ECONOMICS of Soil Health Systems

Black Hawk Creek Watershed of Iowa

FARM SIZE
450 acres

CROPS GROWN
Corn and soybean

SOIL TEXTURE
Silty clay loam

SOIL HEALTH MANAGEMENT SYSTEM
No-till production
Cover crops
Corn-soybean 50:50 rotation
Nutrient management program
Monitoring of soil nutrient levels

NET INCOME INCREASE
Corn
$49.78/acre
Soybean
$21.39/acre

FARM #15

INTRODUCTION

The Jack Boyer farm in the Black Hawk Creek Watershed of Iowa increased profitability by decreasing costs of production for corn and soybean with a soil health management system (SHMS) of no-till production and cover crops. No-till production and cover crops had been used for 10 years.

Benefits of the SHMS reported by the farmer:

- → **IMPROVED WATER INFILTRATION**
- → **REDUCED NITROGEN APPLICATIONS FOR CORN**
- → **IMPROVED CROP RESILIENCE IN DRY YEARS**
- → **INCREASED SOIL ORGANIC MATTER**
- → **DECREASED EROSION**

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 in conventional tillage.
- → A field trip with a chisel plow and a fi eld cultivator were eliminated for corn.
- → A field cultivator trip and an herbicide custom spray were eliminated for soybean.
- → Disease seed treatment expense of $13.00/acre was eliminated for soybean.
- → Nitrogen was reduced 75 lbs./acre of anhydrous ammonia for corn.
- → Reductions in edge of field maintenance were amortized as $2.00/acre for both crops.
- → Total reduced expenses were $55.10/acre for corn and $52.78/acre for soybean.

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ECONOMICS of Soil Health Systems: Black Hawk Creek Watershed of Iowa

Soil Health Management System and Additional Expenses

- The soil health management system adopted was no-till production with cover crops.
- Winter/cereal rye and a brassica were planted as cover crops after the preceding crop harvest.
- Cover crop seed costs were $15.00/acre before planting both corn and soybean.
- Cover crops before corn were broadcast by aerial application.
- Cover crops before soybean were drilled before planting soybean into the living cover crop.
- Termination of cover crops with herbicide was not an additional expense.
- Post-harvest expenses due to increased corn yield were hauling, drying, and check-off fee.
- Total additional expenses were $47.32/acre for corn and $31.39/acre for soybean.

Soil Health Management System Impact on Farm Income

- Reduced expenses were $7.78/acre greater than additional expenses for corn.
- Reduced expenses were $21.39/acre greater than additional expenses for soybean.
- Yield increased 10 bu./acre, and additional revenue was $42.00/acre for corn.
- Reduced expenses for soybean were achieved without reduced crop yield.
- **Net farm income increased $49.78/acre for corn and $21.39/acre for soybean.**

Table 1. Partial Budget[1] Analysis, 9 Years with a Soil Health Management System on a 450-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	15.00	13.00	15.00
Fertilizer & Amendments	26.30	0.00	0.00	0.00
Pesticides	0.00	0.00	23.44	0.00
Fuel & Electricity	3.30	1.03	0.80	1.73
Labor & Services	10.31	19.79	12.46	5.34
Post-harvest Expenses	0.00	4.50	0.00	0.00
Equipment Ownership	15.19	7.00	3.08	9.32
Total Expense Change	**55.10**	**7.00**	**52.78**	**31.39**
	ADDITIONAL REVENUE	REDUCED REVENUE	ADDITIONAL REVENUE	REDUCED REVENUE
Yield, bu./acre	10.00	0.00	0.00	0.00
Price Received,[2] $/bu.	4.20	4.20	10.00	10.00
Revenue Change	**42.00**	**0.00**	**0.00**	**0.00**
	TOTAL BENEFITS	TOTAL COSTS	TOTAL BENEFITS	TOTAL COSTS
Total Change	**97.10**	**47.32**	**52.78**	**31.39**
Change in Net Farm Income	**49.78**		**21.39**	

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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