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.
- In some situations, the use of cover crops may alleviate the need for costly structural erosion control practices.

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 to a Corn - Soybean Rotation: Alleviating Erosion Concerns and Avoiding Terracing

Missouri Cover Crop Economics Case Study 5
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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.

Planting Soybeans into Cereal Rye Cover Crop

Photo Credit: Craig King, 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

A farmer in northeast Missouri raises around 2,000 acres of soybeans and corn on rented and owned land, and has been farming no-till for over 25 years. Starting four years ago he added winter cover crops into the rotation on some acres. Each year since then, more acres have been planted to cover crops. This farmer's goals are to conserve soil for the next generation, increase productivity and increase the return per acre.

The cover crop utilized is cereal rye planted at a rate of 42 lbs/acre. This cover crop is planted in the fall on both corn and soybean acres. The farmer typically terminates the cover crop two weeks prior to planting corn. Corn is planted late April to early May. At planting, starter fertilizer is applied and side dress fertilizer is applied during the growing season. This fertility program is the same as the fertility program on the no till corn prior to utilizing the cover crop. Soybeans are sometimes planted into living cereal rye, but also planted into terminated cereal rye. The farmer has not experienced additional termination costs due to the cover crops over previous spring burndown costs.

The famer has reduced his P and K inputs by 10% in both corn and soybeans, and has not seen any detrimental impact to crop yields. In soybeans, the cover crop has removed the need for a pre-emergent herbicide application due to improved water hemp control. The cover crop also provides improved erosion control on all acres. On one farm, the use of cover crops has controlled erosion enough that he has avoided building terraces. This analysis focuses on that farm.

Analysis

Costs

Cover Crop Before First Soybean		Cover Crop Before Corn	
Cover Crop Seed ($/acre) - Cereal Rye, 42 lbs/acre @ $0.35/lb	$14.70	Cover Crop Seed ($/acre) - Cereal Rye, 42 lbs/acre @ $0.35/lb	$14.70
Cover Crop Planting - no till drill ($/acre)	$20.00	Cover Crop Planting - no till drill ($/acre)	$20.00
Total Cost ($/acre)	$34.70	Total Cost ($/acre)	$34.70

Benefits

Cover Crop Before First Soybean		Cover Crop Before Corn	
Reduced P and K - 10% reduction from soil test recommendations ($/acre)	$5.00	Reduced P and K - 10% reduction from soil test recommendations ($/acre)	$5.00
Herbicide Input Reduction ($/acre) – 25% reduction on $40/acre program	$10.00		
Erosion Reduction ($/acre)[1/]	$5.60	Erosion Reduction ($/acre)[1/]	$5.60
Avoided Terrace Cost ($/acre)[2/]	$53.00	Avoided Terrace Cost ($/acre)[2/]	$53.00
Total Benefit ($/acre)	$73.60	Total Benefit ($/acre)	$63.60

Results

Short Term

Cereal Rye Cover Crop before Soybean net benefit ___ $38.90/ac
Cereal Rye Cover Crop before Corn net benefit _____ $28.90/ac
Rotation Net Benefits _____ $67.80/ac

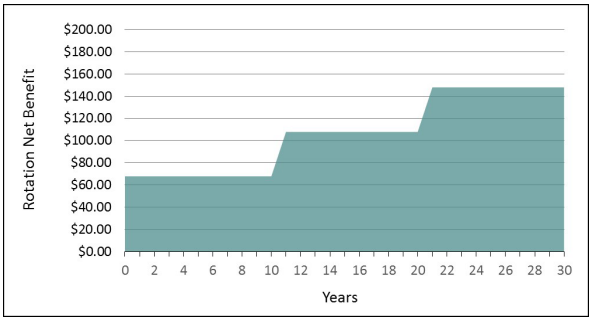
Long Term

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 1 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 the risk of drought-induced yield reductions in dryland farming systems. Assuming it takes this farmer 10 years to increase soil organic matter 1 percent, the additional benefits after year 10 are $20.00/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 [3/]	$9.00
Total Long Term Benefits ($/acre/year)	$20.00

Combining the Short Term and Long Term Results

Year 1-10 Rotation Net Benefit $67.80/ac
Years 11-20 Rotation Net Benefit $107.80/ac
Years 21-30 Rotation Net Benefit $147.80/ac



Conclusion

On fields that do not currently have structural erosion control measures in place, such as terraces, cover crops may be a lower cost alternative to addressing erosion resource concerns. The benefits are avoiding the cost of the structural practice installation in the short run while improving soil health and avoiding the structural practice operation and maintenance costs in the long run.

1/ Erosion reduction: RUSLE2 shows 1.3 tons/acre reduced erosion due to cover crops. Assuming $2.00/ton value of lost fertility from erosion = $2.60/acre. Landowner estimates $3.00/acre saved in erosion repair costs with the use of cover crops (fuel, machinery and labor to manually repair concentrated flow areas prior to planting in spring).

2/ Avoided Terrace Cost – amortized cost of terrace installation ($750/acre) plus operation and maintenance estimated at $50/acre every 5 years.

3/Assuming a possibility in any given year of a 2% yield reduction due to a drought period. Soybeans at 45bu/ac$9/bu*2%=$8.10/ac/yr. Corn at 145bu/ac*$3.50/bu*2%=$10.15/ac/yr. $8.10+$10.15=$18.25/2=$9.00 average annual benefit from avoided yield reduction.*