
THE FINANCIAL IMPACTS OF NUTRIENT MANAGEMENT



UW Discovery Farms

PRACTICE OVERVIEW

Nitrogen, phosphorus, and potash are critical inputs to support optimal crop productivity. However, overapplying these nutrients can contribute to runoff that pollutes waterways and to nitrous oxide emissions, a greenhouse gas, into the atmosphere. Overapplying these inputs also increases input costs and decreases profitability.

Effective nutrient management meets the nutrient needs of the plant and minimizes losses to the environment.¹ Efficient nutrient management involves using the right fertilizer product and applying the right amount of it at the right time and in the right place, also known as the 4Rs of nutrient management. Farmers use practices such as diverse crop rotations, split-applying fertilizer, variable rate application, and soil testing to reduce the risk of overapplying nutrients.

1 McLellan, E. L., Cassman, K. G., Eagle, A. J., Woodbury, P. B., Sela, S., Tonitto, C., Marjerison, R. D., & Van Es, H. M. (2018). "The nitrogen balancing act: Tracking the environmental performance of food production." *BioScience*, 68(3), pp.194–203.

EFFICIENT NUTRIENT MANAGEMENT PRACTICES CAN INCREASE PROFITABILITY BY REDUCING INPUT COSTS

Adopting efficient nutrient management practices can save farmers roughly \$30/acre on land currently receiving excess nutrients, according to the USDA, with some examples approaching \$50/acre.²

- **Illinois farmers applying the university-recommended rate achieve the greatest returns.** A Precision Conservation Management study of 280 farmers found that nutrient management was important for corn profitability and that most farms were applying nitrogen fertilizer at more than the most profitable rate. The most profitable farms applied nitrogen at the maximum return to nitrogen (MRTN) rate in the 150–200 lb. N/a range, as recommended by some land grant universities, as a preplant or side dress application. Sixty-five percent of participating farmers were applying nitrogen in excess of that rate, which decreased profitability and water quality, as shown in Table 1.

Table 1: Nitrogen rates, yields, returns, and environmental assessments of corn on high SPR, 2015–2021³
 Adapted from Precision Conservation Management.

Corn N-RATE HIGH SPR LBS PER ACRE	<150	151-175	176-200	201-225	>225
# of fields	103	348	1,121	1,478	825
AVG Corn Yield (bu/a) 2015-21	204	214	217	219	228
OPERATOR & LAND RETURN (2015-21)	\$297	\$319	\$318	\$307	\$307
GHG emissions (metric tons CO2e/a)	-0.07	0.16	0.14	0.18	0.48



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2 Knight, L. G., & Suhr Pierce, J. (2022). "Estimated potential economic benefits from implementation of Practice 590 – Nutrient Management on acres with excessive nutrient loss." <https://www.farmers.gov/sites/default/files/2022-08/farmersgov-nutrient-management-economic-benefits.pdf>

3 Precision Conservation Management (PCM). (2022). "The business case for conservation." https://www.precisionconservation.org/wp-content/uploads/2022/06/PCMBooklet_WEB_FINAL_05-13-22.pdf

THE FINANCIAL IMPLICATIONS OF CONSERVATION AGRICULTURE THE FINANCIAL IMPACTS OF NUTRIENT MANAGEMENT

- **Wisconsin farms experience savings and, in some cases, yield increases from efficient nutrient management.** A 2012 study involving 250 Wisconsin farms that adopted nutrient management plans concluded that 69% of farmers reported financial savings averaging \$18/acre. Two-thirds of operations reduced their nitrogen applications by an average of 32 pounds per acre. Three-quarters of the study participants saw no change in their corn yields, while 18% reported an increase.⁴
- **Variable rate technology helps an Illinois farm cut costs.** In a single-farm case study of the Ifft family farm conducted by the American Farmland Trust, the farmers began using variable rate technology to apply phosphorus and potassium in 2010. They pay an annual \$0.50/acre for the technology, which has enabled them to lower their nutrient applications by 20% for an annual cost savings of \$20/acre.⁵
- **Nutrient management saves fertilizer and machinery costs on an Illinois farm.** In a case study of Thorndyke Farms in Illinois by the American Farmland Trust, the farmers credited nutrient management to saving them \$66/acre in nutrients and \$2.73/acre in machinery costs.⁶

4 Genskow, K. D. (2012). "Taking stock of voluntary nutrient management: Measuring and tracking change." *Journal of Soil and Water Conservation*, 67(1), pp.51-58. <https://www.semanticscholar.org/paper/Taking-stock-of-voluntary-nutrient-management%3A-and-Genskow/5cdb94d33bab4ab52fcf39d5e8e51a64ef4d550b>

5 American Farmland Trust. (2019). "Soil health case study: Jim, Julie, and Josh Ifft, Ifft Yorkshires, IL." https://farmlandinfo.org/wp-content/uploads/sites/2/2020/02/IL_IfftYorkshiresFarms_Soil_Health_Case_Study_AFT_NRCS.pdf

6 American Farmland Trust (AFT). (2019). "Soil health case study: Larry, Adam, and Beth Thorndyke, Thorndyke Farms, IL." https://farmlandinfo.org/wp-content/uploads/sites/2/2020/02/IL_ThorndykeFarms_Soil_Health_Case_Study_AFT_NRCS.pdf

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