by Thomas L. Dobbs ■ In Short

Organic, conventional, and reduced till farming systems: Profitability in the Northern Great Plains

Are alternative or sustainable farming systems profitable? The National Academy of Science's 1989 Alternative Agriculture report sparked a sharp debate on this question by describing a number of apparently successful alternative system case farms, but presenting little direct or controlled comparisons to more conventional farm systems. Few economic studies of alternative agriculture were available at that time. The United States Department of Agriculture's Low-Input Sustainable Agriculture (LISA) program (renamed Sustainable Agriculture Research and Education, or SARE, in the 1990 Farm Bill), launched in the late 1980s, attempts to answer that question for different agro-climatic regions. Results of that and similar efforts by other agencies, such as the Environmental Protection Agency and a number of state governments and private institutions, now provide at least preliminary answers. An article by Ikerd, Monson, and Van Dyne in *CHOICES* Third Quarter 1993 summarized a study of short-run profitability for alternative farming systems in different regions of the United States.

Using data from a recently completed agronomic and economic research project in northeastern South Dakota, we estimated long-run profitabilities of organic, conventional, and reduced tillage farming systems. This multidisciplinary study began prior to the advent of the LISA (SARE) program, but it was augmented with LISA funds for several years beginning in 1988.

Case farming systems

Two studies were conducted at South Dakota State University's Northeast Research Station, north of Watertown in Codington County. The study area is in the transition zone between the western edge of the U.S. corn, soybeans, hogs region and the eastern edge of the cattle, wheat, sorghum region. Our analysis used data collected from 1986 through 1992. In Study 1, an organic system was compared to conventional and ridge till farming systems. The organic system used a four-year oats/alfalfa/soybeans/corn rotation and no chemical fertilizers or pesticides. The inclusion of a weed suppressive forage legume (alfalfa) and its associated cultural practices, together with some additional tillage (e.g., rotary hoeing of corn and soybeans), substituted for herbicides in organic system weed control. Limited amounts of livestock manure were applied on the oats stubble portion of the rotation. The conventional and ridge till systems each used three-year corn/soybeans/spring-wheat rotations, and chemical fertilizers and herbicides at rates recommended by agronomists who based recommendations on soil tests, weed populations, and other related agronomic conditions. Only the conventional system used a moldboard plow.

Study 2 focused on small grain instead of corn rotations. The organic system used a four-year oats/clover/soybeans/spring-wheat rotation. The clover was turned under as a green manure, rather than harvested as forage. Conventional and minimum till systems used three-year rotations of soybeans, spring wheat, and barley. As in Study 1, recommended amounts of chemical fertilizers and herbicides were applied to these two systems, and the moldboard plow was used only in the conventional system.

Differences in labor intensity among the systems resulted from crop mix and field operation differences. Most labor was used for tractor or self-propelled machine operations, although some was used to hand-weed soybeans. The organic system was the most labor intensive (1.93 hours/acre) of the systems in Study 1, partly because of haying operations and partly because the absence of chemical pesticides necessitated somewhat more mechanical tillage. The ridge till system involved the least amount of mechanical tillage and the lowest labor intensity (1.52 hours/acre).

Figure 1. Net returns in Study 1.

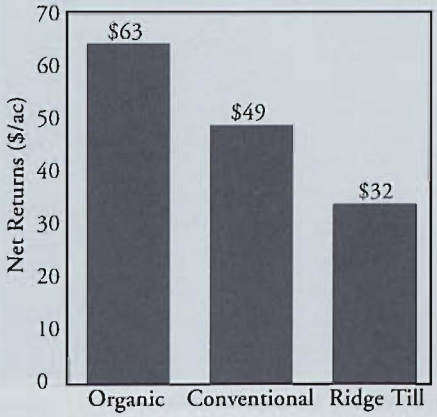
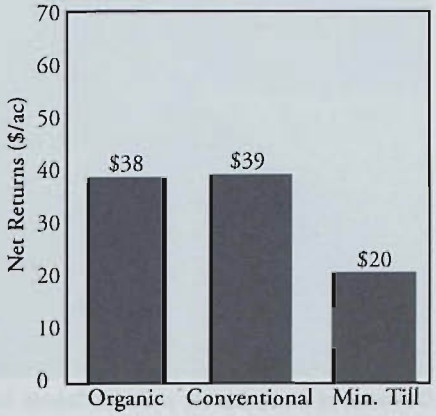


Figure 2. Net returns in Study 2.



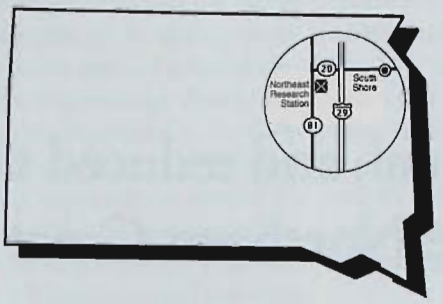
Labor intensity for the conventional system (1.67 hours/acre) was in between the other two. Relative labor intensity was very different in the small grain study—Study 2. The organic system was the least labor intensive (1.58 hours/acre), largely due to the very limited number of field operations associated with green manure clover. The minimum till system was less labor intensive (1.63 hours/acre) than the conventional system (1.70 hours/acre) because, in effect, additional chemical pesticides were substituted for some tillage in the minimum till system.

Profitability

Potential organic price premiums for crops produced in the organic systems were not included in the analysis. Federal farm program payments and set-aside requirements were factored into the gross and net return calculations. Both cash and non-cash costs (except for a land charge) were included. Thus, results reflect long-run profitabilities.

In Study 1 (figure 1), the organic system had the highest net return to land and management ($63/acre), followed by the conventional system ($49/acre), and then the ridge till system ($32/acre). Under the production and market conditions of the seven-year study period, the organic system, which substituted a forage legume and certain tillage practices for agricultural chemicals, performed quite well.

The organic system in the small-grain



rotation comparison (Study 2) also performed reasonably well. Net returns to land and management averaged $38/acre, compared to $39/acre for the conventional system and $20/acre for the minimum till system (figure 2). The organic system, which incorporated a green manure crop for fertility and weed control, appears to have reasonably good economic promise in Northern Great Plains small-grain areas.

In summary

The analysis shows that organic farming systems were economically competitive with conventional and reduced tillage farming systems during the late 1980s and early 1990s in portions of South Dakota. This is an agro-climatic area in the transition zone between corn-soybean farm areas and wheat farm areas. In other sustainable agriculture research we have conducted on case farms across South Dakota, we have found a tendency for conventional systems to be more profitable than organic or near-organic systems in corn-soybean areas, and for some organic or near-organic systems to be economically competitive with conventional systems in wheat areas.

The profitability of different farming systems is affected by federal farm policy. Because of differences in crop mixtures among the farming systems at the Northeast Research Station, the organic system received an average of $9/acre less annually in government payments than the other systems in Study 1 and $4/acre less in Study 2. Changes in the 1990 Farm Bill reduced some of the bias against more diversified alternative systems, and future farm bills are likely to go even further. That, together with an expanded research program on sustainable agriculture, could gradually enhance the profitability of alternative farming systems. ◘

■ For more information

Dobbs, Thomas L., Donald C. Taylor, and James D. Smolik. *Farm, Rural Economy, and Policy Implications of Sustainable Agriculture in South Dakota.* South Dakota State University Agr. Exp. Sta. Bull. No. 713, May 1992.

Smolik, James D. (ed.) *Agronomic, Economic, and Ecological Relationships in Alternative (Organic), Conventional, and Reduced-Till Farming Systems.* South Dakota State University Agr. Exp. Sta. Bull. No. 718, August 1993.

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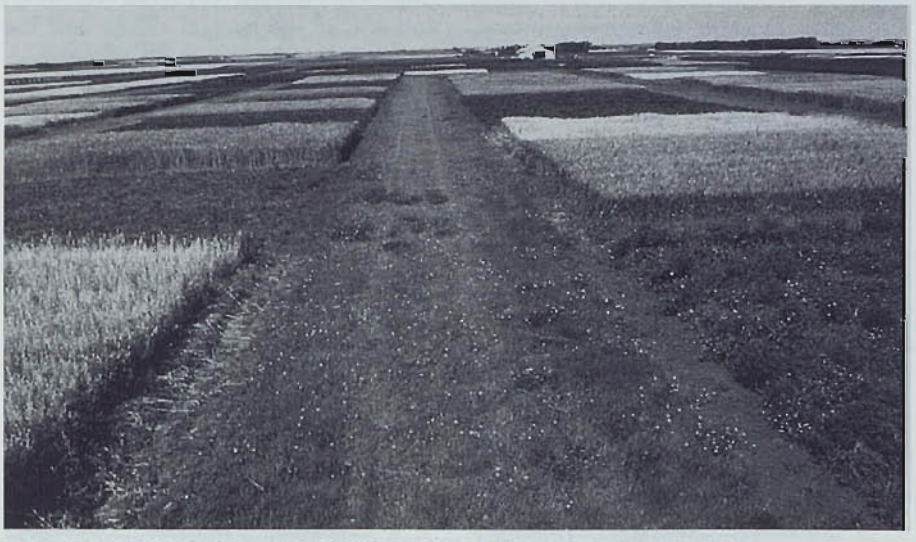

Overview of Study 2 plots at South Dakota State University's research station.