Mississippi Corn Promotion Board
2015 Progress Report

Project Title: Developing Sustainable and Profitable Deficit Irrigation Programs

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Project Summary (Issue/Response)

Mississippi corn producers are facing two major problems—stagnant corn yields in light of increasing production costs and restricted water use arising from declining Mississippi Alluvial aquifer levels. There is a need, therefore, to develop production systems that maintain or improve corn yield or profitability even if irrigation capacity is drastically reduced by regulatory agencies. The objective of this research project is three-fold: 1) determine optimum physiological period for irrigation initiation; 2) determine critical window and allowable water deficit for terminating corn irrigation; and 3) determine growth stage(s) when deficit irrigation adversely affects yield components. Three separate randomized complete block experiments will be conducted at the Delta Research and Extension Center to determine deficit irrigation effects on corn yield components, seed quality, irrigation water use efficiency and economics. We expect that production systems can be developed that maintain or improve corn yield or profitability if irrigation capacity from the Mississippi Alluvial aquifer is reduced by 25%, the theoretical suitability level for the aquifer. Midwest research indicates potential to maintain yield and increase profitability on deficit irrigated corn relative to a well-watered system.

Project Results/Outcomes

Due to the above normal rainfall in June (244%) and July (134%) which usually occurred following an irrigation resulted in no yield differences between the non-irrigated check and the irrigation treatments in Verona and Stoneville (Table 2). Yields ranged from 249 to 254 bu/acre. Monthly maximum air temperature and rainfall compared to historical weather (Table 1) data indicated March, April, May, June, July and August was (-4, -1, -2, -3, -5 and -3°F below the 27-year (1987-2013) average. Monthly rainfall for March, April, May, June, July and August was 59, 145, 71, 244, 134 and 40% of the 40-year (1974-2013) average. Rainfall from R1 to R6 corn growth stage amounted to a total of 10.55 inches.

Project Results

Table 1. Corn response to furrow irrigation initiation and termination on a Leeper Silty clay loam soil in 2014, Verona, MS.

Irrigation Initiation	Termination	Gal. water/A X 1000	Water inch/A	Yield bu/A[6]	$/A[1]	Plants/A X 1000
None	-----			250.12 a[7]	813	33.24 a[7]
R2[2]	R5	69.22	2.55	249.28 a	810	33.12 a
R3[3]	R6	40.26	1.48	254.01 a	826	34.27 a
R3[4]	R5	67.67	2.49	246.40 a	801	33.36 a
R2[5]	R6	99.07	3.65	251.34 a	817	33.82 a

[1]$/acre gross return at $3.25/bu market price.

[2]Furrow irrigations were applied 6/24/14 (R2); 7/03/14 (R3), and 7/11/14 (R4), using "The University of Arkansas (UAR) Irrigation Scheduler" software computer program.

[3]Furrow irrigations were applied 7/03/14 (R3); 7/11/14 (R4), and 7/28/14 (R5) using "UAR Irrigation Scheduler".

[4]Furrow irrigations were applied 7/03/14 (R3), and 7/11/14 (R4), using "UAR Irrigation Scheduler".

[5]Furrow irrigations were applied 6/24/14 (R2), 7/3/14 (R3), 7/11/14 (R4), and 7/24/14 (R5) using UAR Irrigation Scheduler".

[6]Yields adjusted to 15% seed moisture.

[7]Columns with the same letters are not significantly different at the 5% probability level.

Project Impacts/Benefits

Results from the MCPB deficit irrigation research program is the backbone for our RISER extension recommendations. However, in years when rainfall is well above normal, it is difficult to collect drought stress data.

Project Deliverables

11 Popular Press including MidAmerica Farm Grower, MAFES Discovers, The Cleveland Current, MS Business Journal, Growing Mississippi

1 Online Video for Farmweek

19 Blog Articles on Mississippi Crops

6 Field Days

23 Growers Meetings

28 Technical Presentations