

2015-2025 Data Summary

The Business Case for Conservation

Low-SPR Data Analysis



Precision Conservation Management

A program of the **IL Corn Growers Association**

SPR = Soil Productivity Rating

Precision Conservation Management (PCM) was launched in 2015 by the IL Corn Growers Association in response to the Illinois Nutrient Loss Reduction Strategy. Our initial focus on practices impacting water quality looked specifically at nitrate-N losses, which directed most of our program's enrollment and data analysis toward the most intensively tile-drained regions of Illinois. These areas were also the most highly productive soils in the state, which meant that the early PCM dataset had far more high-productivity fields relative to lower-productivity fields.

In recent years, we've seen both success in addressing nitrate-N losses from Illinois agricultural fields, and a growing understanding of the challenge posed by non-point phosphorus losses. **As PCM has gained greater visibility and support from Illinois farmers and our partners who work directly with farmers, we've grown and expanded PCM's geographical reach to consider the agronomic, financial, and environmental picture for farmers on "Low-SPR" Illinois soils (soils we identify using University of Illinois Extension Bulletin 810, assigning an area-weighted SPR score below 135).**

In this low-SPR companion to our annual high-SPR data publication, we summarize financial and environmental outcomes across PCM's three core practice standards: tillage, cover crops, and nitrogen management. We also identify which practices are most profitable on average, and which are most common among our most profitable low-SPR corn and soybean fields.

Year to year we see numerous variables shift in farming, but these broader patterns of profitability can highlight reliable in-field strategies farmers can benefit from regardless of changing prices.

-Dr. Laura Gentry, Director of Water Quality, IL Corn



When we average across all years of our low-SPR corn dataset, 2-Pass Light tillage systems seem like a clear winner in terms of profitability. But this trend varies year-to-year with fluctuating crop prices and machinery costs. In the most recent years, **Strip-Till** and **No-Till** have demonstrated the highest returns, especially when farmers keep their direct and power costs low.

By comparison, net profitability among high-SPR corn fields showed a much tighter range across tillage classes (1-Pass Light and 2-Pass Light differ by less than \$10/acre in the 2015-2025 average), suggesting tillage choice carries more weight on lower-productivity soils.

CORN Low-SPR 2015-2025 Avg. Values	NO-TILL	STRIP TILL	1-PASS LIGHT	2-PASS LIGHT	2-PASS MODERATE	2+ TILLAGE PASSES
# fields	2,275	1,347	2,106	1,021	482	288
Yield per acre	195	209	197	205	204	208
GROSS REVENUE	\$832	\$894	\$840	\$876	\$867	\$881
TOTAL DIRECT COSTS*	\$423	\$464	\$433	\$430	\$441	\$445
Field Work	\$0	\$21	\$12	\$27	\$32	\$42
Other power costs**	\$106	\$109	\$99	\$97	\$99	\$98
TOTAL POWER COSTS	\$106	\$130	\$111	\$124	\$131	\$140
OVERHEAD COSTS	\$42	\$42	\$42	\$42	\$42	\$42
TOTAL NON-LAND COSTS	\$572	\$636	\$586	\$596	\$614	\$627
OPERATOR & LAND RETURN	\$260	\$258	\$254	\$280	\$253	\$254
<i>Estimated Soil Loss (Tons/a)</i>	<i>1.04</i>	<i>0.77</i>	<i>1.78</i>	<i>1.49</i>	<i>1.62</i>	<i>2.17</i>
<i>Soil Carbon Index (-1 to 1, higher=better)</i>	<i>0.78</i>	<i>0.87</i>	<i>0.7</i>	<i>0.62</i>	<i>0.56</i>	<i>0.47</i>
<i>GHG emissions (metric tons CO2e/a)</i>	<i>1.05</i>		<i>1.23</i>			<i>1.44</i>

No-Till = no tillage; **Strip Till** = less than full-width tillage of varying intensity; **1-Pass Light** = 1 pass w/low-disturbance tillage; **2-Pass Light** = 2 passes w/low-disturbance tillage; **2-Pass Moderate** = 2 passes (1 low-disturbance tillage + 1 high-disturbance tillage); **2+ Tillage Passes** = more than 2 tillage passes, any intensity level.

***Direct Costs** = fertilizers, pesticides, seed, cover crop seed, drying, storage, and crop insurance

****Power Costs** = tillage, fall fertilizer application, spraying, planting, cover crop planting, spring fertilizer application, harvesting, & grain hauling

Just like our low-SPR corn fields, the most profitable tillage class in low-SPR soybean fields on average is the **2-Pass Light class**. Additional tillage passes did not produce enough of a yield bump to offset the additional costs incurred, costing producers roughly \$20/acre in lost return.

No-Till is the most represented tillage class in our dataset for both corn and soybean fields, and it is a strong performer despite yielding slightly less than the top classes. The complete absence of field work costs largely offsets that yield gap. We'll take a closer look at No-Till data on the next page.

SOYBEANS Low-SPR 2015-2025 Avg. Values	NO-TILL	STRIP TILL	1-PASS LIGHT	2-PASS LIGHT	2-PASS MODERATE	2+ TILLAGE PASSES
# fields	4,686	102	1,027	627	390	348
Yield per acre	62	63	62	64	65	63
GROSS REVENUE	\$655	\$709	\$661	\$684	\$694	\$679
TOTAL DIRECT COSTS*	\$188	\$223	\$185	\$174	\$195	\$172
Field Work	\$0	\$23	\$13	\$26	\$32	\$43
Other power costs**	\$80	\$90	\$78	\$77	\$80	\$75
TOTAL POWER COSTS	\$80	\$113	\$91	\$103	\$112	\$118
OVERHEAD COSTS	\$35	\$38	\$35	\$35	\$35	\$35
TOTAL NON-LAND COSTS	\$304	\$373	\$311	\$312	\$342	\$325
OPERATOR & LAND RETURN	\$351	\$336	\$350	\$372	\$352	\$354
Estimated Soil Loss (Tons/a)	1.61	1.25	2.08	2.75	3.52	3.18
Soil Carbon Index (-1 to 1, higher=better)	0.51	0.62	0.47	0.27	0.14	0.11
GHG emissions (metric tons CO ₂ e/a)	-0.17		0.05			0.24

No-Till = no tillage; **Strip Till** = less than full-width tillage of varying intensity; **1-Pass Light** = 1 pass w/low-disturbance tillage; **2-Pass Light** = 2 passes w/low-disturbance tillage; **2-Pass Moderate** = 2 passes (1 low-disturbance tillage + 1 high-disturbance tillage); **2+ Tillage Passes** = more than 2 tillage passes, any intensity level.

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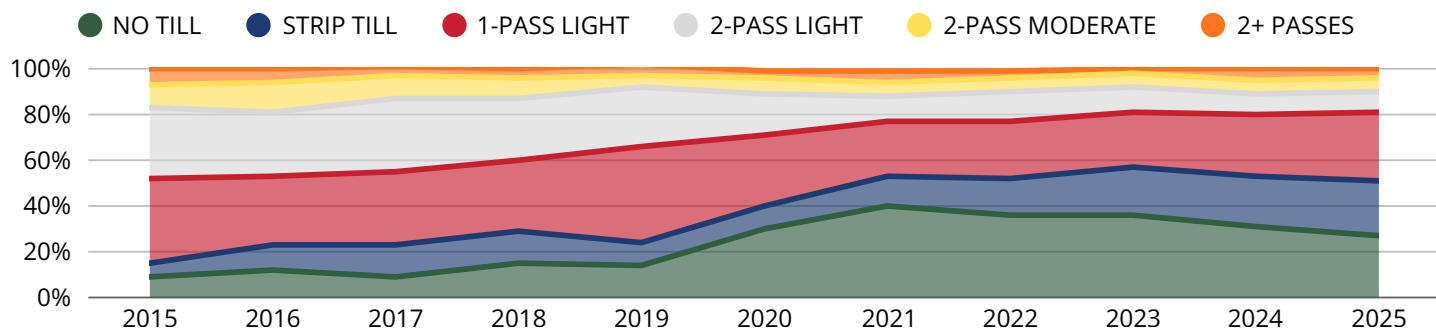
No-Till Data

The adoption of No-Till on low-SPR fields has shifted over the last 11 years with a notable increase in adoption starting in 2020.

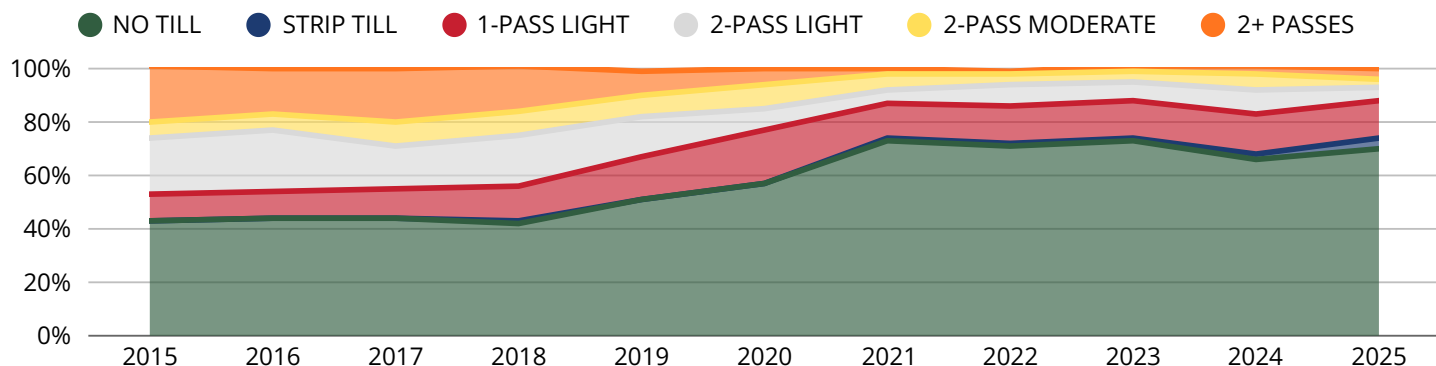
Since 2022, No-Till has performed very well in terms of its representation among the most profitable low-SPR fields, frequently out-performing expectations by making up a greater percentage of the top 25% most profitable corn fields relative to their corresponding percentage of the full dataset. This demonstrates a critical principle that we have learned from the PCM dataset: **during times of high input and machinery costs and low crop prices, balancing lower costs with minimum yield reduction is the key to weathering difficult financial climates as a farmer.**

No-Till has been, by far, the most common tillage practice on soybean fields every year since PCM started — and it performs well in terms of profitability. Because tillage is the primary driver of soil erosion and phosphorus loss on southern IL fields, where many of these lower-SPR fields are located, the continued move toward no-till also means a meaningfully lower erosion and nutrient-loss footprint for the region.

Tillage Class by Year
Low-SPR Corn Fields



Low-SPR Soybean Fields



Most Profitable Acres by Tillage Practice

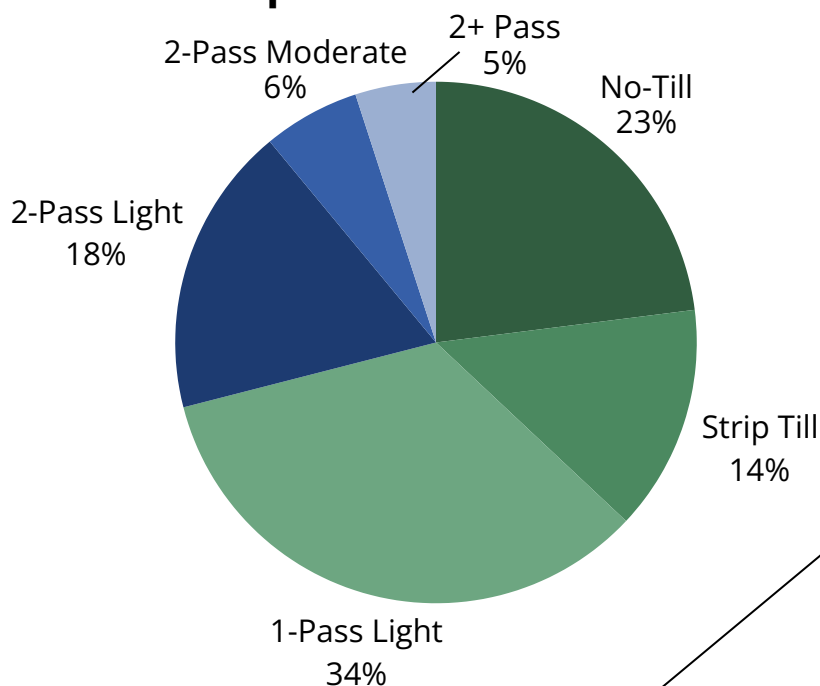
In this analysis, we look at the top 25% most profitable corn & soybean fields with low soil productivity ratings.

As with high-SPR soils, **1-Pass Light Tillage** is the most represented tillage class amongst the most profitable corn fields.

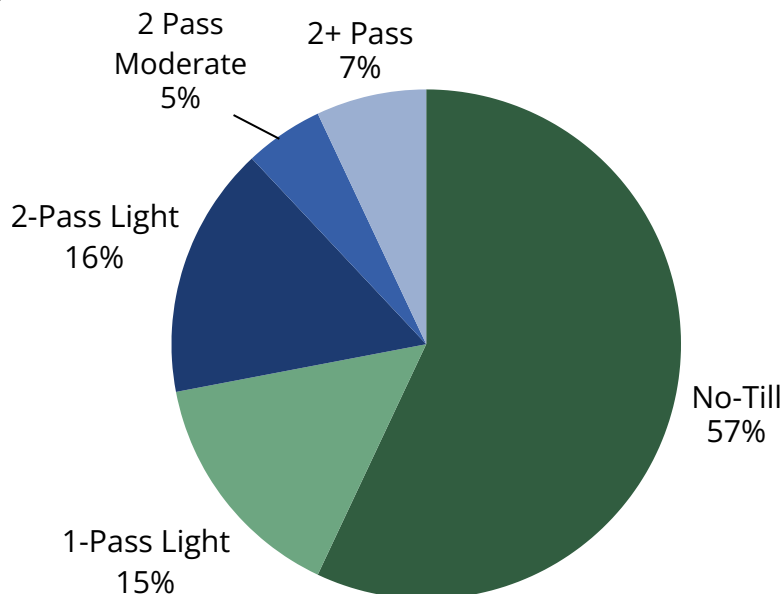
For soybean fields, 57% of the most profitable low-SPR soybean fields were managed with **No-Till**, a notably higher share than the 48% seen on high-SPR fields.

Regardless of crop type, more intensive tillage systems were rare among the top performers: just 5-7% of the most profitable low-SPR fields were managed with 3 or more tillage passes. This is great news for farmers wondering how they can **profit more while doing less!**

Top 25% Corn Fields



Top 25% Soybean Fields



Cover Crop Data

In our low-SPR analysis, cover crops ahead of corn still carry a cost, but winter terminal cover crops like oats returned \$271/acre on average (within one dollar of the \$272/acre return for fields with no cover crop at all). Notably, we don't see a yield decline among low-SPR corn fields planted into winter terminal cover crops. Some winter terminal corn fields demonstrated the potential for improved ROI when farmers were able to keep other costs down.

Remember, this data doesn't include incentive payments available through programs like PCM, which can close much or all of the ROI gap. Fields in this dataset are also generally new to cover crops, so these numbers likely understate what an experienced cover-crop grower could achieve.

CORN Low-SPR 2015-2025 Avg. Values	OVERWINTERING	WINTER TERMINAL	NO COVER CROP
# fields	1,267	335	5,947
Yield per acre	193	212	203
GROSS REVENUE	\$821	\$933	\$866
Cover crop seed	\$16	\$18	\$0
TOTAL DIRECT COSTS*	\$433	\$484	\$436
Cover crop planting	\$13	\$14	\$0
Other power costs**	\$112	\$121	\$116
TOTAL POWER COSTS	\$125	\$135	\$116
OVERHEAD COSTS	\$42	\$44	\$42
TOTAL NON-LAND COSTS	\$600	\$663	\$594
OPERATOR & LAND RETURN	\$197-\$247	\$246-\$296	\$272
Estimated Soil Loss (Tons/a)	1.47	1.17	1.38
GHG emissions (metric tons CO2e/a)	0.8		1.23

***Direct Costs** = fertilizers, pesticides, seed, cover crop seed, drying, storage, and crop insurance

****Power Costs** = tillage, fall fertilizer application, spraying, planting, cover crop planting, spring fertilizer application, harvesting, & grain hauling

For soybeans, overwintering species like cereal rye performed better than winter terminal crops due to lower overall cost. Notably, cover crops had no impact on average yield in low-SPR soybean fields. Pair the cost effectiveness with the environmental benefits and this data continues to support cereal rye as a strong choice ahead of soybeans.

As with corn, these fields tend to represent newer cover crop adopters and don't reflect available incentive payments that can further close the gap. There's also a real soil-retention benefit here that isn't captured in the operator and land return figures below. Especially on low-SPR soils in Illinois, the resulting improvements in water retention, nutrient cycling and protecting topsoil can indirectly benefit a farmers' bottom line over time.

SOYBEANS Low-SPR 2015-2025 Avg. Values	OVERWINTERING	WINTER TERMINAL	NO COVER CROP
# fields	2,256	109	4,890
Yield per acre	63	63	63
GROSS REVENUE	\$666	\$680	\$664
Cover crop seed	\$15	\$17	\$0
TOTAL DIRECT COSTS*	\$196	\$217	\$182
Cover crop planting	\$13	\$11	\$0
Other power costs**	\$79	\$102	\$88
TOTAL POWER COSTS	\$92	\$113	\$88
OVERHEAD COSTS	\$35	\$36	\$35
TOTAL NON-LAND COSTS	\$324	\$366	\$305
OPERATOR & LAND RETURN	\$317-\$367	\$289-\$339	\$359
Estimated Soil Loss (Tons/a)	1.78	2.26	2.03
GHG emissions (metric tons CO2e/a)	-0.37		0.02

***Direct Costs** = fertilizers, pesticides, seed, cover crop seed, drying, storage, and crop insurance

****Power Costs** = tillage, fall fertilizer application, spraying, planting, cover crop planting, spring fertilizer application, harvesting, & grain hauling

Northern Illinois

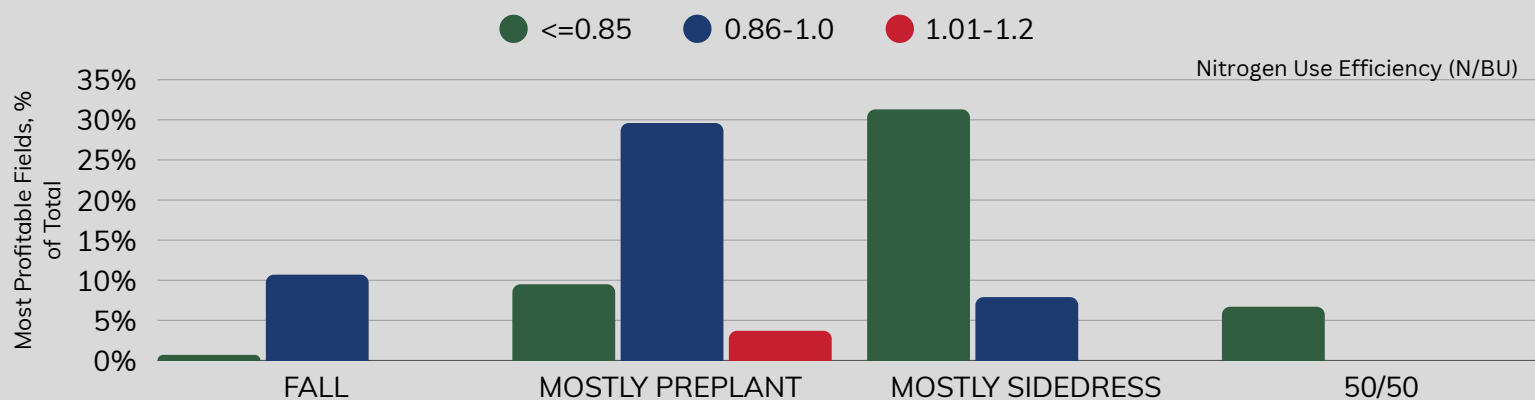
The following pages will present nitrogen data for northern, central, and southern Illinois regions separately. We have further separated the data into highly profitable years and average-to-low profitability years, determined by high input costs relative to corn prices.

In the northern part of Illinois (north of I-80) where fall-application is common, we still see **in-season application being a more profitable choice in highly profitable years.**

In less profitable years, lower N rates are the single most important factor for profitability among nutrient management decisions. Keeping nitrogen application to a single pass (rather than 50/50 or 3-way split) was another good way to keep power costs down and improve ROI.

HIGH PROFITABILITY YEARS

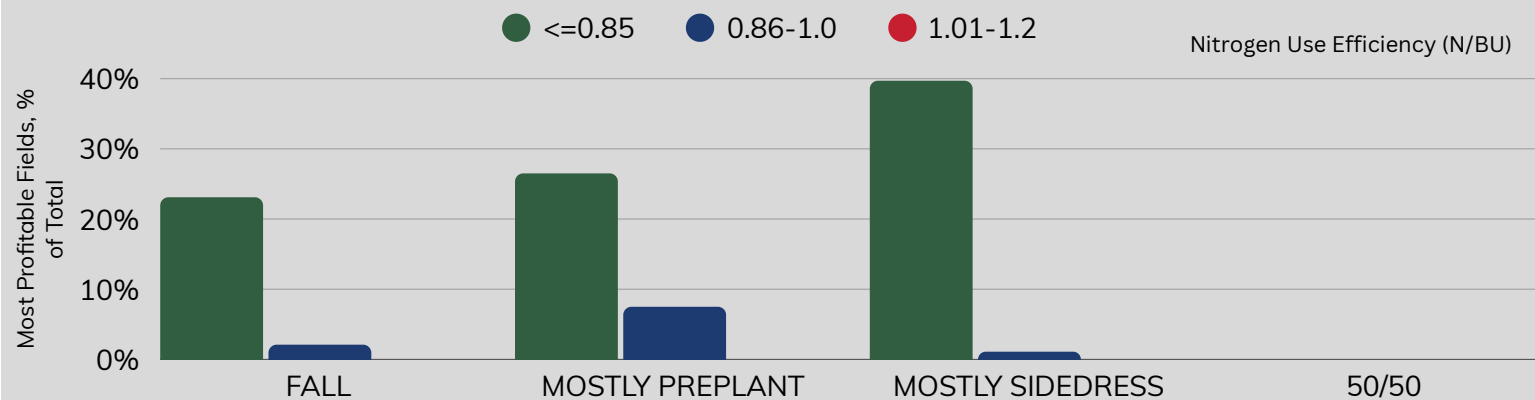
Top 25% Most Profitable Corn Fields by N Management North of I-80



Best Strategy: In-season applications using low-to-moderate N rates (<1.0 lb N/bu).

AVERAGE-TO-LOW PROFITABILITY YEARS

Top 25% Most Profitable Corn Fields by N Management North of I-80



Best Strategy: Lower N rates (<0.85 lb N/bu) with fewer applications.

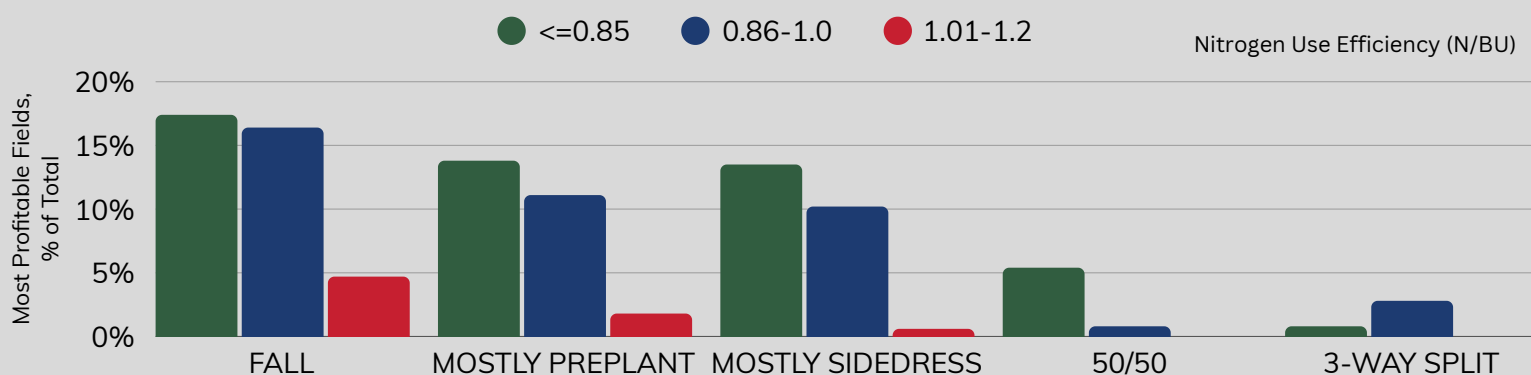
In central Illinois (south of I-80 and north of I-70), we see a more even spread between fall and in-season nitrogen applications among our most profitable low-SPR corn fields.

Regardless of profit potential in a given year, we see the importance of **single-pass applications** to keep power costs down and protect profitability. Timing appears to be less important than minimizing field passes in this region.

Low to moderate application rates (<1.0 lb N/bu) are well represented among the most profitable corn fields, which is important information for farmers to consider. While farmers can't control the price of nitrogen fertilizer, they *can* control how much they apply!

HIGH PROFITABILITY YEARS

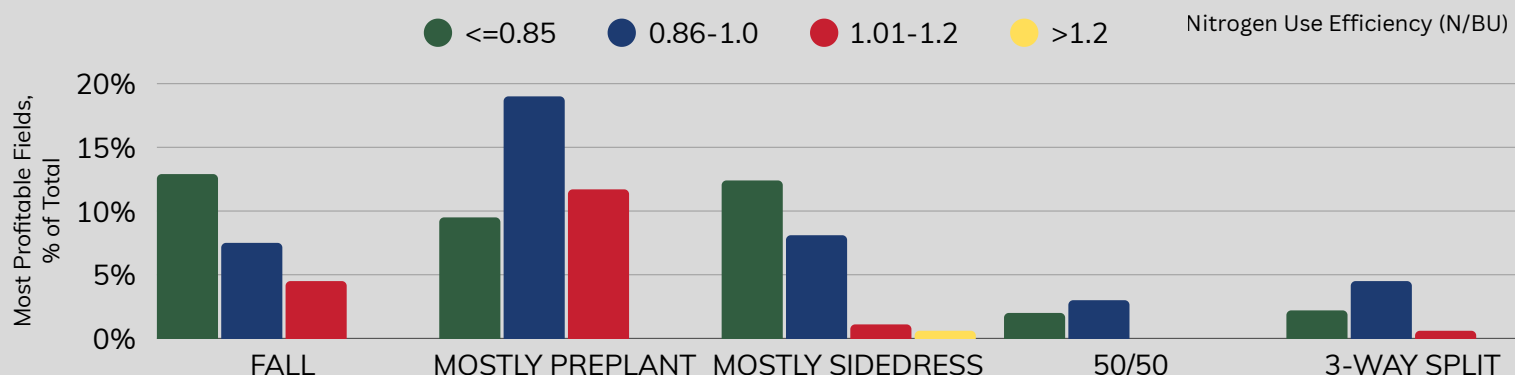
Top 25% Most Profitable Corn Fields by N Management South of I-80 & North of I-70



Best Strategy: Low-to-moderate N rates (<1.0 lb N/bu) with applications that minimize field passes.

AVERAGE-TO-LOW PROFITABILITY YEARS

Top 25% Most Profitable Corn Fields by N Management South of I-80 & North of I-70



Best Strategy: Low-to-moderate N rates (<1.0 lb N/bu) with mostly pre-plant application.

Southern Illinois

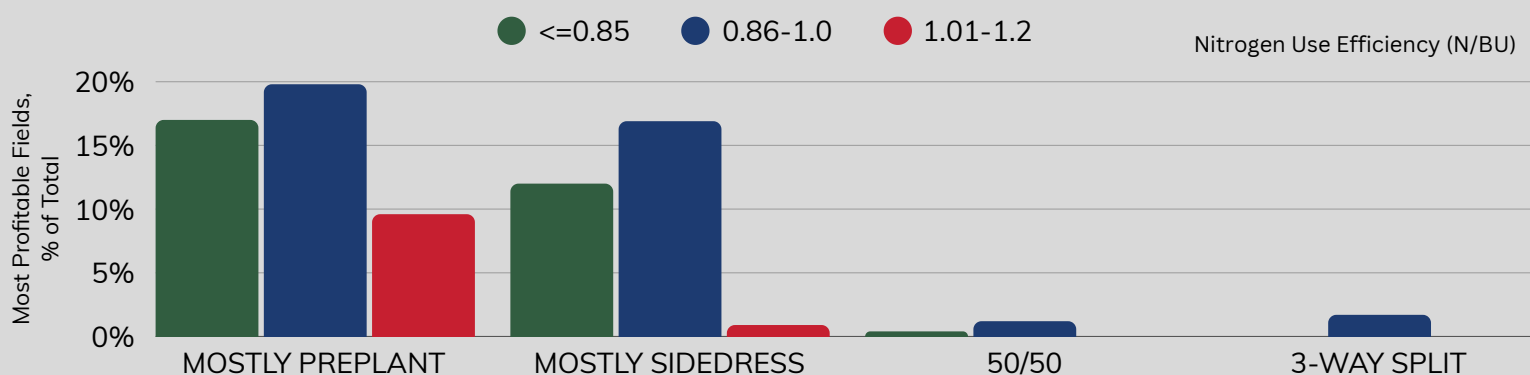
There is a well-recognized University of Illinois declaration that nitrogen fertilizer should not be applied in the fall in the southern part of the state due to warmer soils' impact on nitrogen loss.

In southern Illinois (south of I-70) where fall-application is discouraged, in-season N applications demonstrate good profitability. Once again, we also see that minimizing field passes can positively impact profitability. **Mostly Preplant** application is a promising choice in both high and low profitability years.

Higher N rates (1.01-1.2 lb N/bu) were more profitable in 2015 and 2016 when fertilizer prices, land rent and machinery costs were more in-line with corn prices. We don't typically see these higher rates paying for themselves on low-SPR fields in recent years *unless* those fields had significantly above average yields.

HIGH PROFITABILITY YEARS

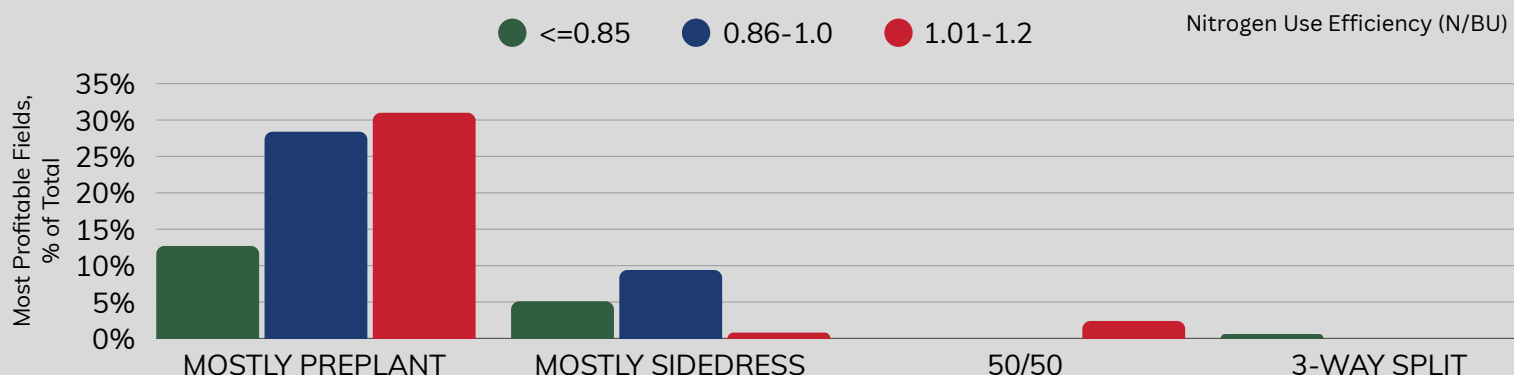
Top 25% Most Profitable Corn Fields by N Management South of I-70



Best Strategy: In-season applications using low-to-moderate N rates (<1.0 lb N/bu).

AVERAGE-TO-LOW PROFITABILITY YEARS

Top 25% Most Profitable Corn Fields by N Management North of I-80



Best Strategy: Mostly Pre-Plant application with moderate N rates.

Lessons & Considerations

Tillage

When averaged across 11 years of data, **2-Pass Light tillage is the most profitable tillage system on low-SPR ground** for both corn and soybeans, but No-Till is becoming the more common choice in recent years — and the data shows why that's a reasonable trade-off due to the high costs and low prices seen in the past 3 years.

No-Till is now the single most common tillage practice on low-SPR fields for both crops, and since 2022 it has increasingly punched above its weight among the most profitable corn fields relative to its overall share of the dataset.

With input costs, land rent, and machinery expenses all elevated, **No-Till's near-zero field work costs make it a reliable choice** even in years it isn't the single highest-return system.

Nitrogen

From northern to southern Illinois, **the most profitable low-SPR corn fields consistently applied nitrogen more conservatively**, staying at or below an NUE of 1.0 lb N/bu. Pushing rates higher doesn't reliably buy more profit.

Timing matters too, but perhaps more important according to our dataset is the number of trips across your corn fields. **Minimizing fertilizer application passes pays off.**

Cover Crops

Winter-terminal species like oats ahead of corn and overwintering species like cereal rye ahead of soybeans continue to be a farmer's best bet. We don't see a negative yield impact with those practices on low-SPR fields.

But cover crops still cost money out of the gate, and incentive programs remain the key to making the economics work. Species selection and termination timing both matter a lot. PCM can connect you with cost-share programs and provide the technical assistance you need to dial in what's right for your fields!



Precision Conservation Management

www.precisionconservation.org

Tell us what you think!

