ECONOMICS of Soil Health Systems

Chesapeake Bay Watershed of Delaware

FARM SIZE
2,100 crop acres

CROPS GROWN
Corn and soybean

SOIL TEXTURE
Sandy loam

SOIL HEALTH MANAGEMENT SYSTEM
No-till production
Cover crops
Poultry litter for fertilizer
Monitoring of soil nutrient levels
Grid soil sampling and variable rate fertilizer application

NET INCOME INCREASE
Corn
$52.09/acre
Soybean
$5.39/acre

FARM #1

INTRODUCTION

The Jay Baxter farm in the Chesapeake Bay Watershed of Delaware increased profitability by decreasing expenses with a soil health management system (SHMS) of no-till production with cover crops. Adoption of no-till with cover crops began in 2002, and acreage was added incrementally. Cover crop species included hairy vetch, cereal rye, annual ryegrass, and tillage radish.

Benefits of the SHMS reported by the farmer:

- **DECREASED EROSION**
- **INCREASED WATER INFILTRATION**
- **REDUCED FERTILIZER APPLICATIONS**
- **REDUCED SOIL COMPACTION**
- **IMPROVED WATER HOLDING CAPACITY**

ADDITIONAL INFORMATION ON THE FARM IS AVAILABLE IN A REPORT AND VIDEO PRESENTATION AT 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.

FINDINGS

Initial Management System and Reduced Expenses

- The initial management system was conventional tillage production.
- Post-plant weed management was exclusively with herbicide for both crops.
- Five tillage activities were eliminated for corn and three were eliminated for soybean.
- An application with 50 lbs./acre of nitrogen was eliminated for corn.
- Weed suppression enabled a reduction in herbicide expense for corn by changing herbicide.
- Total reduced expenses were $98.90/acre for corn and $33.93/acre for soybean.

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Soil Health Management System and Additional Expenses

- The soil health management system adopted was no-till on all acres and cover crops on 75% of acreage.
- Cover crops before corn were planted with a narrow row planter in the fall, after soybean harvest.
- Cover crops before soybean were broadcast in the fall, after corn harvest.
- Cover crop seed expense was $20.00/acre for corn and $14.00/acre for soybean.
- Both crops were planted into living cover crops which were terminated with herbicide which was not an additional expense.
- Total additional expenses were $46.81/acre for corn and $28.54/acre for soybean.

Soil Health Management System Impact on Farm Income

- Reduced expenses were $52.09/acre greater than additional expenses for corn.
- Reduced expenses were $5.39/acre greater than additional expenses for soybean.
- Reduced expenses were achieved without decreases in crop yields.
- **Net farm income increased $52.09/acre for corn and $5.39/acre for soybean.**

Table 1. Partial Budget[1] Analysis, 16 Years with a Soil Health Management System on a 2,100-Acre Farm, $ per Acre per Year (2019 Dollars).

	Corn		Soybean	
	BENEFITS	COSTS	BENEFITS	COSTS
Expense Category	REDUCED EXPENSE	ADDITIONAL EXPENSE	REDUCED EXPENSE	ADDITIONAL EXPENSE
Seed	0.00	20.00	0.00	14.00
Fertilizer & Amendments	24.84	0.00	0.00	0.00
Pesticides	10.65	2.08	0.00	0.00
Fuel & Electricity	8.57	2.06	4.51	1.43
Labor & Services	17.48	8.67	9.21	5.12
Equipment Ownership	37.36	14.00	20.21	7.99
Total Expense Change	**98.90**	**46.81**	**33.93**	**28.54**
	ADDITIONAL REVENUE	REDUCED REVENUE	ADDITIONAL REVENUE	REDUCED REVENUE
Yield, bu./acre	0.00	0.00	0.00	0.00
Price Received,[2] $/bu.	4.20	4.20	10.00	10.00
Revenue Change	**0.00**	**0.00**	**0.00**	**0.00**
	TOTAL BENEFITS	TOTAL COSTS	TOTAL BENEFITS	TOTAL COSTS
Total Change	**98.90**	**46.81**	**33.93**	**28.54**
Change in Net Farm Income	**52.09**		**5.39**	

1 Expenses and expected yields based on farmer reported production practices. (https://soilhealthinstitute.org/economics/)
2 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.

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