Irrigation Water Management of Rice under a Center Pivot

Texas AgriLife Extension Service

Colorado County

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Summary

Colorado County, located in the Coastal Bend Region of Texas, is comprised of about 32% cropland with Rice and Corn being the primary produced grains. Much of the cropland has the ability to be irrigated, with the most common irrigation practice being surface-furrow. Rice is traditional irrigated by means of basin flood irrigation which can produce tail water and excessive drainage amounts. Some rice farmers and pivot manufacturers are experimenting with the use of pivots to conserve water for rice irrigation.

A quarter circle of a pivot was used to irrigate a rice field during the crop production year of 2010. Soil moisture was monitored via WaterMark sensors (Irrometer) during crop growth to assess the irrigation water management plan implemented by the pivot manufacturer. Frequent and significant rainfall events accounted for over 60% of the crops water. Future trials are needed to accurately determine the feasibility of pivot irrigated rice in the area.

Objective

The goal of this demonstration was to determine if sprinkler, pivot based irrigation was feasible for supplying the necessary amount of water to grow a profitable yield of rice and to begin collecting information on water use efficiency in order to develop recommendations for rice production in the area. The demonstration also educated the producer on using soil moisture sensors to efficiently schedule irrigation.

Materials and Methods

The cooperator installed 1 station of soil moisture sensors (Irrometer, WaterMark Sensor) at depths of 6 inches, 1 foot, 2 foot and 3 foot. The producers took regular readings of the sensors and those readings along with irrigation and rainfall data were graphed and displayed on the TexasET Network (http://TexasET.tamu.edu). A cumulative graph of crop water requirements (ETc) and applied water (both irrigation and total water) was also created.

Crop/ Acres:	Rice / 40 Acres
Planting Date:	April 7, 2010
Sensors Installed:	April 16, 2010
Fertilizer:	18 lb/n/ac 28-0-0-5(Sulfur)
Maturity Date:	August 1, 2010

Rainfall:	16.0 inches
Irrigation:	10.56 inches
Total Water:	26.56 Inches

Irrigation Well Meter: 11,938,000 Gallons (36.64 Acre/Feet)

Irrigation System: Center Pivot
Soil Type: Brazoria Clay / Norwood Loam

Results and Discussion

Yield: 35 barrels/ac (116.55 bushels)

Total Evapotranspiration Rice 2010: 22.67 inches

Irrigation Water Use Efficiency: .52 barrels / acre-in
Total Water Use Efficiency: 1.32 barrels / acre-in

The 16 inches of rainfall which fell during the growing season supplied over 60% of the plants total water requirement. An additional 10.6 inches of irrigation resulted in soil moisture levels remaining high throughout the season. Timely rainfall events which fell from June 28 to July 8 eliminated the need for irrigation during the last 15 days of the rice's reproductive peak water use period, supplying 6.4 inches.

The Evapotranspiration (ET) of the crop was calculated to be 22.67 inches for the first crop season. Rainfall and irrigation combined applied 26.56 resulting in a crop yield of 35 barrels per acre (5,670 pounds per acre). According to the 2010 Texas Rice Production Guidelines published by Texas Agrilife Extension, the average rice yield in 2009 was 40.25 barrels (6,531 pounds per acre). While below last year's average, the occurrence of significant rainfall during the crops reproductive stage could have limited potential yield this year.

Conclusions

A study conducted in 2005 and 2006 in the area showed that 50% of rice producers use about 36 inches of water to produce a single crop of rice. However, the average producer allowed for about 18 inches of tail water as a result of conventional farming practices. Pivot irrigation shows potential to meet rice's water requirement through frequent irrigation and reduce tail water (excess irrigation), but further trials are needed in the future when rainfall does not account for 50% or more of the crops water requirement.

Acknowledgements

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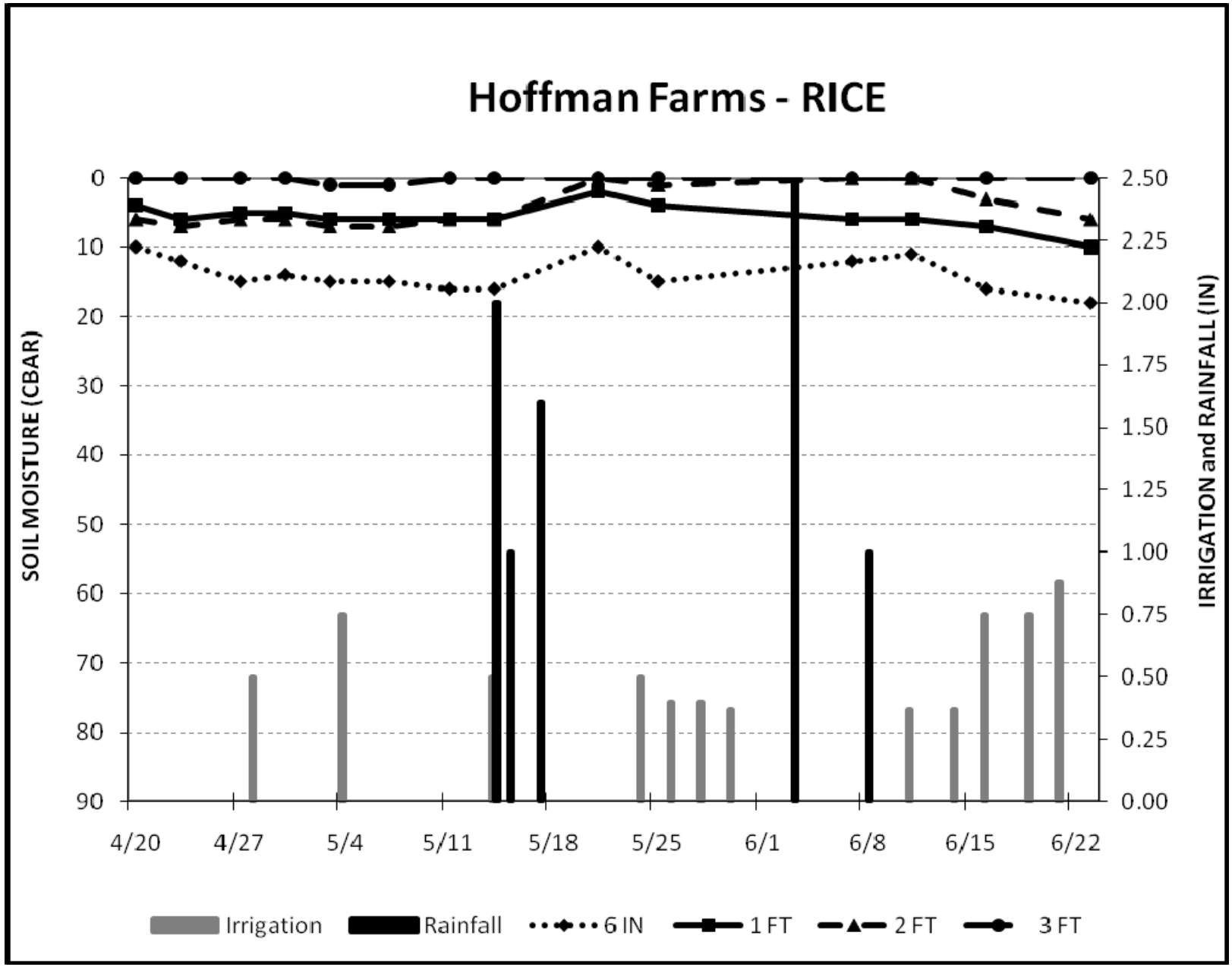
Hoffman Farms - RICE
SOIL MOISTURE (CBAR)
IRRIGATION and RAINFALL (IN)
0
10
20
30
40
50
60
70
80
90
2.50
2.25
2.00
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.00
4/20
4/27
5/4
5/11
5/18
5/25
6/1
6/8
6/15
6/22
Irrigation
Rainfall
6 IN
1 FT
2 FT
3 FT