



An Economic Evaluation of Emerging Variable Rate Application Technologies

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Site-specific farming, or precision farming, is a new technology that promises to aid farmers, society, and the environment. The results are reduced costs, minimal environmental impact, and increased profits. This research considered economic and environmental impacts of site-specific farming. Preliminary results of a survey of Ohio farmers suggests that adoption rates for various precision-farming technologies, including variable-rate applications, or VRT (applications of fertilizer, insecticides, and herbicides in response to the differences in very specific areas of fields), are still quite low. Adoption rates are higher for larger farms and for farmers with greater formal education. Researchers held small group discussions with farmers who adopted site-specific farming practices and found that many farmers with large farms adopted precision agriculture for the entire farm while smaller farmers tended to experiment with portions of their acreage. All farmers surveyed felt precision-farming techniques improved profitability, but none were able to provide supporting data. The large farmers reported that precision-farming investments were recovered within the first year, whereas farmers with smaller acreage expected to recover investments over a four- to five-year period.

OBJECTIVES

- ▶ Quantify variation in crop yields and identify and measure factors that cause variation.
- ▶ Examine how farmers use soil tests, crop yield, and other data in decision making.
- ▶ Measure the required investment in durable capital equipment for a VRT farming system, calculate variable and fixed costs, and estimate profitability of adoption of VRT farming systems.
- ▶ Evaluate the financial performance of VRTs in relation to a single rate/uniform application (i.e., the conventional method).
- ▶ Evaluate the environmental consequences of variable-rate applications of fertilizers

CHALLENGES

Successful implementation of precision-farming techniques requires detailed information about how crops respond to agricultural inputs and the interaction among these inputs. In order to fully evaluate precision farming technologies, substantial field-level production data must be gathered to statistically analyze these complex relationships.

ACHIEVEMENTS

Precision-farming technologies rely on extensive databases that describe variations within agricultural fields. In order to develop these technologies and have farmers adopt precision farming, researchers and farmers must work together to identify sources of information and analytical methods to put it to use. This research project has identified factors affecting precision farming, developed approaches to obtain and manage data, and established the essential link among researchers and farmers.

THE FUTURE

Funding from the OARDC Research Enhancement Competitive Grants Program enabled researchers to obtain a \$220,000 grant from the U.S. Department of Agriculture Fund for Rural America. Results from the USDA grant will help farmers to adopt new technologies and realize the benefits of precision farming. The Extension-education component of the grant is intended to facilitate transfer of information.

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