ECONOMICS of Soil Health Systems

Colusa Basin Watershed of California

FARM SIZE
193 acres

CROPS GROWN
Walnut

SOIL HEALTH MANAGEMENT SYSTEM
Regenerative agriculture with cover crops
Monitoring of soil nutrient levels

NET INCOME INCREASE
$425.19/acre

FARM #24

INTRODUCTION

The Daniel Unruh farm in the Colusa Basin Watershed of California increased profitability by decreasing production expenses with a soil health management system (SHMS) of regenerative agriculture and cover crops. The farm has practiced regenerative agriculture with cover crops for six years.

Benefits of the SHMS reported by the farmer:

- → **IMPROVED SOIL STRUCTURE AND WATER INFILTRATION**
- → **REDUCED EROSION**
- → **INCREASED SOIL ORGANIC MATTER**
- → **REDUCED NITROGEN AND IRRIGATION**
- → **LESS INSECT AND DISEASE PRESSURE**

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 systems included production with conventional inputs and without cover crops.
- → 120 lbs. of nitrogen as UAN 32% applied with irrigation water was eliminated.
- → Five miticide applications and one insecticide application for coddling moths were eliminated due to cover crops attracting beneficial insects as predators.
- → One fungicide spray was eliminated as improved soil structure and soil health increased walnut tree resilience to disease pressure.
- → Reduced irrigation expenses, including electricity for pumping, were reported and calculated for 8 acre-inches of water.
- → Reduced expenses were $695.92/acre.

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ECONOMICS of Soil Health Systems: Colusa Basin Watershed of California

Soil Health Management System and Additional Expenses

- The soil health management systems adopted was regenerative agriculture with cover crops.
- The $25.00/acre cover crop seed mix included annual rye, oat, wheat, barley, triticale, vetch, plantain, velvet pea, chicory, mustard, radish, and phacelia.
- Cover crops were planted in November after walnut harvest in October.
- Low seed density rates encouraged optimal growth of the diverse cover crop mix as smaller seeds were planted with a grain drill, and a planter was used for larger seeds.
- Cover crops were terminated with a roller-crimper in April and shredded with a mower in July.
- Brassicas in the cover crop mix were successful in eliminating nematodes.
- Compost expense was $160.00/acre, and application expense was $40.00/acre.
- Additional expenses were $270.73/acre.

Soil Health Management System Impact on Farm Income

- Reduced expenses were $425.19/acre greater than additional expenses.
- Reduced expenses were achieved without walnut production decreases.
- **Net farm income increased $425.19/acre.**

Table 1. Partial Budget[1] Analysis, 6 Years with a Soil Health Management System on a 193-Acre Farm, $ per Acre per Year (2019 Dollars).

	Walnut	
	BENEFITS	COSTS
Expense Category	REDUCED EXPENSE	ADDITIONAL EXPENSE
Seed	0.00	25.00
Fertilizer & Amendments	56.30	160.00
Pesticides	440.00	0.00
Fuel & Electricity	74.42	5.23
Labor & Services	61.99	59.45
Equipment Ownership	63.21	21.05
Total Expense Change	**695.92**	**270.73**
	ADDITIONAL REVENUE	REDUCED REVENUE
Yield, lb	00.00	00.00
Price Received,[2] $/lb.	1.00	1.00
Revenue Change	**0.00**	**0.00**
	TOTAL BENEFITS	TOTAL COSTS
Total Change	**695.92**	**270.73**
Change in Net Farm Income	**425.19**	

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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