PCM Analysis

Lower Soil Productivity Rating (SPR) Fields

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Precision Conservation Management

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Laura Gentry
IL Corn Growers Association

College of Agricultural, Consumer & Environmental Sciences
UNIVERSITY OF ILLINOIS URBANA-CHAMPAIGN

Gary Schnitkey
University of Illinois

Precision Conservation Management Practice Standards

Reduced Tillage

Nutrient Management

Cover Crops

PCM data identifies conservation practices that effectively address environmental issues without risking the farmers' bottom line.

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2023 IMPACTS

Precision Conservation Management worked with 499 farmers in 2023 to adopt in-field conservation practices that benefit water quality and address climate change concerns.

7 14,007 N Nitrogen

1,154,702

lbs NO_3-N loss reductions

15 30,974 P Phosphorus

174,983

lbs P loss reductions

258,963

tons sediment retained

ILLINOIS

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PCM Impact, 2023
Conservation Acres

247,391
Reduced Tillage

257,009
In-Season N Fertilizer Application (corn)

84,614
Cover Crops

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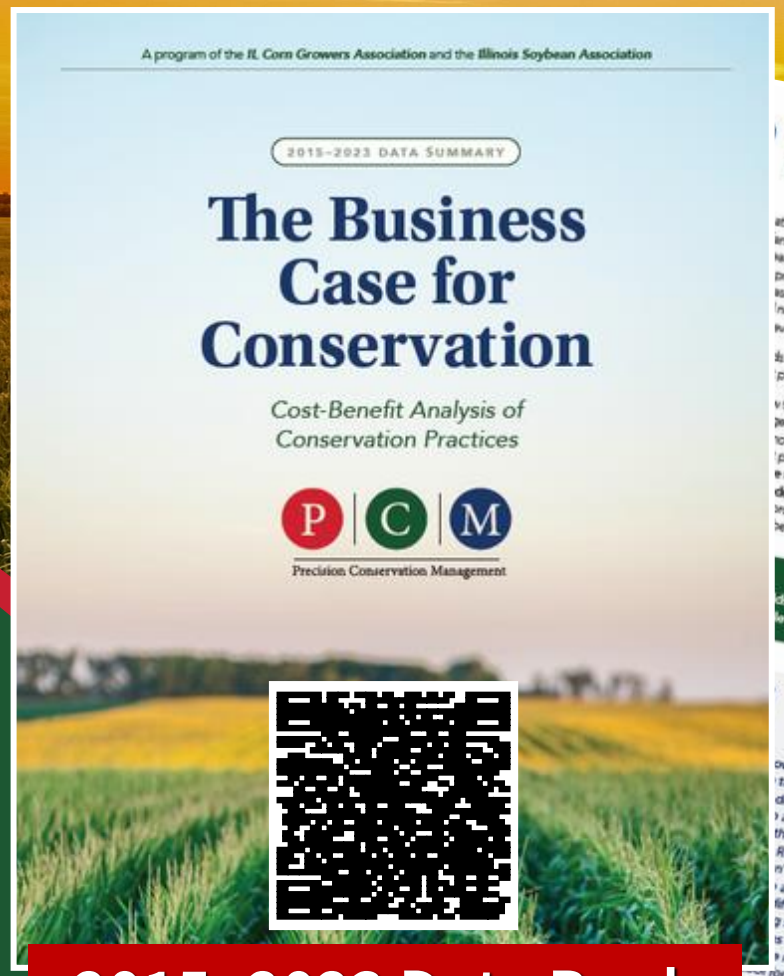
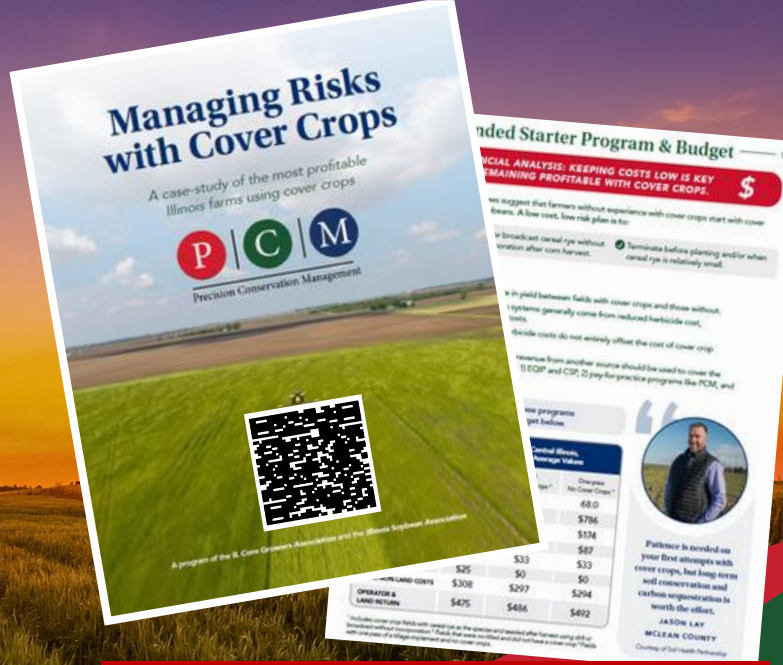
PCM Data Publications



2015 -2023 Data Book



Cover Crop Guide

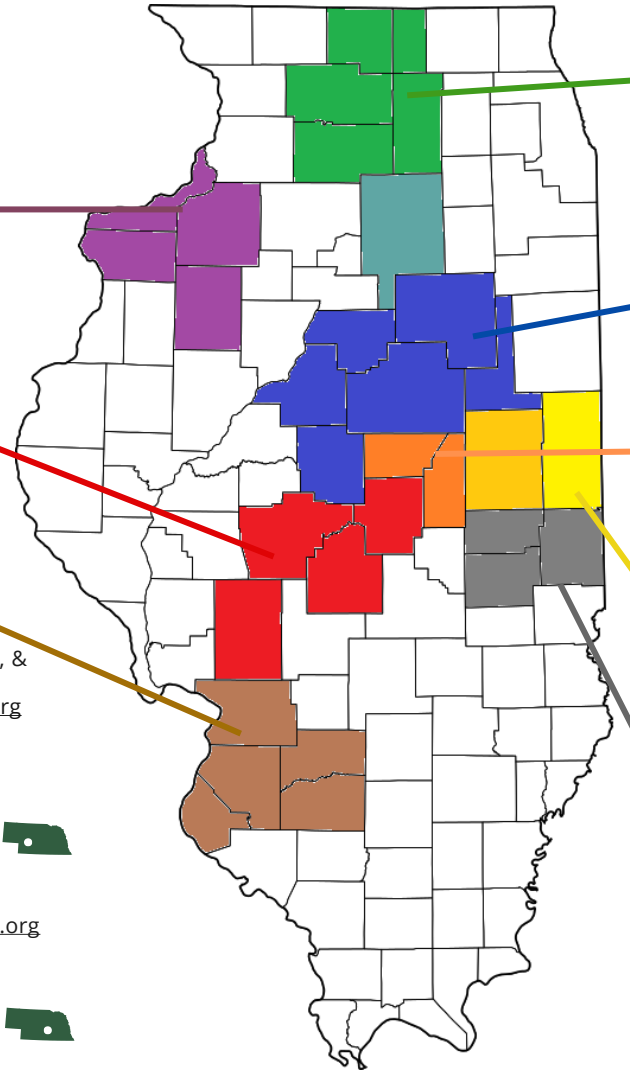
P C M
Precision Conservation Management

Access both publications at
www.PrecisionConservation.org

Check us out online: www.precisionconservation.org

PCM

Precision Conservation Management



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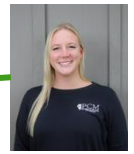

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Understanding Soil Productivity Ratings in Illinois

- Soil Productivity Rating (SPR) or Soil Productivity Index (PI) assigns values to ~800 soil types in Illinois
- Ratings based on expected dryland crop yields under optimum 1990 management practices
- Muscatune silt loam serves as benchmark with optimum PI of 147
- PI range: 47 to 147 for all soil types
- PCM uses 135 as cutoff between "low" and "high" SPR, reflecting farmers' perceptions of productive soils

http://soilproductivity.nres.illinois.edu/

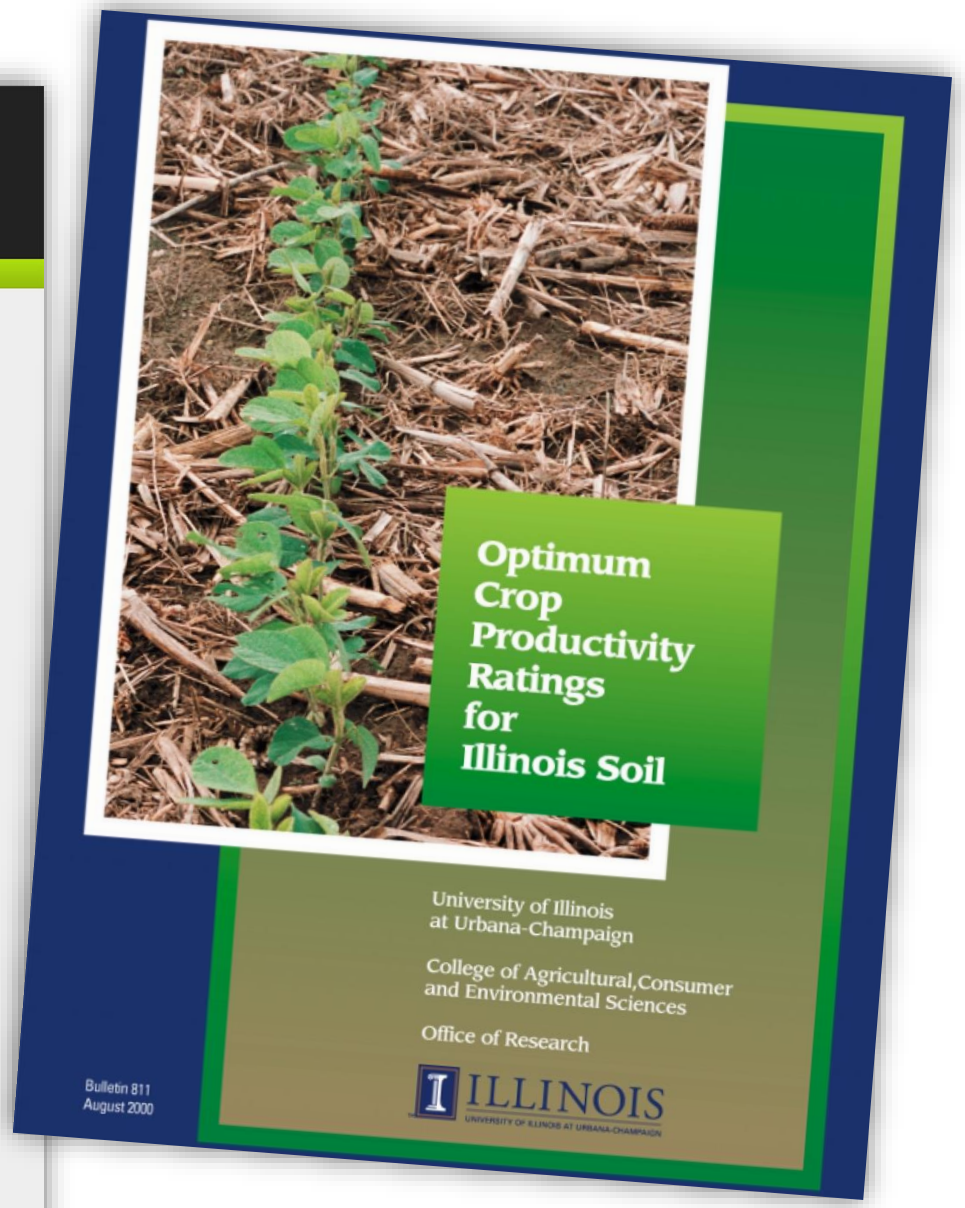
Illinois Soil Productivity Publications

Soil Productivity Index Ratings for Illinois Soils

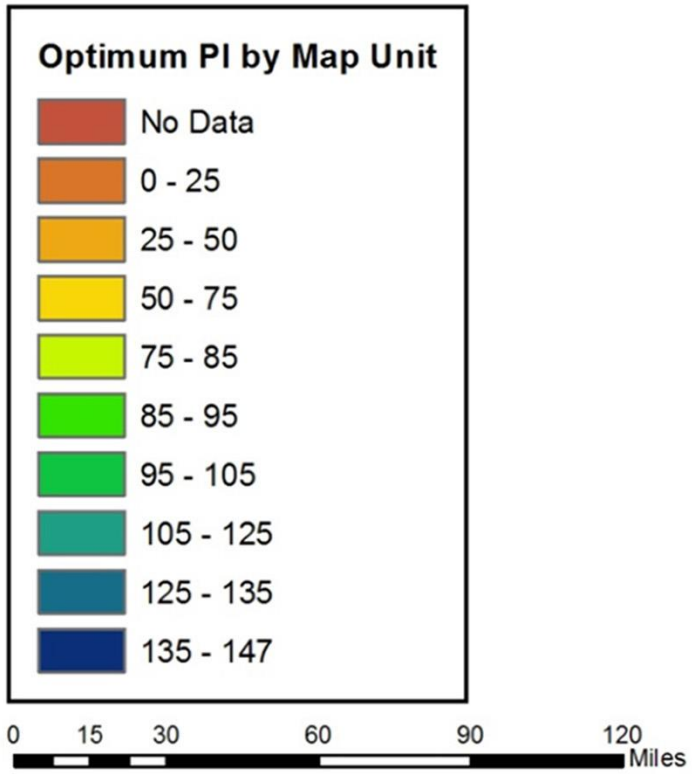
You have reached the web page for the Soil Productivity Index Ratings for Illinois soils. This information was published in August of 2000 in two research bulletins by the Office of Research, College of Agricultural, Consumer and Environmental Sciences, University of Illinois at Urbana-Champaign. The Bulletins listed below are linked to files that can be read using an Adobe Acrobat Reader. The table of contents are linked to the specific pages, text, tables or figures. Once selected, the page can be enlarged or printed. The crop, pasture, and forestry yields and productivity index ratings in Bulletin 810 are for the average level of management used by all farmers in Illinois in the 1990s. The crop yields represent a mean annual yield for a 10-year period. Bulletin 811 provides crop yields and productivity indices under an optimum level of management used by the top 16% of farmers in Illinois in the 1990s.

Prime agricultural land classes (Class A, Class B, and Class C) previously provided in Circular 1156 (Soil Productivity in Illinois) were not included in Bulletin 811. The prime agricultural class of any soil type can be determined by using the optimum productivity index (PI) shown in Table S2 of Bulletin 811 and the following author recommended prime agricultural class scale. Soil types with optimum PI's from 133-147 are in Class A, from 117-132 are in Class B, and from 100-116 are in Class C. Soil types in Bulletin 811 with optimum PI's equal to or below 99 are in the other agricultural land class and not considered prime agricultural land. If the soil type is in a soil map unit which is not on A slope or not slightly eroded, the user will need to determine if the soil type has a favorable or unfavorable subsoil for rooting (3rd column in Table S2 of B811) and make an erosion and/or slope adjustment using either Figure S1 (B811) or Table S3 (B811) prior to utilizing the scale and prime agricultural land class limits provided above.

Since the year 2000, more than 80 new soil types and soil complexes have been identified on Illinois county soil survey maps. Crop yields and productivity ratings under both average management (B810, Table 2 revised) and optimum management (B811, Table S2 revised) have been added to the existing values provided either in the published paper copies of the Bulletin 810 and Bulletin 811 or the previously revised tables (in 2001) within the electronic copies of these Bulletins linked to this soil productivity web site. All new soil symbols are followed by an "*". Please click on either Bulletin 810, Table 2 revised or Bulletin 811, Table S2 revised links provided below if you can not find the appropriate soil ratings (crop yields and PI's) in electronic copy (.pdf) of B810 and B811 which is also linked to this web page.

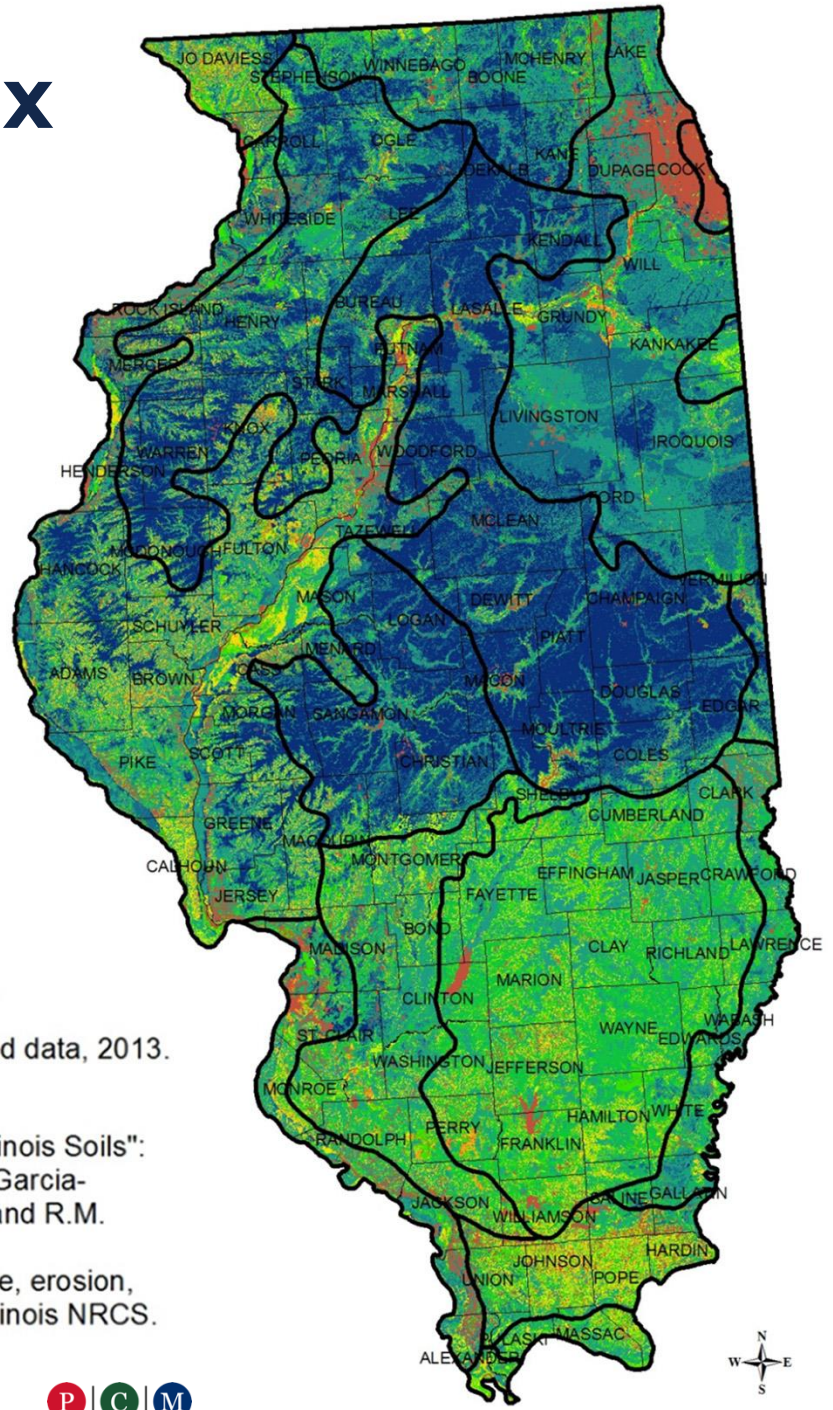


Illinois Productivity Index 2013



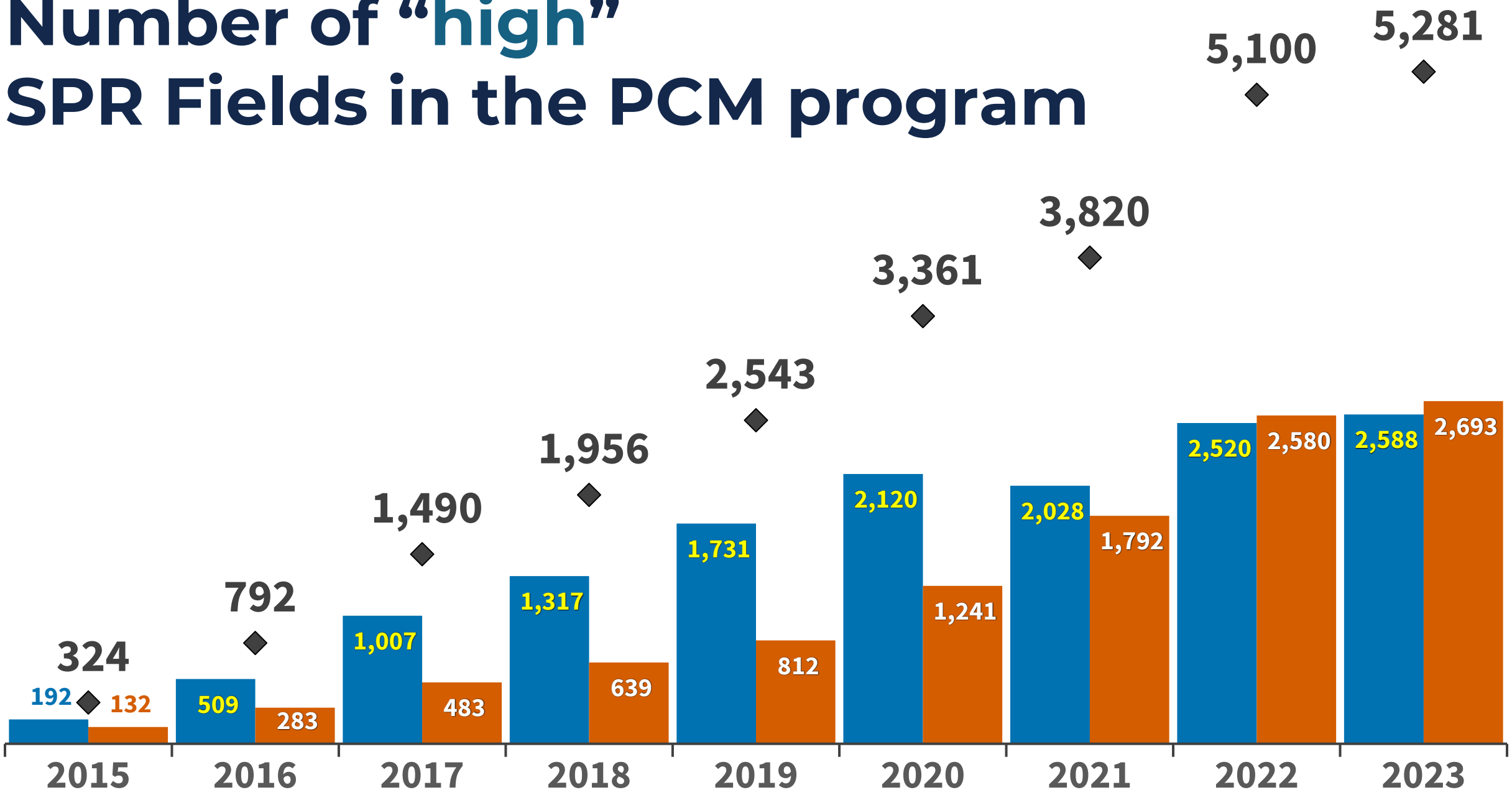
Source: USDA NRCS Illinois, GIS and Soils aggregated data, 2013.

Base Productivity Indices from University of Illinois Bulletin 811 "Optimum Crop Productivity Ratings for Illinois Soils": table S2 revision, 2012. Olson, K.R., J.M. Lang, J.D. Garcia-Paredes, R.N. Majchrzak, C.I. Hadley, M.E. Woolery, and R.M. Rejesus. 2000.
Adjustments to base values made with factors for slope, erosion, flooding, surface texture, and substratum phases by Illinois NRCS.

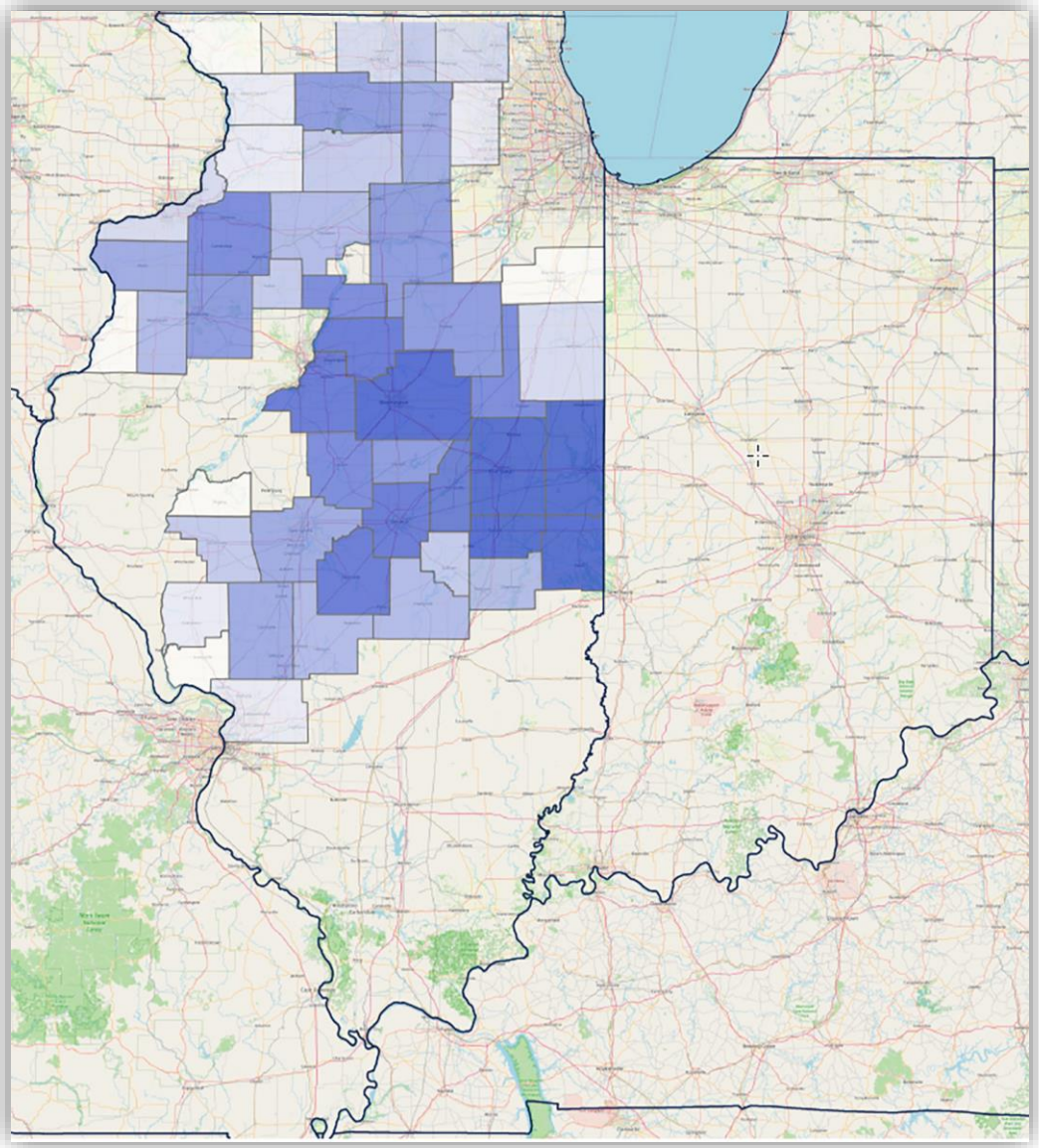


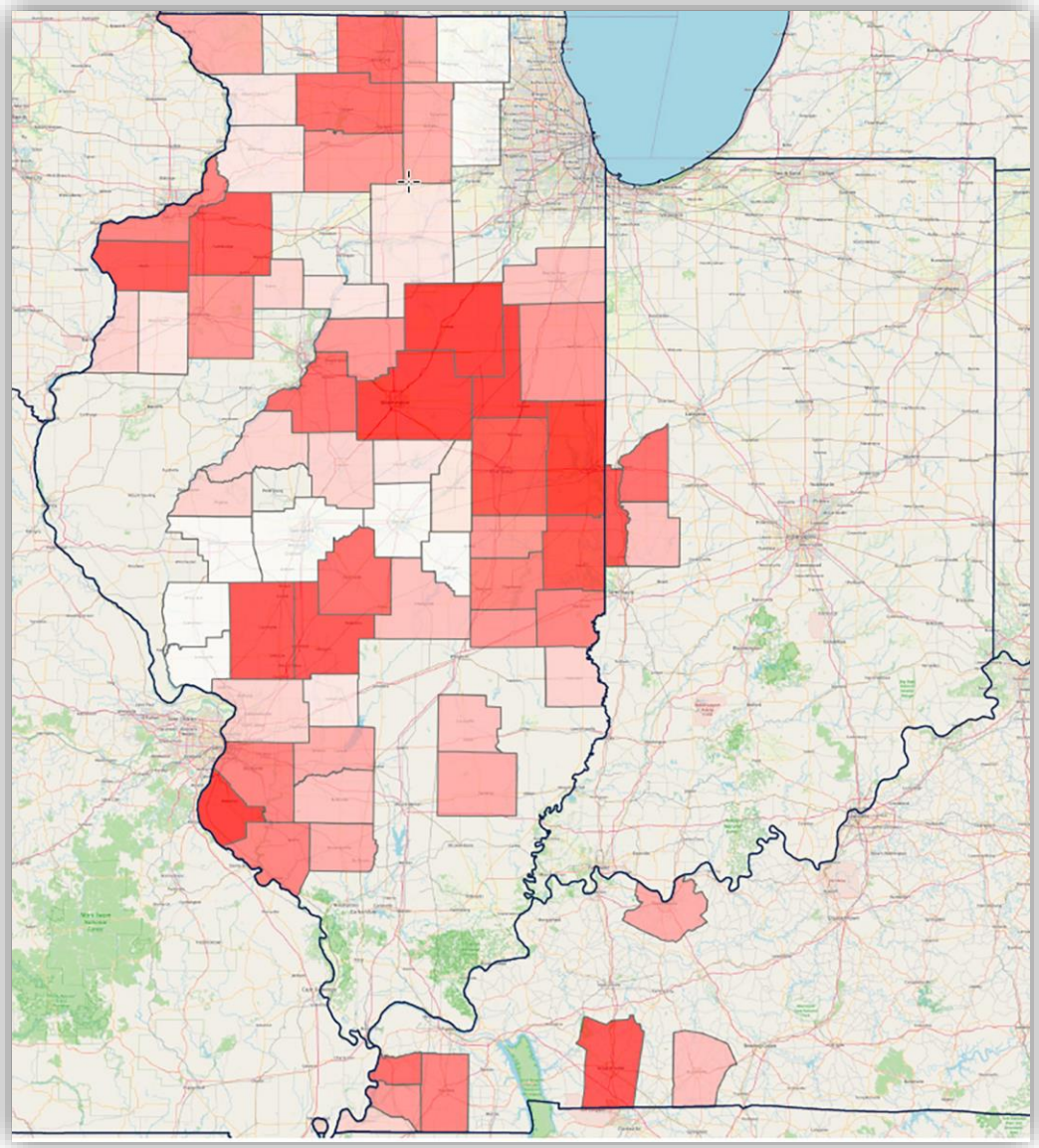
Source:
Factors for Estimating Productivity and Yield Indices of Illinois Soils; Aggregation to the Map Unit; and Adjustments to Reflect Phase Differences

Number of "high" SPR Fields in the PCM program



Where are the high and low SPR fields in PCM?





Conservation Practices and Financial Results for Lower SPR Fields –TILLAGE, CORN

CORN, Low SPR 2015-23 AVG VALUES	No-till	Strip Till	1-Pass Light	2-Pass Light	2-Pass Moderate	2+ Tillage Passes
# fields	1,498	720	1,275	472	583	168
Yield per acre	191	203	195	205	197	211
GROSS REVENUE	$824	$881	$840	$888	$848	$901
TOTAL DIRECT COSTS*	$405	$443	$418	$415	$412	$441
Field Work	$0	$21	$11	$25	$27	$40
Other power costs**	$106	$100	$100	$99	$98	$97
TOTAL POWER COSTS	$106	$121	$111	$124	$125	$137
OVERHEAD COSTS	$39	$39	$39	$39	$39	$39
TOTAL NON-LAND COSTS	$551	$604	$569	$578	$576	$618
OPERATOR & LAND RETURN	$273	$277	$272	$310	$272	$283
Estimated Soil Loss (Tons/acre)	0.99	0.77	1.76	1.85	2.00	2.38
GHG emissions (metric tons CO_2e/a)	0.57	0.75				0.95

Conservation Practices and Financial Results for Lower SPR Fields –TILLAGE, SOYBEAN

CORN, Low SPR 2015-23 AVG VALUES	No-till	Strip Till	1-Pass Light	2-Pass Light	2-Pass Moderate	2+ Tillage Passes
# fields	2940	29	620	287	398	267
Yield per acre	62	65	61	63	64	65
GROSS REVENUE	$655	$770	$653	$676	$677	$690
Direct Costs*	$173	$226	$167	$163	$163	$157
Field Work	$0	$22	$12	$25	$26	$44
Other Power Costs**	$80	$91	$75	$73	$71	$72
Overhead Costs	$33	$35	$33	$33	$33	$33
TOTAL NON-LAND COSTS	$286	$374	$287	$293	$292	$305
OPERATOR & LAND RETURN	$369	$395	$366	$382	$385	$385
Estimated Soil Loss (Tons/acre)	1.55	1.38	1.67	3.49	3.60	3.97
GHG emissions (metric tons CO_2e/a)	-0.23	-0.02				0.16

Conservation Practices and Financial Results for Lower SPR Fields –TILLAGE, SOYBEAN

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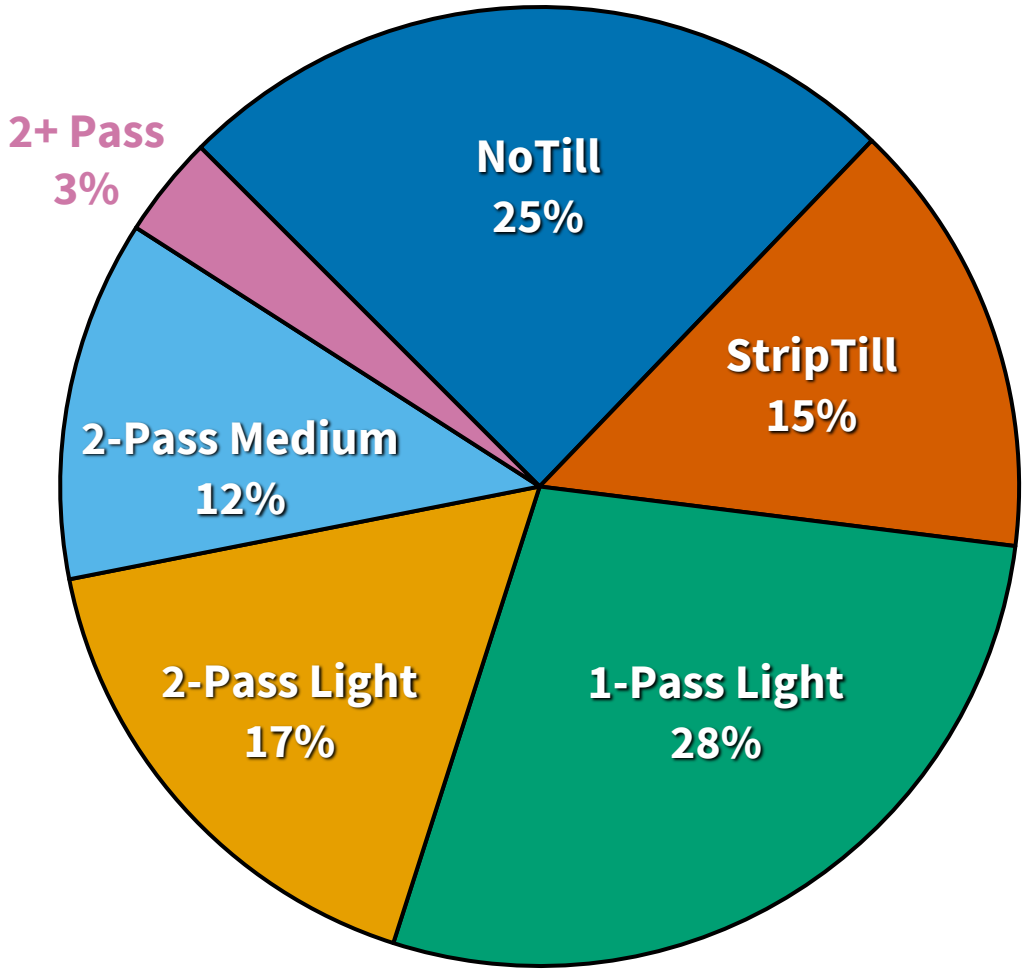
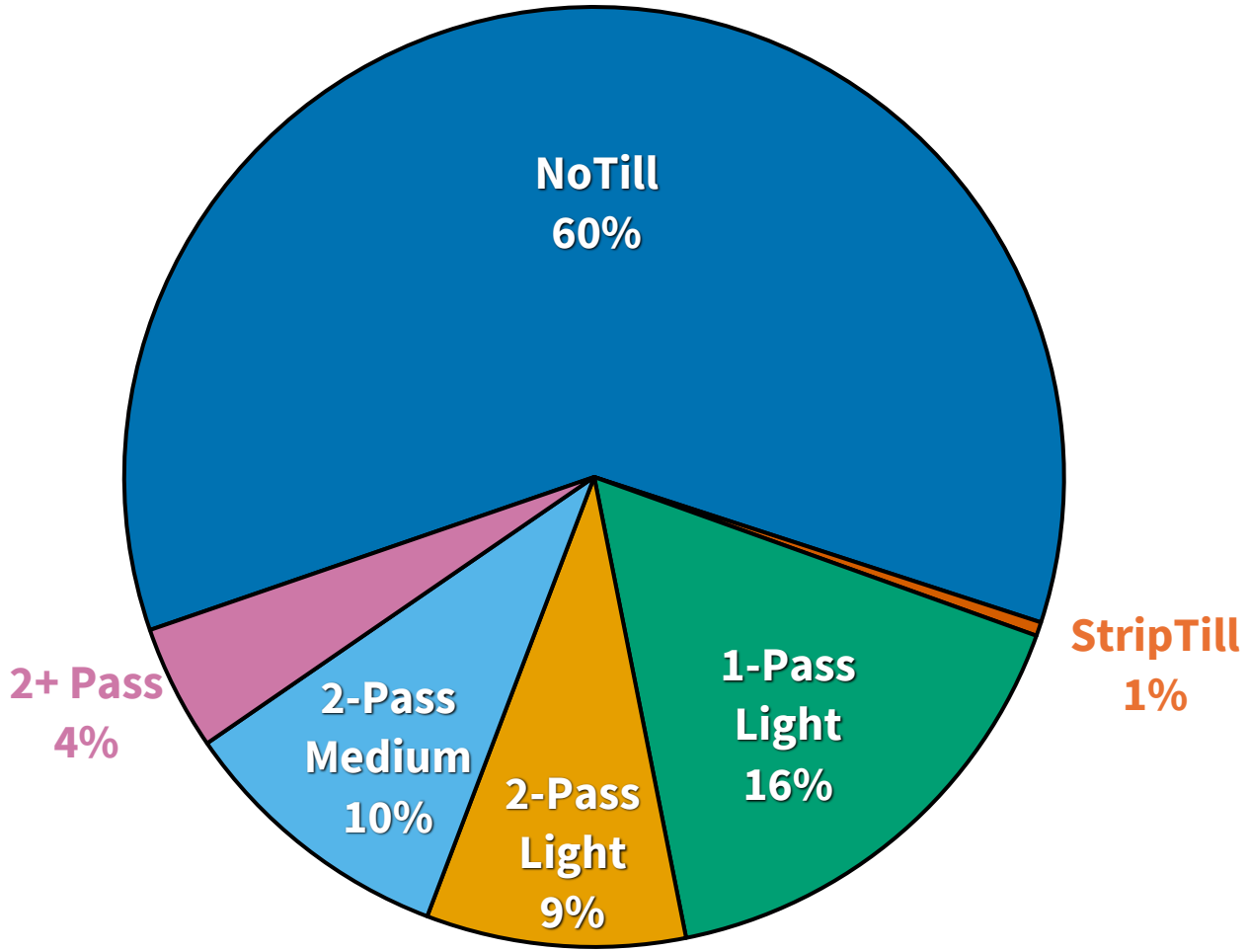
Most Profitable Fields by Tillage Practice

Top 25% most profitable fields, low SPR, 2018-2023

Corn



Soybean



Conservation Practices and Financial Results for Lower SPR Fields –COVER CROP, CORN

2015-23 Average Values	Overwintering	Winter Terminal	No Cover Crop
# fields	670	173	3846
Yield per acre	195	205	200
Soil Productivity Rating	115	121	117
GROSS REVENUE	$832	$923	$861
COVER CROP SEED	$14	$16	$0
TOTAL DIRECT COSTS*	$421	$459	$419
Cover crop planting	$13	$15	$0
Other power costs**	$122	$112	$114
TOTAL POWER COSTS	$135	$127	$114
OVERHEAD COSTS	$39	$40	$39
TOTAL NON-LAND COSTS	$595	$626	$573
OPERATOR & LAND RETURN	$210-$260	$274-$324	$288
Estimated Soil Loss (Tons/a)	1.47	1.16	1.57
GHG emissions (metric tons CO_2e/a)	0.31		0.73

Conservation Practices and Financial Results for Lower SPR Fields –COVER CROP, SOYBEAN

2015-23 Average Values	Overwintering	Winter Terminal	No Cover Crop
# fields	1258	50	3216
Yield per acre	63	59	62
Soil Productivity Rating	116	114	117
GROSS REVENUE	$664	$639	$662
COVER CROP SEED	$14	$16	$0
TOTAL DIRECT COSTS*	$181	$180	$167
Cover crop planting	$14	$13	$0
Other power costs**	$92	$90	$83
TOTAL POWER COSTS	$106	$104	$83
OVERHEAD COSTS	$33	$33	$33
TOTAL NON-LAND COSTS	$319	$317	$283
OPERATOR & LAND RETURN	$318 to $368	$296 to $346	$379
Estimated Soil Loss (Tons/a)	1.91	1.90	2.32
GHG emissions (metric tons CO_2e/a)	-0.44		-0.05

Conservation Practices and Financial Results for Lower SPR Fields –COVER CROP, SOYBEAN

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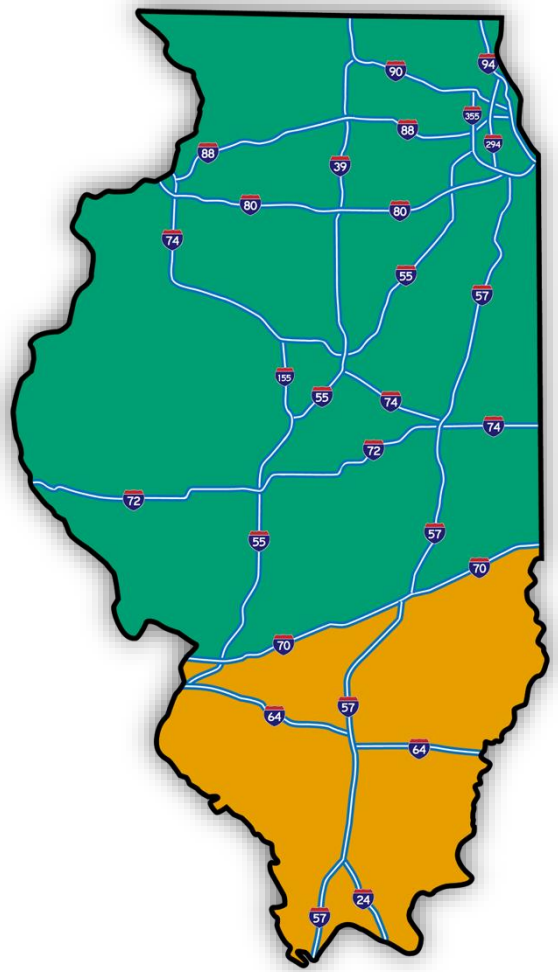
GHG emissions (metric tons CO_2e/a)	-0.44		-0.05

Conservation Practices and Financial Results for Lower SPR Fields N Timing, Corn – North of I-70

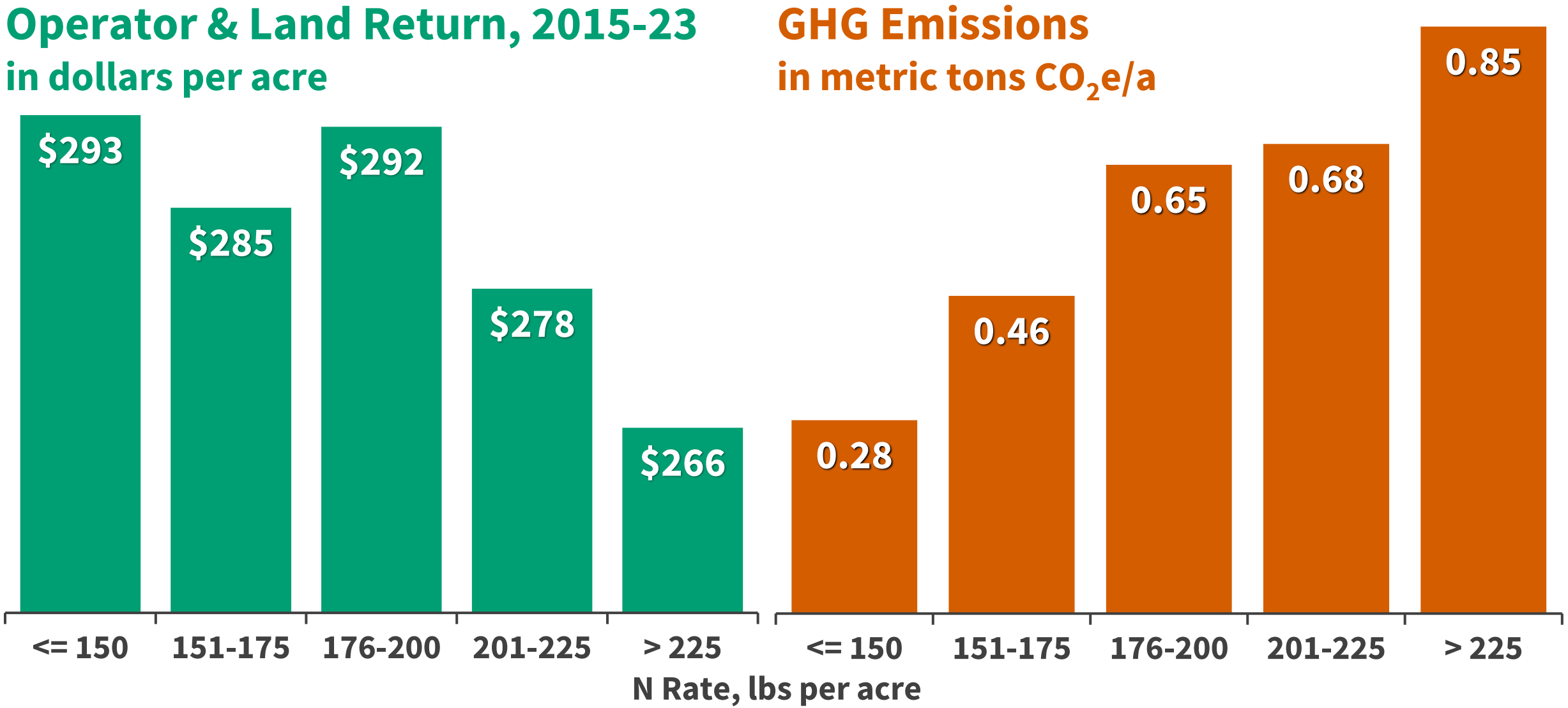
2015-23 AVG VALUES	>40% Fall	Mostly Preplant	Mostly Sidedress	50% Pre/ 50% Sidedress	3-way Split
NUE (lb N/bu grain)	1.04	1.03	0.98	0.99	1.07
# fields	936	1,142	1,135	253	296
Yield per acre	208	196	201	205	199
GROSS REVENUE	$901	$846	866	894	858
TOTAL NON-LAND COSTS	$601	$561	$574	$590	$605
TOTAL DIRECT COSTS*	$442	$409	$419	$425	$448
TOTAL POWER COSTS	$120	$113	$116	$125	$118
OVERHEAD COSTS	$39	$39	$39	$40	$39
OPERATOR & LAND RETURN	$300	$285	$292	$304	$253

Conservation Practices and Financial Results for Lower SPR Fields N Timing, Corn – South of I-70

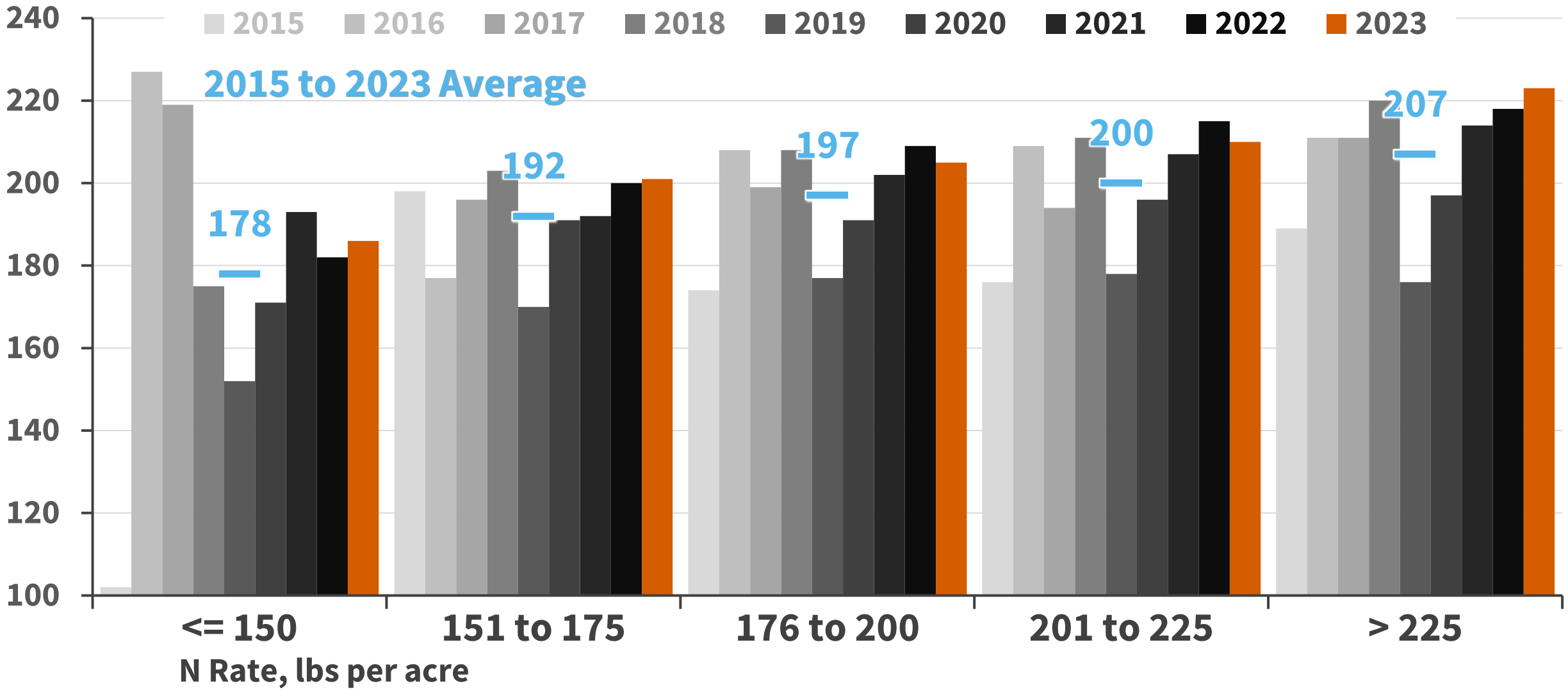
2015-23 AVG VALUES	Mostly Preplant	Mostly Sidedress	50% Pre/ 50% Sidedress
NUE (lb N/bu grain)	1.07	1.03	0.92
# fields	542	228	36
Yield per acre	175	185	167
GROSS REVENUE	$770	$839	$906
N fertilizer	$90	$101	$123
Other direct costs*	$267	$304	$339
TOTAL DIRECT COSTS*	$357	$405	$462
Field Work	$22	$9	$8
Other power costs**	$98	$103	$108
TOTAL POWER COSTS	$120	$112	$116
OVERHEAD COSTS	$40	$41	$44
TOTAL NON-LAND COSTS	$517	$557	$622
OPERATOR & LAND RETURN	$253	$282	$284



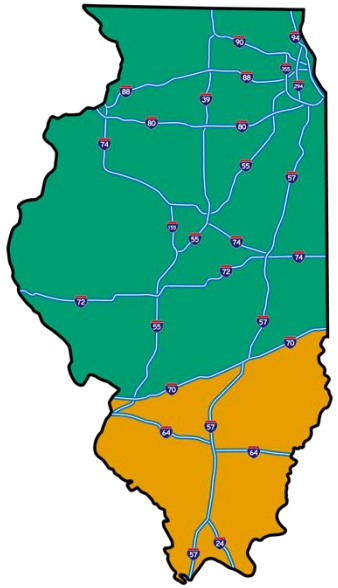
Conservation Practices and Financial Results
for Lower SPR Fields, Corn

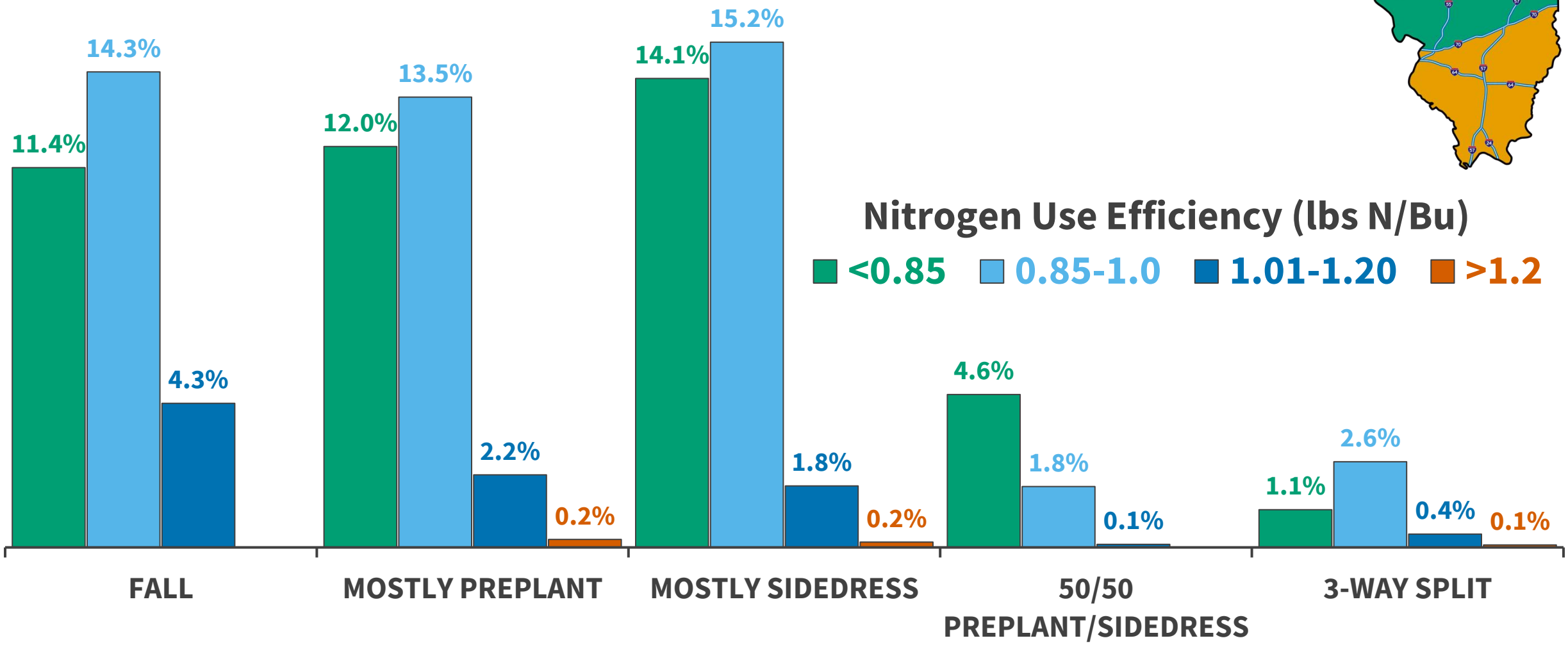


Conservation Practices and Financial Results
for Lower SPR Fields, Corn Yield, Bushels per Acre

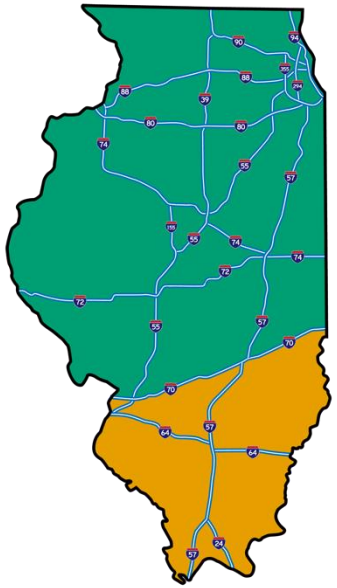


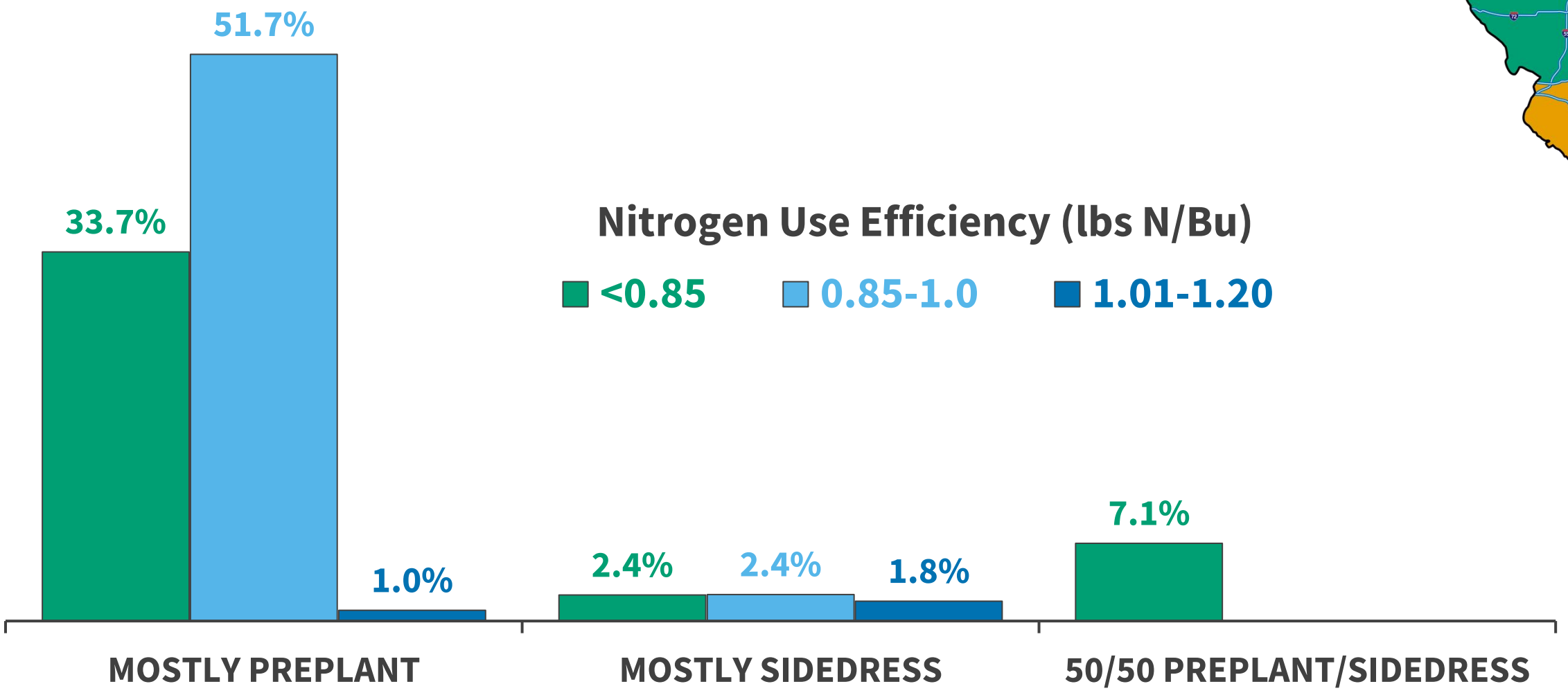
Top 25% Most Profitable Corn Fields (Low SPR) by N Management - North of I-70





Top 25% Most Profitable Corn Fields
(Low SPR) by N Management - South of I-70





PCM Recommendations

Tillage

Less is More - Consider one less tillage pass to reduce fuel costs, save soil, & increase profitability.

Light Tillage - More than two passes of heavy tillage is never more profitable than other tillage management systems in our dataset.

Nitrogen Management

MRTN Rates - Nine years of data show that applying rates above MRTN is less profitable.

In-Season Application - The most profitable acres in our dataset use preplant or side-dress N applications. This practice also improves water quality!

Cover Crops

For Beginners - Farmers new to cover crops should start with cereal rye ahead of soybeans.

Keep Costs Low - Protect your profitability by managing seed, planting and termination costs. Consider cost-share programs like PCM to help cover costs.

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