

**Adoption of Agricultural Production Practices: Lessons Learned from the U.S. Department of Agriculture Area Studies Project.** By Margriet Caswell, Keith Fuglie, Cassandra Ingram, Sharon Jans, and Catherine Kascak. Resource Economics Division, Economic Research Service, U.S. Department of Agriculture. Agricultural Economic Report No. 792.

## **Abstract**

The U.S. Department of Agriculture Area Studies Project was designed to characterize the extent of adoption of nutrient, pest, soil, and water management practices and to assess the factors that affect adoption for a wide range of management strategies across different natural resource regions. The project entailed the administration of a detailed field-level survey to farmers in 12 watersheds in the Nation to gather data on agricultural practices, input use, and natural resource characteristics associated with farming activities. The data were analyzed by the Economic Research Service using a consistent methodological approach with the full set of data to study the constraints associated with the adoption of micronutrients, N-testing, split nitrogen applications, green manure, biological pest controls, pest-resistant varieties, crop rotations, pheromones, scouting, conservation tillage, contour farming, strip cropping, grassed waterways, and irrigation. In addition to the combined-areas analyses, selected areas were chosen for analysis to illustrate the difference in results between aggregate and area-specific models. The unique sample design for the survey was used to explore the importance of field-level natural resource data for evaluating adoption at both the aggregate and watershed levels. Further analyses of the data illustrated how the adoption of specific management practices affects chemical use and crop yields.

**Keywords:** Technology adoption, conservation

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## Summary

The Area Studies Project was designed to characterize the extent of adoption of nutrient, pest, soil, and water management practices and to assess the factors that affect adoption for a wide range of management strategies across a range of natural resource regions. The project entailed the administration of a detailed field-level survey to farmers in 12 watersheds in the United States to gather data on agricultural practices, input use, and natural resource characteristics associated with farming activities. The data were analyzed by the Economic Research Service using a consistent methodological approach with the full set of data to study the constraints associated with the adoption of selected farming practices that may reduce environmental damages. In addition to the combined-areas analyses, selected areas were chosen for analysis to illustrate the difference in results between aggregate and area-specific models. The unique sample design for the survey was used to explore the importance of field-level natural resource data for evaluating adoption at both the aggregate and watershed levels.

The econometric analyses focused on the adoption of technologies and practices within four key management categories: nutrients, pests, soil, and water. The technologies compared were micronutrients, N-testing, split nitrogen applications, green manure, biological pest controls, pest-resistant varieties, crop rotations, pheromones, scouting, conservation tillage, contour farming, strip cropping, grassed waterways, and irrigation. Further analyses of the data illustrated how the adoption of specific management practices affects chemical use and crop yields.

There were several key findings.

- An operator's education had a significantly positive effect on his or her adoption of information-intensive technologies, such as the use of biological pest control or nitrogen testing. The increasing complexity of emerging technologies is a factor that needs to be considered by agencies or technology providers when targeting potential adopters. Technical assistance, demonstration, or consulting services may be necessary to promote adoption of certain preferred practices.
- Ownership of the surveyed field had less of an impact on practice adoption than we initially had expected—probably because most of the practices included in this study were not structural.
- The combined-area models represent the aggregation across very distinct watersheds. From a policy perspective, these results can be misleading. The unified modeling approach used shows how important information can be “lost” in the process of aggregation. Adoption incentives developed to address factors identified in the aggregate model may be appropriate for only one area and counterproductive for all others. While this “averaging problem” exists for all policies to some extent, the comparison of the combined-area and single-area models presented here illustrates the magnitude of the differences between the Area Studies regions.
- With respect to the effect of technology adoption on chemical use and yields, we found that, in general, the use of new technologies resulted in little reduction in chemical loadings and no yield decreases.

