RELATIONSHIPS AMONG FULL SEASON CROP INPUTS AND PRODUCTIVITY ZONES FOR TOTAL VARIABLE RATE COTTON SYSTEMS MANAGEMENT DETERMINED BY AIRCRAFT AND GROUND BASED IMAGING COMBINED WITH THE COTMAN SYSTEM

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Abstract

Adoption of precision agricultural technologies has been limited in cotton production, partly because economic benefits from the system have not been widely established. To examine the potential of this technology to increase profitability of cotton producers in West Tennessee, two demonstration farms were established. These are commercial operations, where some of the fields were managed using variable rate application of most inputs (lime, pre-plant fertilizer, seed, insecticides, growth regulators and harvest aids). Other nearby fields were treated in a uniform manner. To date, the combination of improved yields and input reduction has resulted in increased income of $100 to $200 per acre.

Extended Summary

Presently few cotton producers are using the technologies associated with Precision Agriculture (PA). The profit potential associated with the use of Precision Ag has not been documented nor has the total system been utilized in a typical farming situation. The use of this technology promises to result in improved cotton profit potential.

The objective of this project was to utilize all the Precision Agriculture technologies but do this in a working farm environment. Within this environment, the practical application of PA to a working farm would be tested to establish economic benefit as well as solve the operational problems associated with taking the variety of technologies associated with PA to a working farm and finally to develop a practical farm friendly way to main stream PA for cotton production.

From this work, two technical demonstration farms were established in West Tennessee with one farm in Fayette County and the second in Madison County. With both of these farms a total Precision Farming System has been adopted. This total system includes all aspects of technology usage such as Variable Rate Application (VRA), Multispectral Digital Image utilization, Yield Monitoring and detailed data analysis through the use of Geographic Information Systems. Each of these two farms is an ordinary multi-crop farm producing corn, cotton and soybeans. One farm produces 900 to 1,100 of cotton and the second produces 1,100 to 1,400 acres of cotton per year. Through this project, Jackson State Community College (JSCC) has been successful in assisting these farms in adoption of a total Precision Farming System.

Each of these farms are now utilizing VRA application for Lime, Pre-plant Fertilizer, Seeding Rate, In-Furrow Fungicide and Insecticide, summer applications of insecticides and plant growth regulator and crop termination treatments. All treatments are done on a farm-wide basis with the producer conducting the applications with the producers own existing equipment. JSCC has provided field technical support to the producer. In addition JSCC conducted field research to document the physical and economic impact of VRA systems on cotton production.

Through this work it was found that crop inputs could be varied based on the productive potential of image directed zones. Because these zones are stable from year to year, these zones have utility for future years. From the use of zone based management combined with VRA application technology, profit was increased. Cotton Production Cost was reduced 25% to 38% and yields were increased approximately 100# of lint per acre. The combined cost reduction and yield improvement resulted in an increase in income of $100 to $200 per acre per year.