

Long Term Effects of Crop Management: Profitability

Results from the VICMS study at the Southwest Research and Outreach Center in Lamberton, Minnesota

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The bottom line

Organic production systems in southwest Minnesota are more profitable than conventional systems because of the lower cost of inputs and the organic price premium. If there were no price premium, profits from organic systems would be similar to those from conventional operations. Variability of net returns is similar in both systems.

Background: Why consider organic production systems?

By most measures, crop production systems are more efficient and productive today than at any time in the past. This is largely due to improved crop varieties, improved farm equipment, better management skills, synthetic pesticides, and chemically processed fertilizers. While synthetic pesticides and chemically processed fertilizers have contributed to gains in productivity, some people have become concerned about their effects on food safety and environmental quality and are interested in buying organically grown food. In addition, the current price and income situation has increased farmers' interest in organic production methods.

Farmers' reasons for not changing from traditional cropping systems are as diverse as the farmers themselves. Some of the reasons include uncertainty about the profitability of organic systems, increased labor that may be required by an organic system, lower yields compared to other systems, the cost in money and time to learn other systems, and the difficulty of finding markets for organic products.

The VICMS trials

The University of Minnesota started the Variable Input Crop Management Systems (VICMS) trials in 1989 at the Southwest Research and Outreach Center in Lamberton, MN to compare the agronomic and economic impacts of conventional and organic production methods in southwest Minnesota. The VICMS1 plots were

set up on land with depleted fertility and heavy weed pressure. The VICMS2 plots were established on a field that had been cropped according to University recommendations since 1959, resulting in high soil fertility levels and low weed populations. These conditions are typical of those of many producers interested in the transition from conventional to organic production practices. The value of this study comes from the use of long-term data (10 years) in which each crop in each management strategy and each crop rotation was grown in replicated treatments each year. This report uses data from 1990-1999 from the VICMS2 plots to compare the profitability and riskiness of three different management strategies, two crop rotations, and three organic price scenarios.

The study

Our primary objective was to test the hypothesis that conventional systems were more profitable and/or had less risk than organic systems.

The three management strategies analyzed in this study included conventional production practices (**high inputs, HI**), a reduced level of purchased inputs (**reduced inputs, RI**), and organic production practices (**organic inputs, OI**). Conventional practices used by farmers in the region were similar to the HI treatment in 1989. By 1999, the regions' farmers were commonly using practices that were more similar to the RI system. The two crop rotations were a two-year corn-soybean rotation and a four-year corn-soybean-oat/alfalfa-alfalfa rotation.

The three organic price scenarios were 1) the OI strategy received the full historical average organic premium starting in 1992 (when organic premium could start according to the national standards), 2) the OI strategy received only half of the historical average organic premiums, and 3) no organic premiums even for certified organic production. Net return was calculated for each year based on actual yields, input and operational costs, market prices, and organic premiums.

Risk is the variation in net return. To estimate risk, we analyzed the variation in yields, market prices, and input costs, and we analyzed the correlation among crop yields and between crop yield and market price. From these analyses, we calculated all possible net returns, and estimated the probability of each possible net return. By comparing these probabilities, we evaluated the level of risk of each management system.

Results and conclusions

- Yields and costs were lower for the 4-yr OI strategy than for the 2-yr conventional strategies.
- Without organic premiums, the 4-yr OI strategy had net returns equal to the 2-yr conventional strategies.
- With organic premiums, the 4-yr OI strategy had net returns higher than the 2-yr conventional strategies.
- Even with half the organic premiums, the 4-yr OI strategy had net returns higher than the 2-yr conventional strategies.
- The net return of the 4-year OI strategy was not more variable than the net return of the conventional strategies.
- The finding that conventional agriculture was not obviously more profitable or less variable on a per acre basis supports the continuance of programs supporting organic farming such as production research (including crop insurance coverage), market information and development, and policies at the federal and state levels. Policies that include subsidizing farmers for the environmental benefits of organic production methods warrant further development and refinement.
- This study can give farmers and their advisors more confidence in the potential benefits of investing the time and costs to learn the skills needed to grow and market certified organic products and to control potential problems.

Net returns, 1990-1999

Annual return per acre averaged over either two or four crops.

Management system	2-yr rotation	4-yr rotation
HI	\$153 (44) ^b	\$172 (36) ^b
RI	\$137 (49) ^{bc}	\$173 (37) ^b
OI, ave. org. premium	NA	\$270 (76) ^a
OI, half org. premium	NA	\$223 (53) ^a
OI, no org. premium	\$92 (49) ^c	\$175 (34) ^b

NA = not applicable.

Standard deviations are in parentheses.

Different letters indicate net returns are significantly different (P=0.5).

Production costs, 1990-1999

Average annual costs per acre.

Crop and rotation length	Management strategy		
	HI	RI	OI
Corn, 2-yr	\$145 (16)	\$118 (12)	\$98 (7)
Soybean, 2-yr	\$82 (7)	\$77 (7)	\$73 (10)
Corn, 4-yr	\$142 (19)	\$119 (12)	\$106 (6)
Soybean, 4-yr	\$88 (11)	\$77 (7)	\$75 (6)
Oats, 4-yr	\$90 (14)	\$83 (13)	\$69 (7)
Alfalfa, 4-yr	\$104 (22)	\$100 (17)	\$91 (14)

Standard deviations are in parentheses.

For additional information about these results contact Kent Olson (612-625-7723) at the University of Minnesota, or see the full article published as: Mahoney, P.R., K.D. Olson, P.M. Porter, D.R. Huggins, C.A. Perillo, and R.K. Crookston. "Profitability of organic cropping systems in Southwestern Minnesota." *Renewable Agriculture and Food Systems*, 19(1):35-46, 2004.

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