

THE FINANCIAL IMPACTS OF COVER CROPS



UW Discovery Farms

PRACTICE OVERVIEW

Cover cropping is the practice of planting a crop after harvesting the cash crop to maintain soil cover and root growth before planting the next cash crop. This differs from conventional cropping systems that leave the soil bare over the winter months between harvest and planting, exposing the soil to wind and rain erosion. Cover crops can help increase soil organic matter in the surface soil layers, improve soil structure, improve water retention and drainage, and reduce erosion.¹ The increase in plant residue may also increase biodiversity, leading to stronger suppression of opportunistic pests and weeds.

Cover crops also help retain nitrogen already in the soil, and leguminous cover crops can add new nitrogen to the soil. In both cases, this can reduce the amount of nitrogen fertilizer farmers need to apply to sustain crop yields.

Improving soil health can provide better tolerance to severe weather events like flooding. A 2023 study by the Meridian Institute and the University of Illinois found that fields with cover crops and no-till management were 24% less likely than conventional fields to be declared “prevent plant” and receive insurance payments during the severe precipitation and flooding that occurred in the Upper Mississippi River Basin in 2019.²

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- 1 Daryanto, S., Fu, B., Wang, L., Jacinthe, P. A., & Zhao, W., (2018). “Quantitative synthesis on the ecosystem services of cover crops.” *Earth-Science Reviews*, 185, pp.357–373.
 - 2 Meridian Institute. (2023). “Conservation and crop insurance research pilot.” <https://foodandagpolicy.org/wp-content/uploads/sites/17/2023/03/Conservation-Crop-Insurance-Data-Pilot-Results-1.pdf>

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Cover crops can also be more profitable when addressing particular soil health needs. Specific species can be selected to reduce erosion, alleviate compaction, improve water filtration, suppress weeds, and increase nutrient uptake. Cover crop species used in the Midwest include cereals (rye, wheat, barley, oats, and triticale), legumes (red clover, crimson clover, vetch, peas, and beans), grasses (annual ryegrass), and broadleaf species (buckwheat, mustards, brassicas, and forage radish).³

The USDA Census of Agriculture reports that the acreage planted with cover crops nationally increased by 50% between 2012 and 2017.⁴

COVER CROPS ADD DIRECT COSTS

Planting cover crops presents additional costs to the farm budget, including the cost of the cover crop seed, fuel and equipment for applying the seed, and herbicide for terminating the cover crop. The studies and analyses in the bulleted list below provide greater detail:

- **The median cost nationally of planting a cover crop is roughly \$37/acre.** The National Cover Crop Survey—conducted annually by the Conservation Technology Information Center (CTIC), the Sustainable Agriculture Research and Education (SARE), and the American Seed Trade Association—captures responses from over 1,000 farmers using cover crops to provide a snapshot of cover cropping practices nationwide. An analysis of 5 years of the survey’s data between 2012 and 2016 found that the median cost to plant cover crops was \$37/acre, as shown in Table 1.

Table 1: Cost of seeding cover crops from “Cover Crop Economics: Opportunities to improve your bottom line in row crops.”⁵

Item	Cost Per Acre
Cover crop seed	\$10-\$50
Seeding the cover crops	\$5-\$18
Termination	\$0-\$10
Subtotal range	\$15-\$78
Median cost from survey	\$37

- **Midwest farmers report median cover crop costs of \$15/acre for seed and \$12/acre for application.** A survey by the Soil Health Partnership of 82 farmers across 11 states in the Midwest found that the median cover crop seed cost was \$15/acre and the median application cost to be \$12/acre.⁶

3 Clark, A. (2015). *Cover crops for sustainable crop rotations*. Sustainable Agriculture Research and Education. <https://www.sare.org/resources/cover-crops/>

4 National Agriculture Statistics Service (NASS). (2020). “Land use practices.” <https://www.nass.usda.gov/Publications/Highlights/2020/census-land-use-practices.pdf>; Economic Research Service (ERS). (2021). “Cover crop trends, programs, and practices in the United States.” <https://www.ers.usda.gov/webdocs/publications/100551/eib-222.pdf>. The number of farmers practicing reduced tillage and cover cropping rose between the 2012 and 2017 Census of Agriculture.

5 SARE. (2019). “Cover crop economics: Opportunities to improve your bottom line in row crops.” <https://www.sare.org/wp-content/uploads/Cover-Crop-Economics.pdf>

6 Soil Health Partnership. (2020). “2019 cover crop planting report.” <http://www.soilhealthpartnership.org/wp-content/uploads/2020/08/SHP-cover-crop-survey-results-2020.pdf>

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- **Minnesota farmers spent \$25/acre for cover crop seed and \$17/acre on fuel and repairs.** Cover crop financial data in the FINBIN database, one of the largest publicly available farm financial databases in the country, show that Minnesota corn farms using cover crops spent \$25.10/acre on cover crop seed and \$16.61/acre on fuel and repair.⁷ Data from Minnesota soybean farms using cover crops show expenditures of \$23.51/acre for cover crop seed and \$18.84 in fuel and repairs.⁸

COVER CROPS CAN BE PROFITABLE OVER TIME

Achieving profitability using cover crops can take time as farmers learn the most effective cover crop seed, application, and termination methods for their operations. After the transition period of about 3 to 5 years, some studies have found that farmers who use cover crops can see an increase in profitability.

- **A national cover crop survey found significant cost savings after 5 years of cover crop experience.** In the National Cover Crop Survey's 2012–2016 analysis, cost savings for farmers in the fifth year of cover crop usage were estimated at \$21.90/acre for fertilizer, \$10–\$25/acre for weed control, and \$2–\$4/acre for erosion repair. After added costs of \$37/acre, farms using cover crops for at least 5 years experienced a net return of \$17.90 from growing cover crops.⁹
- **Farmers experience negative returns in year one, but positive net returns over time.** The National Cover Crop Survey's 2012–2016 analysis found that farmers increasingly realized cost savings over the first 5 years. Despite a negative net return per acre in year one (–\$31/acre) and minimal return in year three (\$1.42/acre), farm data from the survey show substantive returns after 5 years of cover crop use (\$18/acre). By the fifth year, farmers saw corn yields increase by 3% and soy yields increase by 4.96%.¹⁰
- **Farmers with more than 5 years of experience have lower cover crop costs than farmers with less than 5 years of experience.** A Soil Health Partnership, Environmental Defense Fund (EDF), and Pinion study of seven farmers in the Midwest found that farms with more than 5 years of experience with cover crops had lower costs and higher net returns as compared to farms with less than 5 years of cover crop experience. The producers with more than 5 years of experience with cover crops had \$95.88 higher net returns on corn and \$123.29 higher net returns on soybeans as compared to the producers with less than 5 years of experience. Compared to recent cover crop adopters, experienced adopters saved \$9.19/acre for cover crop seed, \$25/acre for fertilizer, and \$25/acre for equipment to grow corn, and then \$5.90/acre on cover crop seed, \$48/acre on fertilizer, and \$28/acre for equipment to grow soybeans.¹¹ Experienced cover crop adopters had some of the lowest costs and highest profitability per acre compared to the other groups, as shown in Figure 1 and Figure 2. Figure 1 shows the costs, revenue, and net return for each of the farmer groups for corn, and Figure 2 shows the costs, revenue, and net return for each of the farmer groups for soybeans. Costs are represented in brown, revenue is represented in dark blue on top, and the net return is in gray in the middle. The experienced cover crop adopters have the second highest revenue after the farmers who practice conservation tillage without cover crops.

7 FINBIN. (2021). "Cover crop analysis: Corn on cash rent." <https://finbin.umn.edu/Output/787935.pdf>

8 FINBIN. (2021). "Cover crop analysis: Soybeans on cash rent." <https://finbin.umn.edu/Output/787936.pdf>

9 SARE. (2019). "Cover crop economics"

10 SARE. (2019). "Cover crop economics"

11 SHP, EDF, & Pinion (2021). "Conservation's impact"

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Figure 1: Net returns for corn by tillage and cover crop groups.
 “Experienced adopters” are farmers with more than 5 years of cover crop experience.¹²
 Adapted from the study by Soil Health Partnership, EDF, and Pinion.

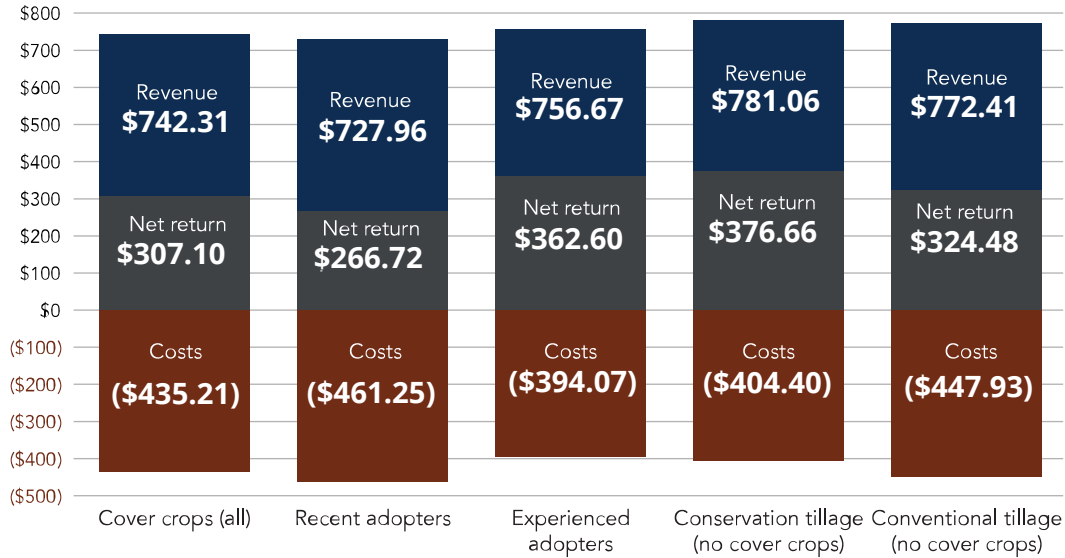
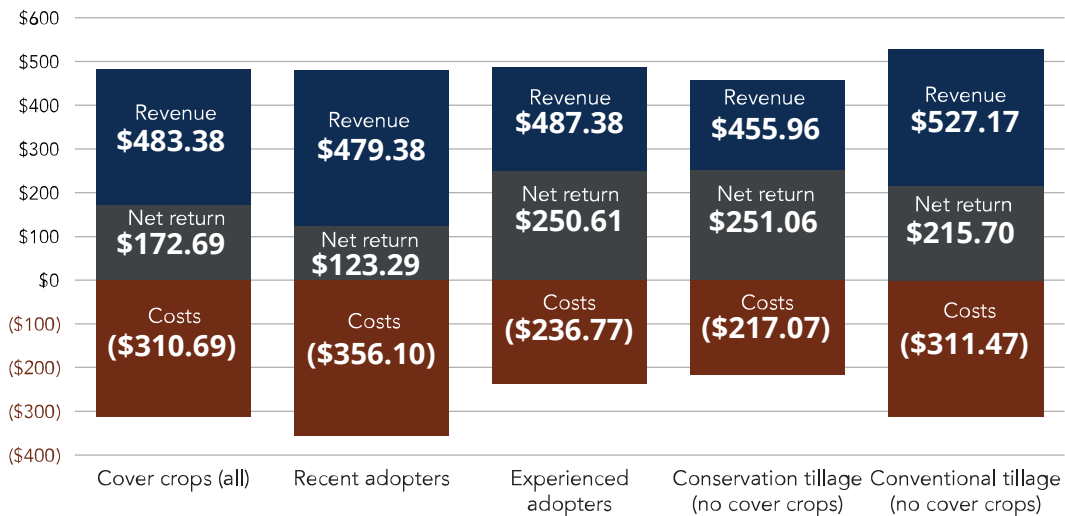


Figure 2: Net returns for soybeans by tillage type and cover crop groups.
 “Experienced adopters” are farmers with more than 5 years of cover crop experience.¹³
 Adapted from the study by Soil Health Partnership, EDF, and Pinion.



12 SHP, EDF, & Pinion (2021), “Conservation’s impact.”

13 SHP, EDF, & Pinion (2021), “Conservation’s impact.”

- **An Illinois farm attributes cover crop use to increased corn and soybean yields.** A case study of Thorndyke Farms in Illinois by the American Farmland Trust attributed a 4% corn yield increase and a 2% soybean increase to cover crops resulting in an average increase in income of \$12.95/ acre.

COVER CROP IMPACTS ON YIELDS VARY BASED ON SOIL TYPE AND WEATHER

- **Cover crops reduced yields, especially in high productivity soils.** A 2022 study using satellite imagery and machine learning found that cover crops, on average, reduced corn yields by 5.5% and soybean yields by 3.5% in 2019–2020. The study found that yield losses were more severe on fields with higher productivity soils and in instances with less spring rainfall.¹⁴
- **Farmers reported higher yields in cover cropped fields during the 2012 drought.** During the drought year of 2012, corn and soybean farmers reported 9.6% and 11.6% higher yields in fields using cover crops than fields without them.¹⁵
- **An Iowa farm experiences higher yields in 2017 by using cover crops.** As part of a case study of three farms by EDF and Pinion, LongView Farms, a corn, soybean, and sorghum farm in Iowa, reinforced the previous finding by reporting that, during the drought year of 2017, fields with cover crops had higher yields due to better water retention.¹⁶

INTEGRATING COVER CROPS WITH GRAZING OR A TRANSITION TO NO-TILL CAN MAKE THEM MORE PROFITABLE

The benefits of cover crops are accelerated when they are used to transition to no-till and as forage for grazing livestock.

- **National survey data shows grazing cover crops and integrating them with no-till increases their profitability.** Using the National Cover Crop Survey data, SARE estimated that cover crops can be more profitable when assisting the transition from conventional tillage to no-till. Integrating cover crops and no-till together increases the net returns of the system by \$24/acre. Cover crops can also be more profitable when they are used as forage for livestock, which provides an additional \$49 in net returns.¹⁷ SARE also estimated that cover crops can be more profitable when addressing challenges such as herbicide-resistant weeds and compacted soils by increasing net returns by \$27/acre and \$15.30/acre, respectively.
- **An Iowa study finds cover crops systems that are grazed have a net return of \$35/acre.** A study of the net returns to cover crops in Iowa found that grazing cover crops for forage and using cost-share payments helped achieve positive financial returns.¹⁸

14 Deines, J. M., Guan, K., Lopez, B., Zhou, Q., White, C. S., Wang, S., & Lobell, D. B. (2023). "Recent cover crop adoption is associated with small maize and soybean yield losses in the United States." *Global Change Biology*, 29, pp.794–807. <https://doi.org/10.1111/gcb.16489>

15 Deines, J. M., et al. (2023). "Recent cover crop adoption"

16 Monast, M., Sands, L., & Granfton, A. (2019). *Farm finance and conservation: How stewardship generates value for farmers, lenders, insurers and landowners*. Environmental Defense Fund. <https://business.edf.org/insights/how-on-farm-conservation-can-generate-financial-value/>

17 SARE. (2019). "Cover crop economics"

18 Alejandro Plastina, A., Fangge Liu, F., Wendian Sawadgo, W., Miguez, F. E., & Marcillo, S. C. G. (2018). "Annual net returns to cover crops in Iowa." *Journal of Applied Farm Economics*, 2:2.

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- **Another Iowa study finds cover crop systems have positive returns with grazing, especially with cost-share.** A farmer-led research study by the Practical Farmers of Iowa compared the economic returns on corn-soybean rotations for “no cover crops and no grazing,” “just cover crops,” and “cover crops and grazing.” The study concluded that cover crops plus grazing averaged a net profit of \$42.52/acre, which rose to \$73.52/acre with cost-share assistance.

COST-SHARE CAN HELP MAKE COVER CROPS PROFITABLE

Cost-share assistance is available from several sources and is an important way to offset the costs of incorporating cover crops. The University of Illinois estimated, on average across the country, a cost-share payment of \$37/acre is needed to cover the cost of seeds, application, equipment, and labor to make cover crops profitable. These are the most common sources of cost-share payments for cover crops:

- **EQIP and CSP provide annual cost-share payments based on state-determined rates.** Federal funding is available to assist in the 3-to-5-year transition typically needed to realize financial benefits. Cost-share assistance can be obtained through the federal NRCS programs Environmental Quality Incentive Program (EQIP) and Conservation Stewardship Program (CSP), which pay farmers per acre to plant cover crops.
- **State programs also provide cover crop incentive payments.** State governments provide incentives that include grants, low-interest loans, tax credits, or insurance discounts.¹⁹
- **Corporate programs provide incentive payments for cover crops in some areas.** Some companies and nonprofits provide incentive payments—for example, the Practical Farmers of Iowa partnered with PepsiCo, Unilever, and Cargill to provide per-acre payments for cover crops.

19 Feldmann, J., Gauthier, V., Monast, M., Rupp, M., & Aasmundstad, B. (2019). “Innovative state-led efforts to finance agricultural conservation.” <https://www.edf.org/sites/default/files/documents/innovative-state-led-efforts-finance-agricultural-conservation.pdf>

This fact sheet comes from a booklet called [The Financial Implications of Conservation Agriculture: Insights from Analyses of Farms in the Upper Midwest](#), produced by the following collaboration.



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