FINDINGS FROM A FOCUS GROUP OF PRECISION FARMING TECHNOLOGY ADOPTERS

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Abstract

Eighteen Tennessee farmers discussed adopting precision farming technologies in a focus group. Major adoption impediments included lack of a trained labor force, high investment cost for equipment, and lack of software compatibility. Producers want downloadable digitized soil maps, farmhands trained in precision farm technologies, skilled service providers, standardized equipment and software, and extension programs in software training.

Problem Statement and Relevance

The purpose of this study was to evaluate the adoption of precision farming technologies in Tennessee and to determine where precision farming is being adopted and under what circumstances.

Lowenberg-DeBoer and Swinton (1997) identified three forces that have come together to motivate farmers to re-examine site-specific management (p. 372): 1) New technology has made it feasible to identify precise field locations and gather crop data cheaply and quickly. 2) Competition is driving farmers to cut costs and increase returns, agribusiness to identify new services to provide to farmers, and former defense contractors to seek alternative uses for advanced technology. 3) Public concerns and government policies have encouraged farmers to seek ways to reduce the environmental impacts of agricultural chemicals.

While farmers have shown considerable interest in site-specific management practices, information about the degree to which they have adopted precision farming practices is fragmentary and not well documented (Khanna et al., 1999; Lowenberg-DeBoer, 1998). The available information on the adoption of precision farming practices is primarily for some higher value crops such as sugar beets and for some row crops grown in the Midwestern United States (Daberkow and McBride, 1998; Khanna et al., 1999; Franzen, 2000). Little information currently exists on the use of precision farming practices in the Southern United States (Popp, 2000), and specifically in Tennessee. Crops in Tennessee are generally produced in fields known to have a high degree of variability in soil type, topography, soil moisture, weed and insect pressure, and other major factors affecting crop production. Furthermore, crop production in Tennessee requires extensive use of agricultural chemicals, promising potential environmental benefits.

Specific information about precision farming adoption is needed to gain a better understanding of the ways in which Tennessee farmers might benefit from its use. Some important questions to be asked are: What precision farming technologies are being adopted? Where are they being adopted? On what crops are producers using precision farming technologies? What factors influence the decision to adopt a technology? Answering these and other questions will improve our understanding of how these new technologies will fit into farming systems as they become more prevalent and accessible to Tennessee crop producers.

Data and Methodology

A list of Tennessee farmers using precision farming technologies was developed through contacts with the Tennessee Extension Service and selected firms that provided precision farming service to Tennessee farmers. Twenty-six farmers were contacted, 21 indicated that they would attend, and 18 farmers attended a focus-group meeting held in Jackson, Tennessee on July 24, 1999. The 18 farmers were given a written survey that took about 45 minutes to complete. Following dinner, the survey instrument was discussed for about 2.5 hours, along with several other questions including:

- Do you use precision farming techniques to keep track of the inputs placed on different parts of a field?
- How do you use the diagnostic information provided by precision farming technologies?
- What additional information/technologies would you like to see made available to the producer? and
- What problems need to be addressed before widespread adoption of precision farming technologies can occur?

Techniques were used that allowed each participant to provide comments.

Major Results and Implications

Farmers participating in the focus group averaged 41 years of age, with 12 or more years of education, and a principle occupation of farming. Incomes of five farmers were less than $50,000, three were between $150,000 and $200,000, and two with more than $200,000. Average farm size was 833 acres owned and 1,781 acres rented, with the smallest farm being 650 acres and the largest having over 7000 acres.

Four farmers grew cotton. Precision farming technologies used by those cotton farmers on cropped land included yield monitors with GPS (three farmers with one using this technology on cotton acreage), yield monitors without GPS (no cotton farmers), soil survey maps (two farmers), remote sensing (two cotton farmers), and grid soil sampling (four cotton farmers). Similar results are available for the other 14 farmers that did not grow cotton.

In answering the question of why they adopted precision farming techniques, 88% indicated economic gain was the number one reason. Forty-four percent indicated a desire to be on the cutting edge was a reason for them to adopt precision farming. Ten of the 18 farmers indicated environmental benefits was an important reason that impacted their decision to adopt. Each of the cotton producers indicated that the number one reason for adopting precision farming technologies was economic in nature. This is illustrated by several of their statements

- "The investment has been worthwhile."
- "I have seen a reduction in fertilizer and lime applications."
- "I have improved drainage control and hence increased yields."
- "The sampling has paid for itself in the first year in input savings. The crops have been more uniform from beginning to end."
- "By using the yield mapping system, I can locate a problem area in the field and further investigate."
- "Variable rate input application technology increases net returns, especially with the lime work".

Focus-group discussion indicated that diagnostic information was used for making permanent field improvements, rental negotiations, variable rate application of lime, P, K, and N, variety testing, and to maintain field records on soil quality, productivity, variety differences, and input response.

When asking the producers what they would like to see in the future, they indicated that downloadable digitized soil maps would be important. In

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addition, they wanted farmhands trained in the use of precision farm equipment and software, skilled and reliable personnel representing firms providing precision farming services, standardized equipment and software, and training centers for software and equipment use.

Major perceived impediments to adoption included lack of return on investment, insufficient returns to cover custom charges, low crop prices, and difficulty in computer, software, and equipment use.

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