ECONOMICS of Soil Health Systems

Big Sioux River Watershed of South Dakota

FARM SIZE
560 acres
Cropland
400 acres
Pasture
100 acres

CROPS GROWN
Alfalfa, Oats
200 acres
Corn, Soybean
200 acres

SOIL TEXTURE
Silt loam

SOIL HEALTH MANAGEMENT SYSTEM
40+ years certified organic
Reduced till with cover crops
Six-year rotation of oats-alfalfa-alfalfa-soybean-corn-soybean
Poultry manure for crop nutrients
Monitoring of soil nutrient levels

NET INCOME INCREASE
Corn
$523.03/acre
Soybean
$417.62/acre

FARM #6

INTRODUCTION

The Aaron Johnson farm in the Big Sioux River Watershed of South Dakota increased profitability with a soil health management system (SHMS) of cover crops and certified organic production that reduced production expenses and expanded marketing opportunities.

Benefits of the SHMS reported by the farmer:

- → **IMPROVED SOIL HEALTH**
- → **LESS WATER & WIND EROSION**
- → **INCREASED ORGANIC MATTER**
- → **ELIMINATION OF COMMERCIAL PESTICIDE AND FERTILIZER**
- → **BALANCE OF CROP PESTS AND BENEFICIAL PREDATORS**

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 included conventional inputs without cover crops.
- → Eliminating pesticides reduced expenses $40.00/acre for corn and $57.00/acre for soybean.
- → Eliminating fertilizers reduced expenses $128.00/acre for corn and $40.00/acre for soybean.
- → Post-harvest expenses were reduced due to decreased yields and the associated reduction in costs from hauling, check-off fees, and drying corn.
- → Total reduced expenses were $203.02/acre for corn and $115.41/acre for soybean.

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ECONOMICS of Soil Health Systems: Big Sioux River Watershed of South Dakota

Soil Health Management System and Additional Expenses

- The soil health management system adopted was organic corn and soybean production with cover crops.
- Winter/cereal rye was broadcast after soybean in year four of the rotation cycle.
- Cover crop seed cost was $12.00/acre for winter/cereal rye before planting corn.Cover crops were planted with the no-till planter used to plant cash crops.
- The cover crop was terminated by incorporation into the soil with a field cultivator
- Hand weeding expense was $80.00/acre for corn and $50.00/acre for soybean.
- Certified organic poultry litter was $60.00/acre for corn and $45.50/acre for soybean.
- Total additional expenses were $162.99/acre for corn and $97.79 for soybean.

Soil Health Management System Impact on Farm Income

- Reduced expenses were $40.03 / acre greater than additional expenses for corn.
- Reduced expenses were $17.62/acre greater than additional expenses for soybean.
- Yield was reduced 30 bu./acre for organic corn and 10 bu./acre for organic soybean.
- Prices received for certified organic corn and soybean were twice those received for conventional corn and soybean.
- **Net farm income increased $523.03/acre for corn and $417.62/acre for soybean.**

Table 1. Partial Budget1 Analysis, 40 Years with an Organic Soil Health Management System on a 400-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	12.00	0.00	0.00
Fertilizer & Amendments	128.00	60.00	40.00	45.50
Pesticides	40.00	0.00	57.00	0.00
Fuel & Electricity	2.19	1.21	1.34	0.00
Labor & Services	8.45	85.70	5.15	52.29
Post-harvest Expenses	13.50	0.00	3.20	0.00
Equipment Ownership	10.88	4.08	8.72	0.00
Total Expense Change	**203.02**	**162.99**	**115.41**	**97.79**
	ADDITIONAL REVENUE	REDUCED REVENUE	ADDITIONAL REVENUE	REDUCED REVENUE
Yield, bu./acre	145.00	175.00	50.00	60.00
Price Received,[2] $/bu.	8.40	4.20	20.00	10.00
Revenue Change	**1,218.00**	**735.00**	**1,000.00**	**600.00**
	TOTAL BENEFITS	TOTAL COSTS	TOTAL BENEFITS	TOTAL COSTS
Total Change	**1,421.02**	**897.99**	**1,115.41**	**697.79**
Change in Net Farm Income	**523.03**		**417.62**	

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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