same well? This assumes that all fields or sets are planted to the same crop reasonably at the same time, and the soils are similar. Producers will need to furrow irrigate all their fields irrigated by the same well before the last field or set to be irrigated reaches a yield reducing stress.

In a demonstration project, multiple soil moisture sensor systems were installed on multiple irrigation sets furrow irrigated by one well at several cotton producer locations, demonstrating the use of soil-based moisture sensor systems. Soil maps were obtained for each site and general locations for the sensors were determined. The approach taken to select potential site locations for sensors for this demonstration was to place sensors in the predominant soil type or predominant yield area to get optimum yield for a majority of the field. Sensors were generally located one half to two thirds down the row from the top end of the field staying above any water that may backup on the end of the rows from rainfall or irrigation.

Over the three years of this demonstration project, 11 farm sites were instrumented with multiple sensors. The number of irrigated sets per well ranged from three to six, while the time necessary to complete the first irrigation of all irrigated sets per well

when rain did not interfere was three to five days except for one location that took eight days. Total acres irrigated by one well at each location ranged from 77 to 176. Most wells were above minimum recommendations of 10 gallons per minute per acre for furrow irrigation of row crops.

Typically, a furrow irrigation producer is managing by triggering irrigation for all sets as one unit. He then irrigates sequentially all sets irrigated by the well until completed. He then waits until he triggers the next irrigation. Our observations indicate, instrumenting the predominant soil of a crop area watered by one well to monitor soil moisture to aid in irrigation decisions can be helpful, especially if the producer tends to over- or under-irrigate. On average, one well-placed soil moisture sensor site should be sufficient for scheduling irrigations on the same or similar soils under present scheduling recommendations. More sensor sites would help to diminish the effect of any outlier's values. The producer also needs to manage in a way to irrigate the sets in order of more droughty to less droughty if discernable. Obtaining yield from each set for comparison may help decide the effectiveness of the scheduling, if water is the common yield limiting factor for each set.



Typical soil moisture sensor configuration from one farm in the project.

As more concise recommendations are developed and a producer manages irrigation more frugally to maximize yield with the least amount of water for each individual set it will be more critical to have more sensors.