

# ECONOMICS of Soil Health Systems

## Middle Columbia Watershed of Oregon



### FARM SIZE

2,400 crop acres



### CROPS GROWN

Winter Wheat  
1,000 acres  
Sunflower  
200 acres



### SOIL TEXTURE

Silt loam



### SOIL HEALTH MANAGEMENT SYSTEM

No-till production  
Cover crops  
Monitoring of soil  
nutrient levels



### NET INCOME INCREASE

Winter Wheat  
\$88.31/acre  
Sunflower  
\$16.35/acre

## INTRODUCTION

The Noah Williams farm in the Middle Columbia Watershed of Oregon increased profitability for winter wheat and sunflower by increasing winter wheat yield and decreasing production costs for sunflower with a soil health management system (SHMS) of no-till production and cover crops. The farm has practiced no-till production for approximately 15 years and has planted cover crops for five years.

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



→ **IMPROVED WATER INFILTRATION**

→ **REDUCED EROSION**

→ **IMPROVED SOIL STRUCTURE**

→ **ENHANCED RESILIENCE TO WATER STRESS**

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.
- Six tillage trips were eliminated for winter wheat and three were eliminated for sunflower.
- A field trip with 45 lbs. of anhydrous ammonia was eliminated for winter wheat.
- One spray application with herbicide expense of \$20.00/acre was eliminated for sunflower.
- Total reduced expenses were \$72.35/acre for winter wheat and \$54.91/acre for sunflower.

## FARM #29

# ECONOMICS of Soil Health Systems: Middle Columbia Watershed of Oregon

## Soil Health Management System and Additional Expenses

- The soil health management system adopted was no-till production with cover crops before winter wheat.
- Cover crops on 300 acres consisting of triticale, oat, common vetch, spring pea, phacelia, and forage collard for \$25.00/acre were drilled in April before winter wheat production.
- Before planting winter wheat in September, cover crop termination was in June with herbicide that was not an additional expense.
- One fungicide application was added for winter wheat.
- Nitrogen as 45 lbs./acre dried fertilizer was added to an application for winter wheat.
- Additional herbicide expenses were \$22.00/acre for sunflower.
- Post-harvest expense due to increased winter wheat yield were hauling and check-off fee.
- Total additional expenses were \$94.04/acre for winter wheat and \$38.56/acre for sunflower.

## Soil Health Management System Impact on Farm Income

- Reduced expenses were \$21.69/acre less than additional expenses for winter wheat.
- Reduced expenses were \$16.35/acre greater than additional expenses for sunflower.
- Yield increased 20 bu./acre, and additional revenue was \$110.00/acre for winter wheat.
- Reduced expenses were achieved for sunflower without a reduction in yield.
- **Net farm income increased \$88.31/acre for winter wheat and \$16.35/acre for sunflower.**

Table 1. Partial Budget<sup>1</sup> Analysis, 15 Years with a Soil Health Management System on a 2,400-Acre Farm, \$ per Acre per Year (2019 Dollars).

Expense Category	Winter Wheat		Sunflower	
	BENEFITS	COSTS	BENEFITS	COSTS
	REDUCED EXPENSE	ADDITIONAL EXPENSE	REDUCED EXPENSE	ADDITIONAL EXPENSE
Seed	0.00	25.00	0.00	0.00
Fertilizer & Amendments	15.78	20.05	0.00	0.00
Pesticides	0.00	3.00	20.00	22.00
Fuel & Electricity	8.66	3.47	5.08	1.73
Labor & Services	16.06	18.28	10.13	5.51
Post-harvest Expenses	0.00	5.60	0.00	0.00
Equipment Ownership	31.85	18.64	19.70	9.32
<b>Total Expense Change</b>	<b>72.35</b>	<b>94.04</b>	<b>54.91</b>	<b>38.56</b>
	ADDITIONAL REVENUE	REDUCED REVENUE	ADDITIONAL REVENUE	REDUCED REVENUE
Yield, bu.	20.00	0.00	0.00	0.00
Price Received, <sup>2</sup> \$/bu.	5.50	5.50	6.00	6.00
<b>Revenue Change</b>	<b>110.00</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>182.35</b>	<b>94.04</b>	<b>54.91</b>	<b>38.56</b>
<b>Change in Net Farm Income</b>	<b>88.31</b>		<b>16.35</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.