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.

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

Contact

Lauren Cartwright
MO NRCS State Economist
lauren.cartwright@mo.usda.gov
(573) 876-9415

USDA

Adding Cover Crops to a Corn-Soybean Rotation

Missouri Cover Crop Economics Case Study 1
March 2015

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 adding cover crops to a corn-soybean rotation. For an operation-specific analysis refer to the For More Information section.

Cereal Rye planted in corn residue

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 on 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 raises 1,300 acres of soybeans and corn, and has been no-tilling for 40 years. He is adding winter cover crops into the rotation to reduce erosion and improve soil health. His goal is to have all acres in winter cover crops each year. The farm is terraced with average slopes of 6 percent. Before adding cover crops, even with no-till and terraces, the farmer experienced an annual erosion rate of 5 tons per acre on this farm. The cover crops utilized are as follows:

Cover Crop Species	Seeding Rate	Cash Crop Following Cover Crop
Winter Cereal Rye	40	Soybeans
Hairy Vetch	15	Corn

When cover crops can be planted before October 1, an air seeder is used. For fields where the cover crops cannot be seeded until after October 1 a no-till drill is utilized to improve germination and establishment.

Where cover crops are planted, the farmer has achieved excellent control of water hemp in the soybean crop. As a result, he has reduced herbicide use by 25 percent. In addition, he has experienced a soybean yield increase of 10 percent. With cover crops, he saves five days of field work each spring because he no longer has to address erosion collection points and ephemeral gullies. The hairy vetch provides some plant available nitrogen to the following corn crop.

Analysis

Costs

Cover Crop Before Soybean		Cover Crop Before Corn	
Cover Crop Seed ($/acre) - Cereal Rye, 40 lbs/acre, $0.52/lb	$20.80	Cover Crop Seed ($/acre) - Hairy Vetch, 15 lbs/acre, $1.92/lb	$28.80
Cover Crop Planting ($/acre)	$20.00	Cover Crop Planting ($/acre)	$20.00
Total Cost ($/acre)	$40.80	Total Cost ($/acre)	$48.80

Benefits

Cover Crop Before Soybean		Cover Crop Before Corn	
Herbicide Reduction ($/acre) - $21/acre reduced by 25%	$5.25	Nitrogen nutrient credit ($/acre) - 30 lb/acre * $0.55/lb	$16.50
Yield Increase ($/acre) - 45 bu/acre *10% increase @$10/bu	$45.00	Reduced Erosion ($/acre) - equipment and labor 1/	$6.50
Reduced Erosion ($/acre) - equipment and labor 1/	$6.50		
Total Benefits ($/acre)	$56.75	Total Benefits ($/acre)	$23.00

Results

Short Term

Cereal Rye Cover Crop before Soybean net benefit__$15.95/ac
Hairy Vetch Cover Crop before Corn net cost_____-$25.80/ac
Rotation Net Cost _____-$9.85/ac

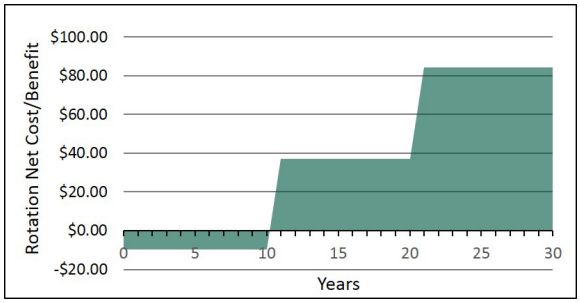
Long Term

If the farmer continues to utilize cover crops 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 20lb/ac 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 $23.50/ac/yr.

Long Term Benefits	
Soil Fertility ($/acre/year) - 20 lbs/acre plant available N at $0.55/lb	$11.00
Water Storage ($/acre/year) - avoided yield reduction due to drought 2/	$12.50
Total Long Term Benefits ($/acre/yr)	$23.50

Combining the Short Term and Long Term Results

Years 1-10	Rotation Net Cost	-$9.85/acre
Years 11-20	Rotation Net Benefit	$37.15/acre
Years 21-30	Rotation Net Benefit	$84.15/acre



Conclusion

This farmer's continued modest investment of approximately $10/ac to improve the soil health on his farm will result in net benefits to the operation in the long term. These net benefits will translate into increased profits for this operation.

*1/ Equipment and Labor Calculation details: Approximately 1/4 of the 1,300 acre operation is treated annually. Tractor: $20/ac tractor cost (includes fixed and variable costs) * 325 acres = $6,500/yr. Labor: Using producer estimate of 5 days field work saved, at $25/hr * 40 hrs (5—8 hour days) = $1,000/yr. $7,500/yr / 1,300ac = $6.50/ac/yr*

*2/ Assuming a possibility in any given year of a 2% yield reduction due to a drought period. Soybeans at 45bu/ac * $10/bu * 2%=$9.00/ac/yr. Corn at 160bu/ac * $5/bu * 2%=$16.00/ac/yr. $9.00 + $16.00 = $25.00/2 = $12.50 average annual benefit from avoided yield reduction.*