Use Partial Budget Analysis to Assess the Economics of Cover Crops

- Focus only on what changes (adding cover crops).
- Focus on the Costs and Benefits realized on-farm.
- Focus on benefits that can be easily monetized.

In General

- Keep your cover crop seed and planting costs as low as possible to meet your objectives.
- Good management is the key to maximizing the benefits of cover crops.
- Reducing tillage may offset the cover crop costs in the short term until the long term soil health benefits are realized.

For More Information

To assess the costs and benefits for your farm a spreadsheet based tool is available to download from the NRCS Missouri Soil Health Website

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USDA

Adding Cover Crops and Reducing Tillage in a Corn-Corn-Wheat Double Crop Soybean Furrow Irrigated Rotation

Missouri Cover Crop Economics Case Study 4
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Costs and benefits are highly variable from operation to operation. The information presented here is provided as an introduction to the economic variables associated with this case study. For an operation-specific analysis refer to the For More Information section.

Field of Cereal Rye, Oat, Crimson Clover, Balansa Clover, Radish and Winter Peas on beds with irrigation furrows.

Photo Credit: Warren Cork, Resource Conservationist, NRCS

Introduction

Utilizing cover crops provides many benefits to soil and water resources. However, some farmers may question the affordability of incorporating cover crops into their operations. Partial budgeting is a tool to help answer that question.

In a partial budget analysis the focus is on changes in the operation. To keep the analysis relevant to the operation, the focus of this assessment is the on-farm cover crop costs and benefits. Additionally, only benefits that can be easily expressed in dollar terms are assessed.

When assessing the economics of cover crops, time horizon matters. The short term (typically less than 10 years) assesses the immediate economic impact of adding cover crops. The long term assesses the continued long term utilization of cover crops which may lead to additional economics benefits (aka: Soil Health).

Case Study

Three years ago a farmer in southeast Missouri started reducing tillage and adding cover crops with the goal of increasing soil organic matter, improving aeration in his soils and reducing irrigation costs. This part of his operation is a furrow irrigated corn-corn-wheat/double crop soybean rotation on loamy soils, and includes about 1,000 acres. The soil organic matter is one percent. Before reducing tillage and adding cover crops, runoff from the fields was filled with sediment, and equipment and labor cost associated with sediment movement remediation and re-hipping beds was a common expense. Cover crops are planted with a no-till drill or broadcast by airplane. The cover crops utilized are as follows (rates are for drilling):

Cover Crop Species and Seeding Rate (lb/ac)	Cash Crop Following Cover Crop
Cereal Rye (28)/Rape (2.5)	First Corn
Cereal Rye (15)/Oat (7.5)/Crimson Clover (5)/ Balansa Clover (5)/Radish (1.25)/Winter Pea (6.25)	Second Corn

In the three years since the change to reducing tillage and adding cover crops the farmer's labor and equipment costs are lower, the water coming off his fields after rain events is cleaner, and he is already noticing the ground maintaining moisture longer. The farmer has reduced tillage passes (including hipping) from three passes to one pass in corn, three passes to no passes in wheat and three passes to one pass in soybeans. The remaining tillage pass in corn and soybeans is with a row cultivator to clean the irrigation furrows. The farmer no longer performs full width tillage. In addition, the farmer has stopped burning wheat straw and does not feel he will need to deep till every four years to break the plow pan as he has in the past.

Analysis

Costs

Cover Crop Before First Corn		Cover Crop Before Second Corn	
Cover Crop Seed ($/acre)[1/]	$9.78	Cover Crop Seed ($/acre)[2/]	$30.65
Cover Crop Planting- No-Till Drill ($/acre)	$20.00	Cover Crop Planting- No-Till Drill ($/acre)	$20.00
Total Cost ($/acre)	$29.78	Total Cost ($/acre)	$50.65

Benefits

Reduced Tillage Equipment and Labor Benefits			
Crop	Original Tillage Operation(s)*	Reduced Tillage Operation	Benefit ($/acre)
First Corn	After harvest: rip/deep till, field cultivate twice, build beds	After harvest: row cultivator to clean furrows	$46.00
Second Corn	After harvest: field cultivate three times	After harvest: row cultivator to clean furrows	$26.00
Wheat	After harvest: burn wheat stubble, field cultivate twice, build beds	No tillage operation	$40.50
Soybeans	After harvest: field cultivate twice, build beds	After harvest: row cultivator to clean furrows	$26.00

** Tillage operations such as number of passes and equipment used varied. The operations described here are meant to capture the average situation.*

Results

Short Term

Average Annual Rotation Cover Crop Costs[3/] ___ -$26.81/ac/yr
Average Annual Rotation Benefits _____ $46.17/ac/yr
Average Annual Net Benefits _____ $19.36/ac/yr

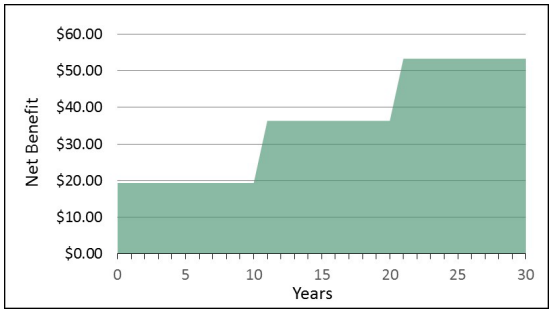
Long Term

If the farmer continues to utilize cover crops and reduced tillage in his rotation he will experience improvements in the physical and biological properties of the soil. One way to measure this improvement is through soil organic matter. For each one percent increase in soil organic matter (based on increasing the active carbon content in the soil) approximately 20 lb/acre of plant-available nitrogen becomes available. Additionally, the water-holding capacity of the soil increases, reducing irrigation costs. Assuming it takes this farmer 10 years to increase soil organic matter one percent, the additional benefits after year 10 are $17.00/acre/year.

Long Term Benefits	
Soil Fertility ($/acre/year) - 20 lbs/acre plant available N at $0.55/lb	$11.00
Water Storage ($/acre/year) - reduced irrigation costs [4/]	$6.00
Total Long Term Benefits ($/acre/year)	$17.00

Combining the Short Term and Long Term Results

Year 1-10 Rotation Net Benefit $19.36
Years 11-20 Rotation Net Benefit $36.36
Years 21-30 Rotation Net Benefit $53.36



Conclusion

By reducing tillage and adding cover crops to his rotation, this farmer is able to immediately improve the profitability of his operation. With continued utilization of reduced tillage and cover crops he will improve his profitability in the long run through improved nutrient cycling and water storage which will allow him to reduce his irrigation costs.

1/cereal rye, 28 lb/ac, $0.26 + rape, 2.5 lb/ac, $1.00

2/ cereal rye, 15 lb/acre, $0.26 + crimson clover, 5 lb/ac, $1.50 + balansa clover, 5 lb/ac, $2.15 + oat, 7.5 lb/ac, $0.30 + winter pea, 6.25 lb/ac, $0.55 + radish, 1.25 lb/ac, $2.25.

3/ Average of cover crop costs for three year rotation ($29.78 1st corn + $50.65 2nd corn + $0 wheat/DC Soybeans)

4/ Assumes a 25% reduction in irrigation cost per 1% increase in soil organic matter.