Project Proposal

Managing Water Resources of the Seymour Aquifer Using Subsurface Drip Irrigation (Requested funds $10,565)

John W. Sij, Jeffrey E. Slosser, and David G. Bordovsky

Texas Agricultural Experiment Station, Box 1658, Vernon, TX 76385.

Project Need, Description, and Expected Outcomes

A long-term management program for water conservation and utilization is essential if irrigated production agriculture is to survive in the Texas Rolling Plains. Subsurface drip irrigation (SDI) is the most efficient (nearly 100%) water delivery system to roots of plants and can be considered one component of precision agriculture. Frequently, crop yields equal or exceed those of some traditional irrigation methods while requiring less water, thus saving valuable water resources. The Seymour Aquifer is a fragmented, shallow aquifer that underlies portions of the Texas Upper Rolling Plains and whose recharge is mainly through rainfall. During dry seasons, excessive pumping can deplete underground water resources to the point that wells are no longer functional. Also, during these dry periods, a lowering of the water table often results in reduced water quality; i.e. increased salinity. Nitrates levels frequently exceed government standards for water quality.

Due to SDI's water delivery efficiency and labor savings, SDI will play an increasing role in Rolling Plain's agriculture in the near future. The ***Goal*** of the proposed study is to maximize crop production through prudent management of limited ground water resources that results in economic gain for producers and rural communities. The ***Objective*** of the current effort is to develop a SDI system at the Chillicothe Research Station to demonstrate and educate producers, through science-based research, the benefits and utility of SDI as an alternative and superior irrigation system to inefficient traditional systems that are currently employed.

Plan: Install 72 individually-controlled SDI research plots at the Chillicothe Station to study water use of numerous crops (initially cotton) incorporating conventional and conservation tillage systems. Research will focus on deficit irrigation as a means to enhance water-use efficiency and conserve ground water resources. Research results from SDI plots at the former Munday Station showed that a 50% reduction in irrigation water (based on Potential Evapotranspiration) resulted in only a 20% reduction in yield. Deficit irrigation combined with conservation tillage could potentially extend the groundwater resources of the Seymour Aquifer and perhaps manage nitrate movement within the soil profile. Additional research is needed to verify early results.

Expected Outcome: (1) generate new knowledge on water-use and water-use efficiency using SDI, (2) identify crop growth and reproductive development responses under SDI for cotton and other high-dollar crops, (3) monitor rainfall capture and seedling protection from a terminated cover crop, (4) extend knowledge to producers and the scientific community through educational materials, fact sheets, field day demonstrations, research reports, and professional meetings.

Budget (one year)

Expenditure	Requested Funds	Matching Funds	Total
Salaries/wages	$5,640	0	$5,640
Benefits	1,410	0	1,410
Student worker	1,015	0	1,015
Total Salary & Benefits			8,065
Supplies & Materials	2,500	1,065	3,565
Contracted Services	0	9,500	9,500
Totals	**$10,565**	**$10,565**	**$21,130**