No-till planting milo after winter cover crop mix

Soil Health Case Study

Rodney Hern, Hern Farms, OK

Introduction

Mark and his father, Franklin

Rodney Hern is the fifth generation to farm land claimed by his family in the Oklahoma land runs of the 1890s. He grows wheat, milo (sorghum), soybeans, other small grain crops, and raises cattle on 2,000 acres in and around Grant County. This case study compares one of Rodney's fields, managed with soil health practices, to a conventionally-managed field just across the fence.

Rodney formerly worked as an agriculture teacher in the Oklahoma Panhandle, where he met his wife Pat. They learned from farmers in that area to be very mindful of water conservation and erosion prevention. When he took the reins of the family farm, Rodney built on the example of his elders. "They used cover crops as "green manure" in the 1950s, before synthetic fertilizers became available," he said.

Rodney switched to no-till to combat the wind erosion of his soil. He was one of the first adopters of the USDA-NRCS's Conservation Stewardship Program, which helped defray the cost of changing his equipment. Rodney sold all of his tillage implements, replacing them with a drill and sprayer. He says it's necessary for farmers who adopt no-till to own those two items.

In Rodney's area it is common for farmers to plant wheat every fall and leave fields fallow after spring harvest. Rodney implemented cover cropping and crop rotation to fight the weeds, pests and diseases that came with continuous wheat production. He also hoped to rebuild soil organic matter and cut input costs by learning to farm for soil health.

Rodney has now been using no-till, mixed-species cover crops and crop rotation for thirty years. He says this management program saves time, fuel and fertilizer compared to his past conventional practices.

Rodney has noticed less soil erosion and better retention of rainfall. He has also been spared some pest infestations that befell his neighbors, enabling him to outyield them even without starting up the sprayer. Though encroachment of windmillgrass and marestail are still a challenge, Rodney has fewer problems with pigweed and kochia than he did while farming conventionally

Rodney works closely with the Oklahoma Conservation Commission (OCC)'s Soil Health Team as he continues to learn and teach others. He is the Grant County farmer mentor for the General Mills/OCC regenerative agriculture program. Rodney is also a board member of No-Till On The Plains (NTOP), a conservation agriculture group based in Wichita, KS. He was a presenter at the very first NTOP conference in the 1990s.

Economic Benefits

A partial budget analysis (PBA) was used to analyze the marginal benefits and costs of adopting no-till, cover crops, diversified crop rotation, and nutrient management changes within the 126-acre study area. We used a combination of published machinery and material cost estimates and farmer-provided data to estimate the cost of operations, on average, before and after soil health practice adoption. The analysis was limited to only those income and cost variables affected by the adoption of these practices. The PBA table below summarizes these economic effects, revealing that due to soil health practice adoption, Rodney's wheat crop was $___ dollars per acre more profitable than the adjacent conventional crop. Rodney achieved a ___% return on his transition investment on this crop alone.

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Wheat ready to ripen

In Rodney's comparison practices. Mark has saved $15/ac/yr in fertilizer costs. The Haney Test is more expensive than standard soil testing, resulting in a cost increase of $200/yr.

Closing Thoughts

"Timing is everything," Mark said to emphasize the importance of careful planning of field activities around weather and seasonality of all crops in rotation. Early in his soil health transition, he struggled to get cover crops planted on time and yields suffered as a result. However, with the adoption of both summer and winter cover crop mixes, acres that were unable to be planted to summer cover could be planted to winter cover. Flexibility and trying new things are key. Despite the challenges, in just five years, Mark has seen visible aggregation in high-clay soils and improved water-holding capacity in the top 12 inches of soil after a dry winter. As rainfall in western Oklahoma becomes more erratic, Mark will be prepared to capture and retain every drop that falls on his soil.

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Economic Effects of Soil Health Practices on 2N2E Farms, OK (2020)

Increases in Net Income

Increase in Income

ITEM	PER ACRE	ACRES	TOTAL
Wheat yield improvement (+7.5 bu/ac)	$38	63	$2,363
Increased net income due to milo	$44	126	$5,544
Total Increased Income			**$7,907**

Decrease in Cost

ITEM	PER ACRE	ACRES	TOTAL
Machinery cost savings due to no-till	$38	126	$4,826
Fertilizer savings in wheat due to nut. mgt.	$15	63	$936
Value of decreased erosion	$3	126	$327
Total Decreased Cost			**$6,089**
Annual Total Increased Net Income			**$13,995**
Total Acres in this Study Area			**126**
Annual Per Acre Increased Net Income			**$111**

Decreases in Net Income

Decrease in Income

ITEM	PER ACRE	ACRES	TOTAL
None identified			$0
Total Decreased Income			**$0**

Increase in Cost

ITEM	PER ACRE	ACRES	TOTAL
Cover crop costs	$52	126	$6,610
Annual Haney Tests		126	$200
Learning costs (140 hours/year)			$3,662
Total Increased Cost			**$10,472**
Annual Total Decreased Net Income			**$10,472**
Total Acres in this Study Area			**126**
Annual Per Acre Decreased Net Income			**$83**

Annual Change in Total Net Income = $3,523

Annual Change in Per Acre Net Income = $28

Return on Investment = 34%

• This table represents estimated average costs and benefits reported by the farmer, Mark Nault, with his adoption of no-till, summer and winter cover crop mixes, nutrient management, and adding milo to wheat over a 126-acre study area. • All values are in 2020 dollars. • Prices used: Wheat: $5.00/bu (USDA NASS, Feb 2021, Crop Values: 2020 Summary); Net income (value of production minus operating costs) Wheat: $310/ac, Milo: $204/ac (USDA ERS, May 2021, Commodity Costs and Returns: Recent Costs and Returns); Nitrogen: $0.34/lb, Phosphate: $0.39/lb (ISU Extension and Outreach, Jan 2021, Ag Decision Maker: Estimated Costs of Crop Production in Iowa). • Value of decreased erosion ($1.18/ton) is based on estimated N & P content of the soil (2.32 lbs N/ton, 1 lb P/ton) and fertilizer prices (USDA NRCS, May 2010, Final Benefit-Cost Analysis for the EQIP). • Return on Investment is the ratio of Annual Total Change in Net Income to Annual Total Decreased Net Income, as a percent. • For information about: (1) study methodology, see farmland.org/soilhealthcasestudies; (2) USDA's NTT, see ntt.tiaer.tarleton.edu/; and (3) USDA's COMET-Farm Tool, see comet-farm.com. • This material is based on AFT's work supported by a USDA NRCS CIG grant (NR183A750008G008) and a grant from the Oklahoma Conservation Commission.

For more information about this study or to discuss soil health practices, please contact
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