FINDINGS OF A 2009 PRECISION FARMING SURVEY OF COTTON FARMERS IN FLORIDA

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Abstract

This paper summarizes the results of a survey of cotton farmers in Florida that was administered in early 2009. Farmers were asked about their adoption of information gathering technologies (e.g., grid soil sampling and yield monitoring), adoption of variable rate input application technologies (e.g., fertilizer, herbicide, and defoliants), farm characteristics, and information about them and their perceptions about precision farming. A total of 27 complete responses were received and of those, 19 (70%) reported adopting at least one precision agricultural technology in some form. Information on cotton producers' perception about the future role of precision farming, the perceived benefits of adoption and differences between adopters and non-adopters will also be presented.

Introduction

"Precision farming" or "precision agriculture" refers to site-specific management of a farm. It is a management strategy that uses information technology to bring data from multiple sources to bear on decisions associated with crop production. More specifically, it is a set of technologies that are rapidly evolving for use in obtaining information about soil characteristics and yields, and to apply input levels that match varying crop and soil needs at the sub-field level. Historically, the use of precision technologies for cotton has been limited by the commercial availability of accurate yield monitors. At this time, GPS-based guidance systems are available to obtain the necessary information for cotton production. This is important since cotton is a relatively high-valued crop but it also uses a relatively high level of inputs. Thus, the potential to increase profitability from the adoption of precision farming technologies can result from both the cost savings from reducing overall input use (by only applying what is needed at the sub-field level) and for increasing gross revenues due to improvements in yields. Since technologies are changing and advancing rapidly, this study serves as an important update to two earlier similar studies on precision farming technology use by cotton farmers that have been conducted since 2001 (Roberts et al. 2002).

Materials and Methods

Overall Survey

In early 2009, the Cotton Incorporated Precision Agriculture survey was mailed to 13,579 farms in 12 southern states: Alabama, Arkansas, Georgia, Florida, Louisiana, Mississippi, Missouri, North Carolina, South Carolina, Tennessee, Texas, and Virginia. A remainder postcard was sent after the first mailing then a second mailing was sent in an attempt to increase the response rate. This is the third survey since 2001 that has been sent to cotton farmers in this region. A total of 1,692 of the surveys were returned with sufficient information to analyze. The study by Mooney et al. (2010) provides additional details on the survey.

Scope of Study

The survey population included all Florida farmers with registered sales of cotton to Cotton Incorporated ®, that is, this study attempted a census of the population. Of the 193 active farmers in 2008, which represents a 28% since 2004, 27 returned completed surveys for a 14% response rate. Approximately 85% of respondents were located in Santa Rosa, Escambia, and Jackson Counties. All of these counties are located in Northeast Florida; a region commonly referred to as the 'Panhandle' of Florida.

Objectives

The overall objective of this project was to evaluate the use of precision farming by cotton farmers in Florida. Since this survey was the third since 2001, the results could also be used to identify trends or at least key changes in farmers or farming practices over time. This study focuses on the characteristics of Florida cotton farmers in 2009, including information on their farm and farming practices with a focus on farming technologies.

Results and Discussion

Farm and Farmer Characteristics

A few of the key characteristics of the responding farmers are summarized in Table 1 below. With respect to the farmer, the average age of the respondent was 53 years but these ages ranged from 35 to 87 indicating a fairly heterogeneous group of individuals. This was also evident for farming experience which averaged 30 years but ranged from 10 years to 60 years. Overall, these individuals were heavily depending on income from farming; the average share of household income from farming ranged from just 10% to a full 100%, but the average was a relatively high 74%. In terms of education, 96% had earned a high school diploma or equivalent while 17% had a bachelor's degree.

Since many of the precision farming technologies require use of electronic information that is stored and or manipulated using a computer, respondents were asked about whether or not they used a computer for farm management and, if so, whether they used a computer in the field (i.e., "on-the-go"). A total of 50% of respondents reporting using a computer to manage their farm (which is a 10 percentage point increase above the usage reported in 2001) but, of those, only 4% reported using a computer in the field.

All respondents grew cotton in 2009. A total of 59% reported owning an average of 169 acres, which ranged from 20 to 626 acres. A total of 70% reported leasing an average of 400 acres; leased cotton acreage ranged from 65 acres to 1,850 acres. In terms of land, nearly half of the respondents reported having their land under a conservation easement or, more specifically, an agricultural conservation easement.

The majority of respondents reported owning a cotton picker (i.e., 64%). This is an increase of 12 percentage points above ownership reported in the 2001 survey. Reported cotton yields ranged from 500 pounds per acre to 1,500 pounds per acre and averaged 1,021 pounds per acre across all respondents. The minimum yield is higher than that reported in 2001, and so is the average, even though the maximum reported yields remained unchanged.

Table 1. Key characteristics of Florida farms and farmers that responded to the survey

Characteristic	Unit	Mean	Min.	Max.
Age of owner or farmer responding	Years	53	35	87
Farming experience	Years	30	10	60
Income from farming vs. total household income	%	74	10	100
High school/GED completion rate (1 = yes, 0 = no)	%	96	0	1
Bachelor's degree completion rate (1 = yes, 0 = no)	%	17	0	1
Computer use for farm management (1 = yes, 0 = no)	%	50	0	1
Computer use in the field (1 = yes, 0 = no)	%	4	0	1
Dryland cotton area – owned (59% reporting)	Acres	169	20	626
Dryland cotton area – leased (70% reporting)	Acres	400	65	1,850
Conservation or agricultural easements (1 = yes, 0 = no)	%	47	0	1
Own a cotton picker (1 = yes, 0 = no)	%	64	0	1
Dryland cotton yield	Lbs/ac	1,021	500	1,500

Note: For variables with % units, the mean of the variable has been multiplied by 100.

Precision Farming

Precision farming (PF) entails the assessment of site-specific land and or crop needs in order to develop efficient production plans, which usually requires a needs assessment of the land within narrowly defined geographic areas. By 2009, 70% of cotton farmers in Florida had adopted at least one precision farming technology and 86% believe that it will be profitable for them to use precision farming technologies in the future. Variable rate management decisions for cotton were only reported for fertilizer or lime (i.e., these inputs were applied at a rate needed for each geographic area versus at a uniform rate across the entire field). Information gathering technologies were restricted to only yield monitors and soil sampling techniques. None of the respondents reported abandoning any precision farming technology that they have adopted. Of those that have reported adopting precision farming technologies, only 17% reported improvements in cotton quality (which are not necessarily expected, but beneficial to the farmer) while 43% reported improvements in environmental quality (which are expected but difficult to quantify).

GPS Guidance Systems

Figure 1 shows the five uses of GPS guidance systems that were reported by Florida cotton farmers responding to the survey. The vast majority of farmers (i.e., at least 75%) used these systems for primary tillage (87%), planting (80%) or spraying (80%) activities. A few farmers (i.e., less than 25%) also used GPS guidance systems for cultivating (20%) or harvesting (13%).

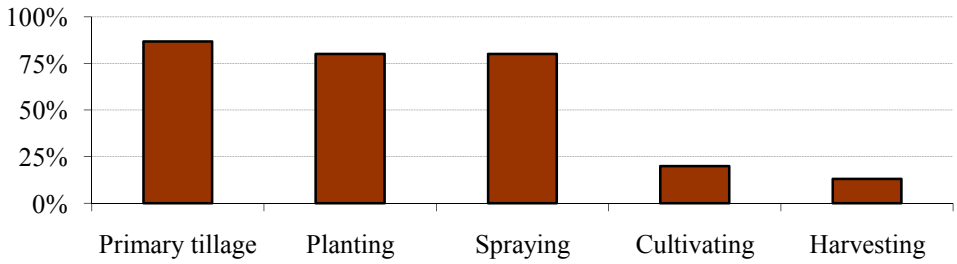

Figure 1. Reported use of in-field GPS guidance systems.

Figure 2 shows that there were four main reasons that were reported by Florida cotton farmers for adopting the use of GPS guidance systems. Most of the respondents (65%) reported adopting to improve spraying capacity and planting. The remaining two reasons included to improve overall farming efficiency and to eliminate the need for row markers (59%).

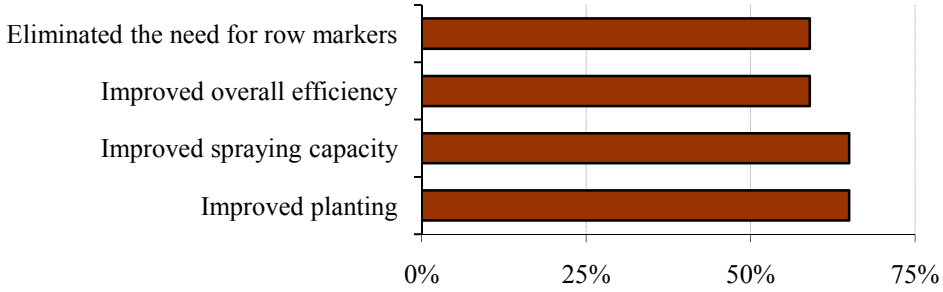

Figure 2. Reported reasons for adopting the use of GPS guidance systems.

Farmers were also asked to list the main benefits they have observed from adopting the use of GPS guidance systems on their farming operations. The following is a ranked list of the benefits that were reported from most significant to least significant benefit:

1. Reduced operator fatigue
2. Labor cost savings
3. Input cost savings
4. Fuel cost savings
5. More time to do other things

Summary

While 70% of cotton farmers in Florida have adopted at least one precision farming technology, an even higher percentage (86%) reported that future use of these technologies would be profitable to them. This potential increase in demand is promising but may be hampered by insufficient information on costs. For example, non-adopters estimated the average cost of a GPS cotton yield monitor system at $12,816 but their estimates ranged from $2,500 to $70,000. Of the respondents that owned such systems, 88% reported that they met their expectations.

Acknowledgements

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