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STATUS OF PRECISION AGRICULTURE TECHNOLOGY ADOPTION BY LOUISIANA COTTON FARMERS

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Abstract

Precision agriculture technologies for cotton production have been commercially available for only a short time. The adoption of these technologies is not widespread. It is important to know what producers attitudes are toward these technologies and what factors they consider important in make adoption decisions. A mail survey of cotton producers was conducted in 2004 to obtain information on the status of precision agriculture technology adoption. Results of the survey indicated that only a small percentage of respondents had adopted precision agriculture technologies for cotton production. The primary reason given for adoption was improving profit potential.

Introduction

One of the underlying principles of precision technologies is the ability to deliver inputs to a specific site and in the required quantity. This precise placement of inputs implies a more efficient utilization of inputs and the possibility of reducing inputs while maintaining output levels. Because cotton production expenses are much higher than other row-crop alternatives, the opportunity for cost reduction is likewise greater (Paxton). Therefore, the use of precision agriculture technologies in cotton production may increase overall production efficiency by reducing input use while maintaining or improving yields and profit.

The use of precision agriculture technologies, or precision farming, involves the identification of within-field variability, the sources of this variability, development of a prescription application of inputs, and delivering that prescription with a variable rate application. Because of the very recent introduction of yield monitors for cotton harvesters, there has been only limited interest in precision farming for cotton production. A comprehensive review of the literature on the economics of precision farming was published by Lambert and Lowenberg-DeBoer (2000). This report found that approximately seventy three percent of the studies examined indicated that precision farming was profitable. Most of the reported studies focused on crops with much lower values than is generally associated with cotton production.

A study of adoption of precision farming technologies by cotton producers in the Southeast was conducted recently (Roberts et al.). Results of this study indicated that approximately 23% of the respondents in all six states had adopted some form of precision farming technology. Grid soil sampling was the most widely adopted precision farming technology adopted with over 95% of the adopters indicating use of this practice. About 75% of the adopters reported they thought precision farming was profitable. A majority of both adopters and nonadopters thought precision farming would be profitable for them in the future. Adopters planted about twice as much cotton as nonadopters and tended to have about 100 pounds per acre higher yield than nonadopters.

Methods

A survey of Louisiana cotton producers was conducted in 2004 to obtain information on precision farming technology adoption. A total of 1,200 questionnaires were mailed to individuals identified as cotton producers by the Louisiana Agricultural Statistics Service. Mail survey techniques suggested by Dillman were followed. A total of 217 surveys were returned for a response rate of approximately 18%. Several respondents indicated they no longer produced cotton or no longer farmed. There were 141 completed questionnaires used to compile the results reported below.

Results

Characteristics of Respondents

Cotton farmers adopting precision farming technologies operated a total of just over 2,100 acres compared to just over 1,200 for those who did not adopt these technologies. The total acreage for adopters consisted of 535 acres of owned land, 1,021 acres cash rented, and 567 acres rented on a share basis. Nonadopters owned 540 acres, cash rented about 254, and share rented 448 acres. These acreages were planted to a variety of crops. Most producers also produced corn and soybeans in addition to cotton.

Farm Size and Tenure

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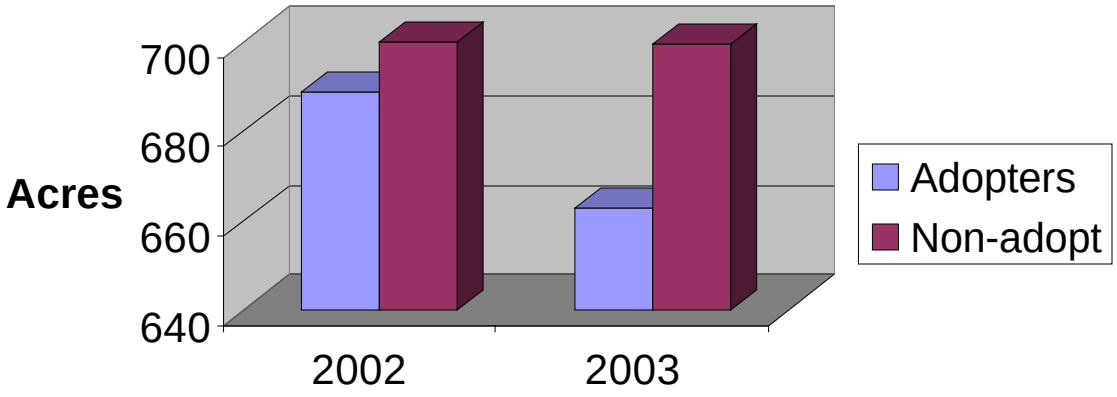

Figure 1. Comparison of Cotton Acreage between Adopters and Non Adopters of Precision Agriculture Technologies, Louisiana, 2004.

Cotton Acreage and Yield

Nonadopters planted slightly more cotton than adopters even though they had less total acres (Figure 2). Producers who adopted precision farming technologies had slightly higher cotton yields than nonadopters in both 2002 and 2003 (Figure 3).

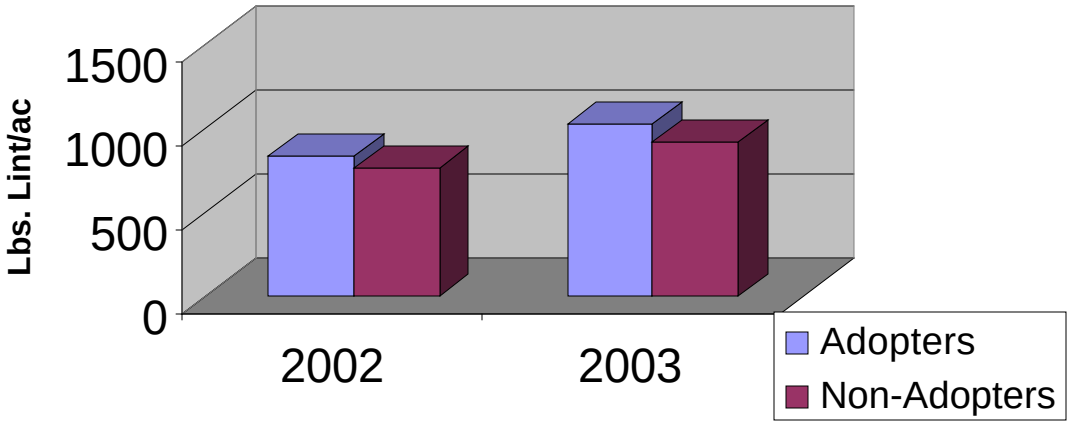

Figure 2. Comparison of Cotton Lint Yields Between Adopters and Nonadopters of Precision Agriculture Technologies, Louisiana 2002-03.

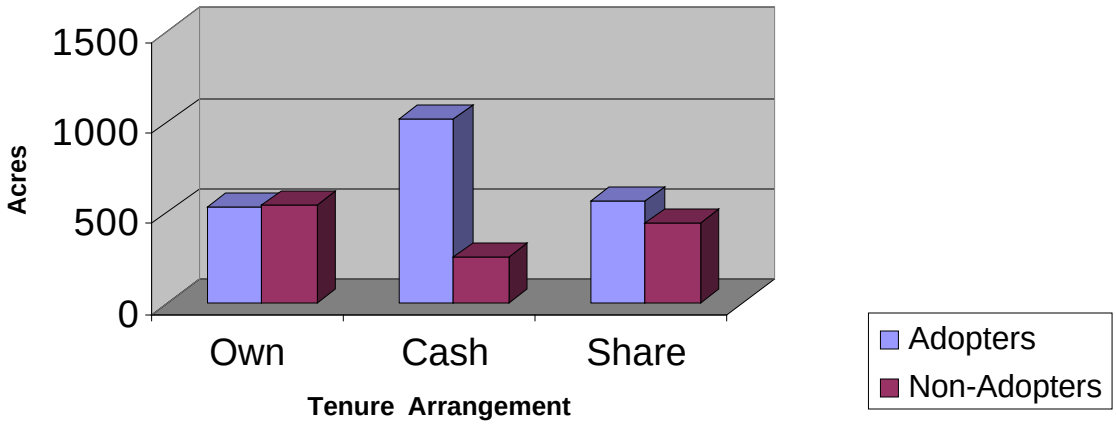

Figure 3. Comparison of Tenure Arrangements Between Adopters and Nonadopters of Precision Agriculture Technologies, Louisiana, 2003.

Age and Education

The age and education of respondents was similar between adopters and nonadopters. Average age for adopters was 47 compared to 50 for nonadopters. Adopters averaged about 2 years more education than nonadopters. The average number of years farming was about 23 for adopters and 28 for nonadopters.

Use of Precision Farming Technology

A total of 70 of the respondents indicated that they had adopted some form of precision farming technology. The survey identified a total of 21 possible technologies from which respondents could choose. The most widely adopted technology was some form of soil sampling either on a grid basis or management zone. A total of 37 out of 70 (52.9%) indicated they used grid soil sampling on cotton. Thirty-four respondents indicated they used soil sampling on a management zone basis for cotton production. This technology was also used on corn production with about the same number indicating use on corn.

Rank Precision Farming Technologies Importance

Respondents were asked to rank precision farming technologies importance in improving management from 1 (not important) to 5 (very important). The highest ranking response was improved yields with an average score of 4.7 out of 5. The second highest score was received by the item discovery of a need for drainage with an average score of 3.9. Other items receiving high scores were better yield records (3.7), better soil records (3.5), and land leveling (3.4).

Why adopted precision farming Technologies ?

When asked why they adopted precision farming technologies**,** producers indicated that profit was the most important consideration receiving an average score of 4.8 (where 5 is very important). Environmental considerations were also important with an average score of 3.8. The other choices of fear of being left behind and being on the forefront of technology were less important considerations with an average score of 2.0.

Source of Information

Respondents were asked to identify the sources of information used in researching precision farming technologies and to rate the usefulness of each source. Survey results indicate that no one source is highly rated for all technologies. Dealers and crop consultants rated the highest for information on yield monitors with GPS as well as grid and management zone soil sampling. University personnel were also ranked equal to or higher than dealers and consultants in terms of helpfulness as a source of information for grid soil sampling. Consultants were consistently ranked high as a source of information for most types of precision farming technology. Figure 4 summarizes overall importance of selected sources of information on precision agriculture technologies for Louisiana cotton producers. As shown here, consultants had the highest overall average rank of 3.7 out of 5 on a scale where 5 is most important and 1 is least important.

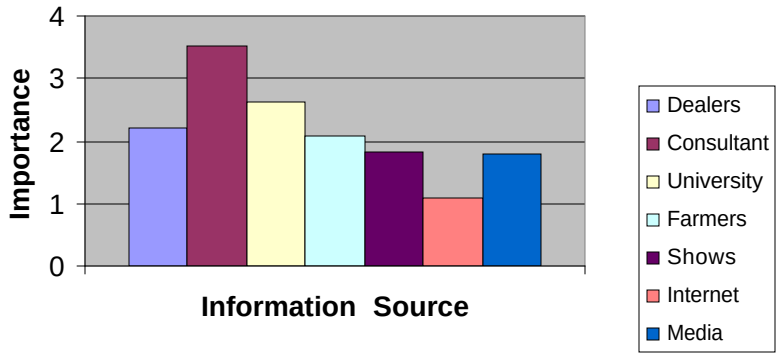

Figure 4. Importance of Sources of Information on Precision Agriculture Technologies, Louisiana, 2003.

Summary

This study was conducted to determine the extent to which Louisiana cotton producers have adopted precision farming technologies and to determine their attitudes about these technologies. Results indicate that approximately half of the respondents have adopted at least one precision farming technology. The most widely adopted technology was grid soil sampling. Adopters of precision farming technologies tended to have larger farming operations, but planted about the same amount of cotton as the nonadopters. Farmers who adopted the technology were somewhat younger and had a slightly higher level of education than nonadopters. Precision farming technology adopters place the highest value on consultants as a source of information followed closely by university personnel and farm dealers.

References

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