ECONOMICS of Soil Health Systems

China Creek-Red River Watershed of Texas

FARM SIZE
14,800 acres

CROPS GROWN
Cotton/wheat
Cotton/grain sorghum
Winter wheat

SOIL TEXTURE
Various soil types

SOIL HEALTH MANAGEMENT SYSTEM
No-till production
Cover crops
Crop rotation on most acres of cotton after winter wheat and fallow
Monitoring of soil nutrient levels

NET INCOME INCREASE
Cotton/wheat
$298.11/acre
Cotton/grain sorghum
$314.10/acre
Winter wheat
$15.69/acre

FARM #23

INTRODUCTION

The Kenneth McAlister farm in the China Creek-Red River Watershed of Texas increased profitability for a crop rotation of cotton and winter wheat by decreasing production costs and increasing cotton yield with a soil health management system (SHMS) of no-till production and cover crops. No-till production began in 2003 and all acreage was converted to no-till in 2005. Planting of cover crops began in 2013 and has been increasing each year.

Benefits of the SHMS reported by the farmer:

- → **IMPROVED WATER INFILTRATION**
- → **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.
- → Eight cotton tillage operations with a chisel plow, ripper, harrow, field cultivator, and rotary hoe were eliminated in the wheat rotation and seven eliminated with a chisel plow, harrow, field cultivator, and rotary hoe in the grain sorghum rotation.
- → Three tillage operations with a chisel plow and disc were eliminated for wheat.
- → Total reduced expenses for cotton were $61.67/acre in the wheat rotation, $53.00/acre in the grain sorghum rotation, and expense reductions for wheat were $37.19/acre.

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ECONOMICS of Soil Health Systems: China Creek-Red River Watershed of Texas

Soil Health Management System and Additional Expenses

- The soil health management system adopted was no-till production with cover crops.
- Black oat seed as cover crop before cotton in the grain sorghum rotation was $12.50/acre.
- Between the grain sorghum and cotton crops, black oat was planted with a no-till air seeder.
- Cover crops developed from October to January and grazed until termination with herbicide that was not an additional expense.
- A fall spray was added for cotton in the wheat rotation with herbicide cost of $9.00/acre.
- A spray field trip was added for wheat with herbicide cost of $7.38/acre.
- Increased cotton yields entailed additional expense for round module covers of $6.66/acre.
- Post-harvest expense for increased cotton yield were assumed paid with cottonseed value.
- Total additional expenses for cotton were $31.56/acre in the wheat rotation, $41.90 in the grain sorghum rotation, and expense additions for wheat were $21.50/acre.

Soil Health Management System Impact on Farm Income

- Cotton reduced expenses were $30.11/acre greater than additional expenses for the wheat rotation and $11.10/acre greater than additional expenses for the grain sorghum rotation.
- Wheat reduced expenses were $15.69/acre greater than additional expenses.
- Cotton yield increased 400 lb./acre for both rotations, and additional revenue was $268.00/acre.
- Grazing of cover crops was valued as $35.00/acre for the cotton and grain sorghum rotation.
- Wheat reduced expenses were achieved without a yield decrease.
- **Net farm income increased $298.11/acre for the cotton and wheat rotation, $314.10/acre for the cotton and grain sorghum rotation, and $15.69/acre for wheat.**

Table 1. Partial Budget[1] Analysis, 16 Years with a Soil Health Management System on a 14,000-Acre Farm, $ per Acre per Year (2019 Dollars).

	Cotton/Wheat		Cotton/Grain Sorghum		Winter Wheat	
	BENEFITS	COSTS	BENEFITS	COSTS	BENEFITS	COSTS
Expense Category	REDUCED EXPENSE	ADDITIONAL EXPENSE	REDUCED EXPENSE	ADDITIONAL EXPENSE	REDUCED EXPENSE	ADDITIONAL EXPENSE
Seed	0.00	0.00	0.00	12.50	0.00	0.00
Fertilizer & Amendments	0.00	0.00	0.00	0.00	0.00	0.00
Pesticides	0.00	9.00	0.00	0.00	0.00	7.38
Round Module Covers	0.00	6.66	0.00	6.66	0.00	0.00
Fuel & Electricity	9.32	1.34	7.98	2.41	5.53	1.69
Labor & Services	16.73	4.99	14.70	7.41	9.56	3.93
Post-harvest Expenses	0.00	0.00	0.00	0.00	0.00	0.00
Equipment Ownership	35.62	9.57	30.32	12.92	22.10	8.50
Total Expense Change	**61.67**	**31.56**	**53.00**	**41.90**	**37.19**	**21.50**
	ADDITIONAL REVENUE	REDUCED REVENUE	ADDITIONAL REVENUE	REDUCED REVENUE	ADDITIONAL REVENUE	REDUCED REVENUE
Yield, bu./acre	400.00	0.00	400.00	0.00	0.00	0.00
Price Received,[2] $/bu.	0.67	0.67	0.67	0.67	5.50	5.50
Grazing Value	0.00	0.00	35.00	0.00	0.00	0.00
Revenue Change	**268.00**	**0.00**	**303.00**	**0.00**	**0.00**	**0.00**
	TOTAL BENEFITS	TOTAL COSTS	TOTAL BENEFITS	TOTAL COSTS	TOTAL BENEFITS	TOTAL COSTS
Total Change	**329.67**	**31.56**	**356.00**	**41.90**	**37.19**	**21.50**
Change in Net Farm Income	**298.11**		**314.10**		**15.69**	

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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