

# ECONOMICS of Soil Health Systems

## Stony Creek- River Raisin Watersheds of Michigan



### FARM SIZE

2,300 crop acres  
500 head dairy



### CROPS GROWN

Corn, Soybean  
2,000 acres  
Alfalfa  
300 acres



### SOIL TEXTURE

Silty clay loam



### SOIL HEALTH MANAGEMENT SYSTEM

No-till production  
Cover crops  
Corn-soybean  
rotation  
Soils amended with  
dairy manure  
Monitoring of soil  
nutrient levels



### NET INCOME INCREASE

Corn  
\$23.32/acre  
Soybean  
-\$7.06/acre

## INTRODUCTION

The Blaine Baker farm in the Stony Creek-River Raisin Watersheds of Michigan increased profitability by decreasing production costs for corn and soybean with a soil health management system (SHMS) of no-till production and cover crops. No-till production has been practiced for approximately 30 years and cover crops planted for 13 years.

### Benefits of the SHMS reported by the farmer:



→ **DECREASED RUNOFF AND EROSION**

→ **IMPROVED WATER INFILTRATION**

→ **ENHANCED RESILIENCE TO DROUGHT**

→ **LESS VARIABILITY IN CROP YIELD**

ADDITIONAL INFORMATION ON THE FARM IS AVAILABLE IN A REPORT AND VIDEO PRESENTATION AT [WWW.NACDNET.ORG/SOIL-HEALTH-ECONOMICS](http://WWW.NACDNET.ORG/SOIL-HEALTH-ECONOMICS).

## METHODS

The Soil Health Institute conducted an interview to obtain production information for evaluating economics of the soil health system based on partial budget analysis. In this approach, the benefits and costs of a soil health system are assessed by calculating changes in revenue and expenses before and after adoption of that system. The change in net farm income associated with adopting a SHMS is calculated as shown below and presented in Table 1.



**Net change in farm income = Benefits - Costs, where:  
Benefits = Reduced Expenses + Additional Revenue  
Costs = Additional Expenses + Reduced Revenue**

A DETAILED DESCRIPTION OF THE METHODOLOGY FOR PARTIAL BUDGET ANALYSIS CAN BE FOUND AT [HTTPS://SOILHEALTHINSTITUTE.ORG/ECONOMICS](https://soilhealthinstitute.org/economics).

## FINDINGS

### Initial Management System and Reduced Expenses

- The initial management system was conventional tillage production.
- Post-plant weed management was exclusively with herbicide in conventional tillage.
- Before planting corn, three tillage field trips were eliminated.
- Before planting soybean, two tillage field trips were eliminated.
- Nitrogen was reduced in corn production by 48 lb./acre with anhydrous ammonia.
- One herbicide spray trip for corn reduced herbicide expenses by \$14.00/acre.
- Total reduced expenses were \$57.69/acre for corn and \$25.26/acre for soybean.

## FARM #21

# ECONOMICS of Soil Health Systems: Stony Creek-River Raisin Watersheds of Michigan

## Soil Health Management System and Additional Expenses

- The soil health management system adopted was no-till production with cover crops.
- Cover crop mixes that included annual rye, rapeseed, and clover were planted with a high clearance applicator into standing corn and soybean crops.
- Cover crop seed costs were \$17.00/acre before planting corn and \$15.00/acre before planting soybean.
- Cover crops were terminated with herbicide that was not an additional expense.
- Total additional expenses were \$34.37/acre for corn and \$32.32/acre for soybean.

## Soil Health Management System Impact on Farm Income

- Reduced expenses were \$23.32/acre greater than additional expenses for corn.
- Reduced expenses were \$7.06/acre less than additional expenses for soybean.
- The SHMS was implemented without yield reductions for corn and soybean.
- **Net farm income increased \$8.13/acre for corn and soybean in a 50%-50% rotation.**

Table 1. Partial Budget<sup>1</sup> Analysis, 30 Years with a Soil Health Management System on a 2,300-Acre Farm, \$ per Acre per Year (2019 Dollars).

Expense Category	Corn		Soybean	
	BENEFITS	COSTS	BENEFITS	COSTS
	REDUCED EXPENSE	ADDITIONAL EXPENSE	REDUCED EXPENSE	ADDITIONAL EXPENSE
Seed	0.00	17.00	0.00	15.00
Fertilizer & Amendments	16.83	0.00	0.00	0.00
Pesticides	14.00	0.00	0.00	0.00
Fuel & Electricity	3.30	1.38	3.17	1.38
Labor & Services	8.37	5.37	7.18	5.32
Equipment Ownership	15.19	10.62	14.91	10.62
<b>Total Expense Change</b>	<b>57.69</b>	<b>34.37</b>	<b>25.26</b>	<b>32.32</b>
	ADDITIONAL REVENUE	REDUCED REVENUE	ADDITIONAL REVENUE	REDUCED REVENUE
Yield, bu./acre	0.00	0.00	0.00	0.00
Price Received, <sup>2</sup> \$/bu.	4.20	4.20	10.00	10.00
<b>Revenue Change</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
	TOTAL BENEFITS	TOTAL COSTS	TOTAL BENEFITS	TOTAL COSTS
<b>Total Change</b>	<b>57.69</b>	<b>34.37</b>	<b>25.26</b>	<b>32.32</b>
<b>Change in Net Farm Income</b>	<b>23.32</b>		<b>-7.06</b>	

<sup>1</sup> Expenses and expected yields based on farmer reported production practices. (<https://soilhealthinstitute.org/economics/>)

<sup>2</sup> Commodity prices applied to yields based on long-term average prices. Irwin, S. "IFES 2018: The New, New Era of Grain Prices?" Department of Agricultural and Consumer Economics, University of Illinois at Urbana-Champaign, January 11, 2019.