
Results from On-farm N Rate Response Trials

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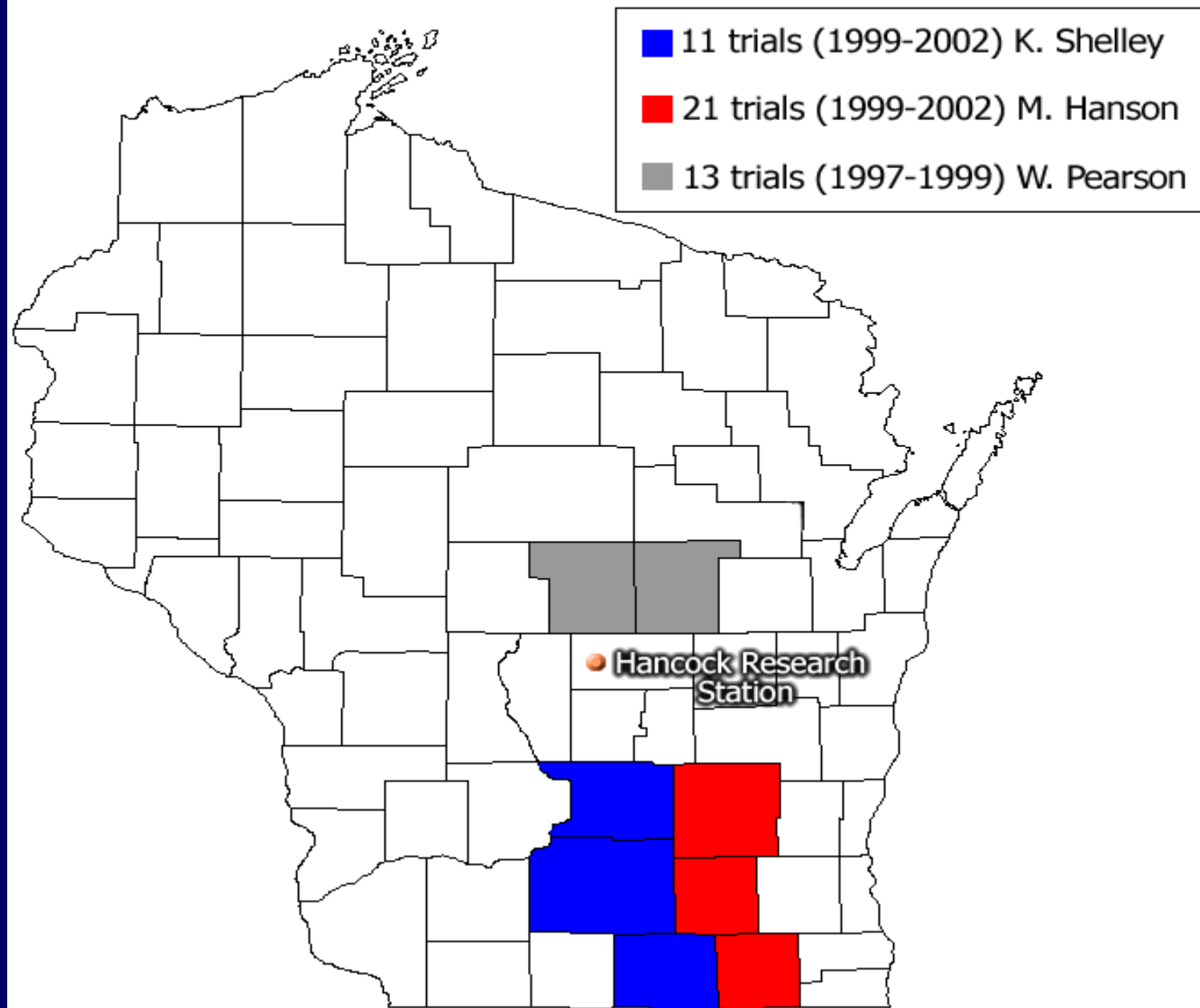
Questions?

- Are N rate recommendations too low?
 - High yield producers use higher rates.
 - Are yields held back by N rates that are too low?
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Nitrogen Rate and Timing Studies - Wisconsin

- Jefferson, Dodge, Walworth Cos.- Matt Hanson
 - Silt loam soils
 - 21 expts. 1999-2002, Soybean/corn, corn/corn
- South Central Wis. – Kevin Shelley, NPM program
 - Silt loam soils
 - 11 trials, 1999-2002, Soybean/corn, corn/corn
- Portage & Waupaca Cos. – Bill Pearson
 - Sandy loam soils
 - 13 Expts. , 1997-1999, Alfalfa/corn; corn/corn

Locations of on-farm nitrogen rate response experiments



Nitrogen Recommendations for Corn

Sands & loamy sand

Other soils

Yield Potential

Organic
matter

Irrigated

Non-
irrigated

Med/low

Very high/
high

---%---

-----lb N/acre-----

<2	200	120	150	180
2-9.9	160	110	120	160
10-20	120	100	90	120
>20	80	80	80	80

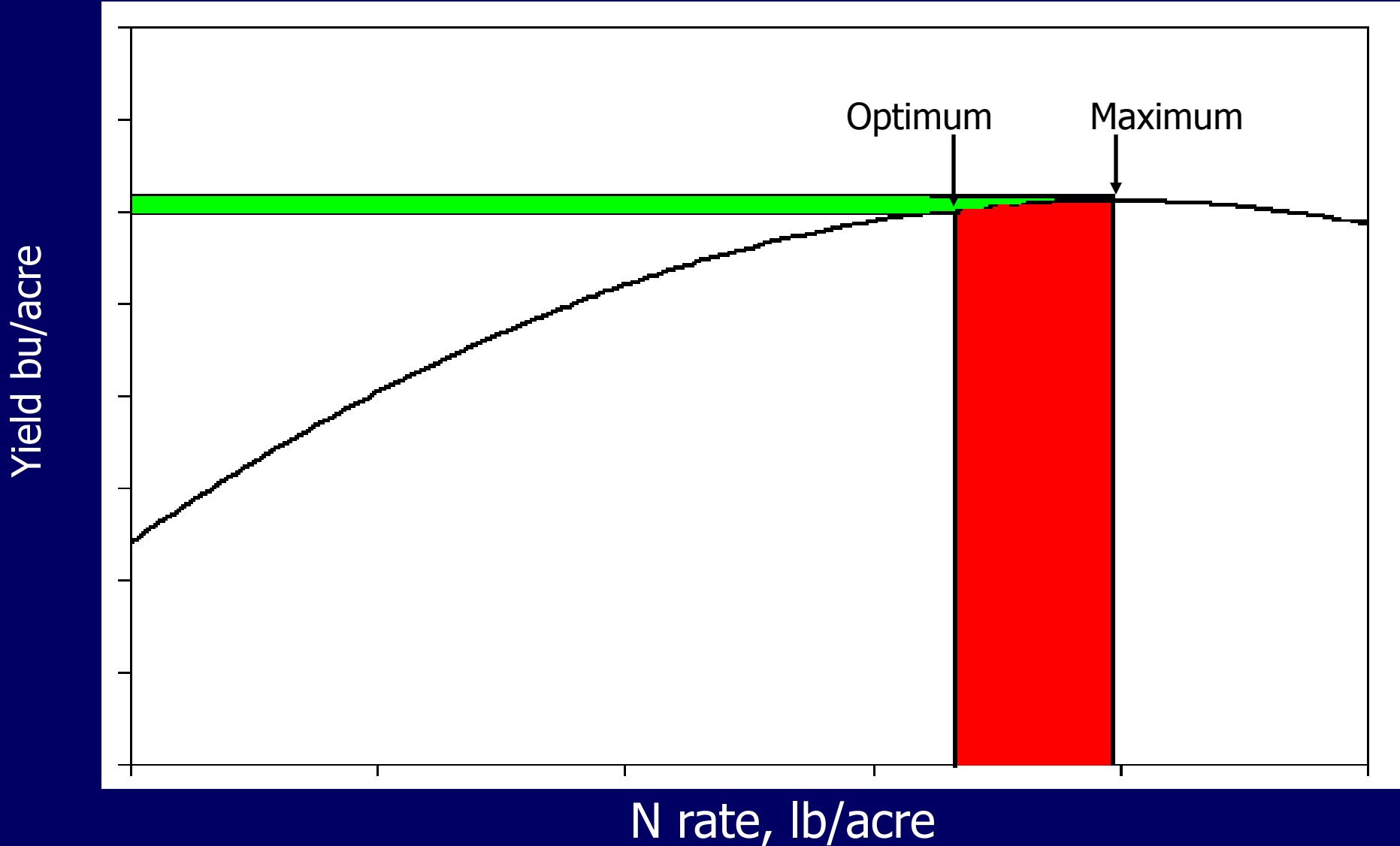
Optimum N Rate for Corn

- **Soil-specific characteristic**
 - **Not affected by annual variations in yield**
 - **Year-specific adjustments for soil nitrate and organic N inputs needed**
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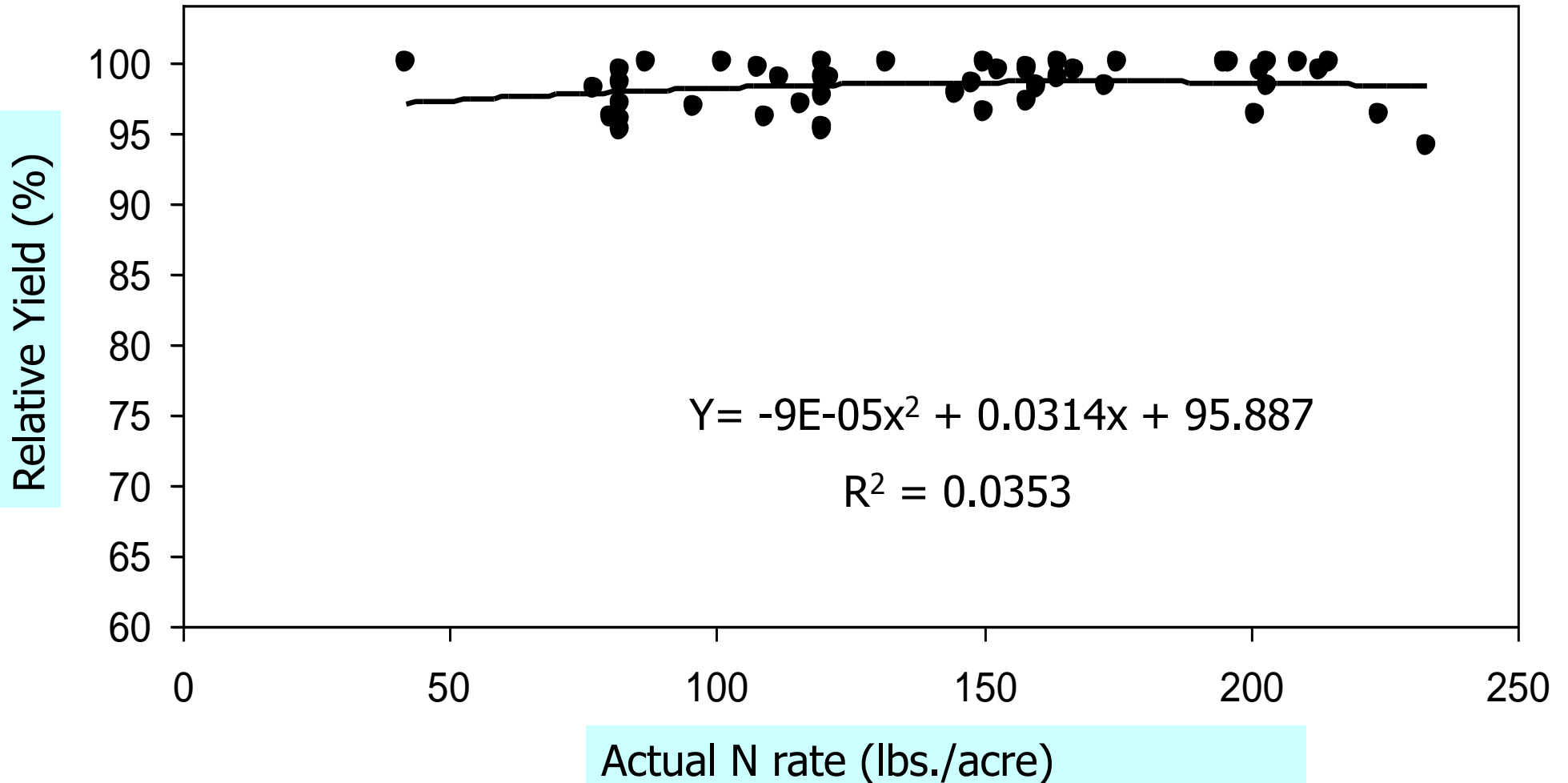
Adjustments to Base N Rates

- Nitrogen Credits
 - Legumes
 - Manure
- Soil nitrate tests
- Tillage/residue adjustment

Maximum and optimum levels for yield response to applied N

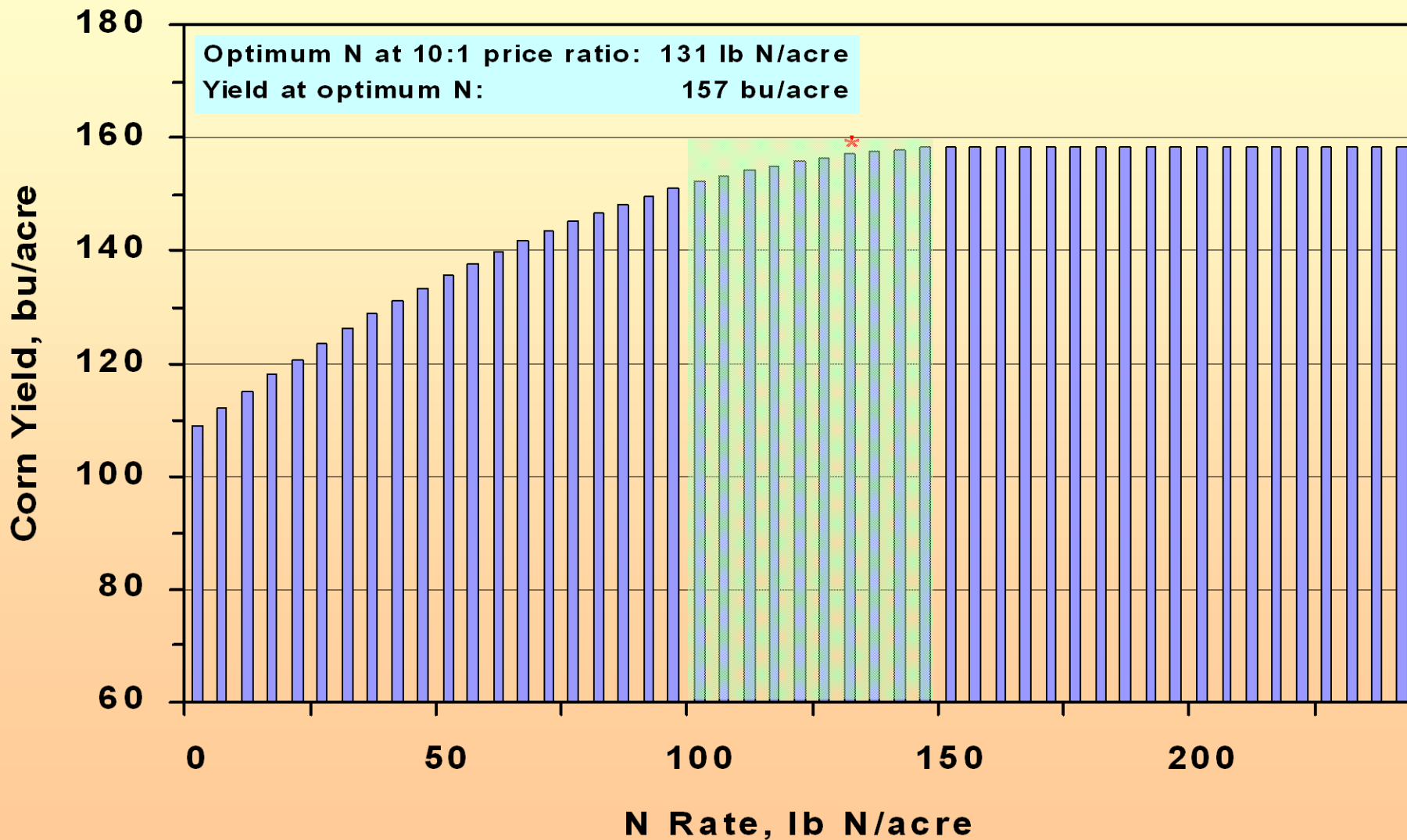


Nitrogen rate effects on corn relative yield following soybean. 12 trials, Dodge, Jefferson, Walworth Cos., 1999-2001.



Data from M..Hanson, Jefferson Co.

59 Site-Years in Iowa Corn-Soybean Rotation



Kevin Shelley
UW Nutrient and Pest Management Program
South-Central Region

On-Farm Nitrogen Rate and Application Time for Corn Comparisons

1999 – 2002: 11 Comparisons on 6 Farms

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- Arlington
 - DeForest/ Keyser
 - Stoughton
 - Sun Prairie
 - Cottage Grove
 - Janesville

Corn response to preplant and sidedress N, Sun Prairie, 2001. Corn after soybeans

<u>Reps</u>	<u>Preplant N (82-0-0)</u>	<u>Sidedress N (28% UAN)</u>	<u>Total N (lbs/acre)</u>	<u>Average Yield (bu/acre)</u>	<u>Marginal* Return (\$/acre)</u>
2	0	120	120	215	370.12
2	0	150	150	210	352.00
3	150	30	180	207	341.85

* Corn price = \$1.90/bu; N = \$.23/lb (82-0-0), \$.30/lb (28% UAN);
Preplant N application = \$5/acre; sidedress N application at cultivation = \$2/acre ; Ringwood silt
loam, 3.2% OM

Corn response to N rates and timing, Stoughton, 2002 . Corn after corn.

<u>Reps</u>	<u>Fall N (82-0-0)</u>	<u>Spring Preplnt N (82-0-0)</u>	<u>Sidedress N (28% UAN)</u>	<u>Total N* (lbs/acre)</u>	<u>Average Yield (bu/acre)</u>	<u>Marginal** Return (\$/acre)</u>
2	0	170	0	175	195	411.75
2	0	170	40	215	194	399.78
2	180	0	0	185	183	376.10
2	180	0	40	225	186	373.58

* 5 lbs N credited from starter

** Corn price = \$2.25; N = \$.15/lb (82-0-0), \$.21/lb (28% UAN);

Sidedress N application at cultivation = \$2/acre. Plano silt loam = 2.9% OM

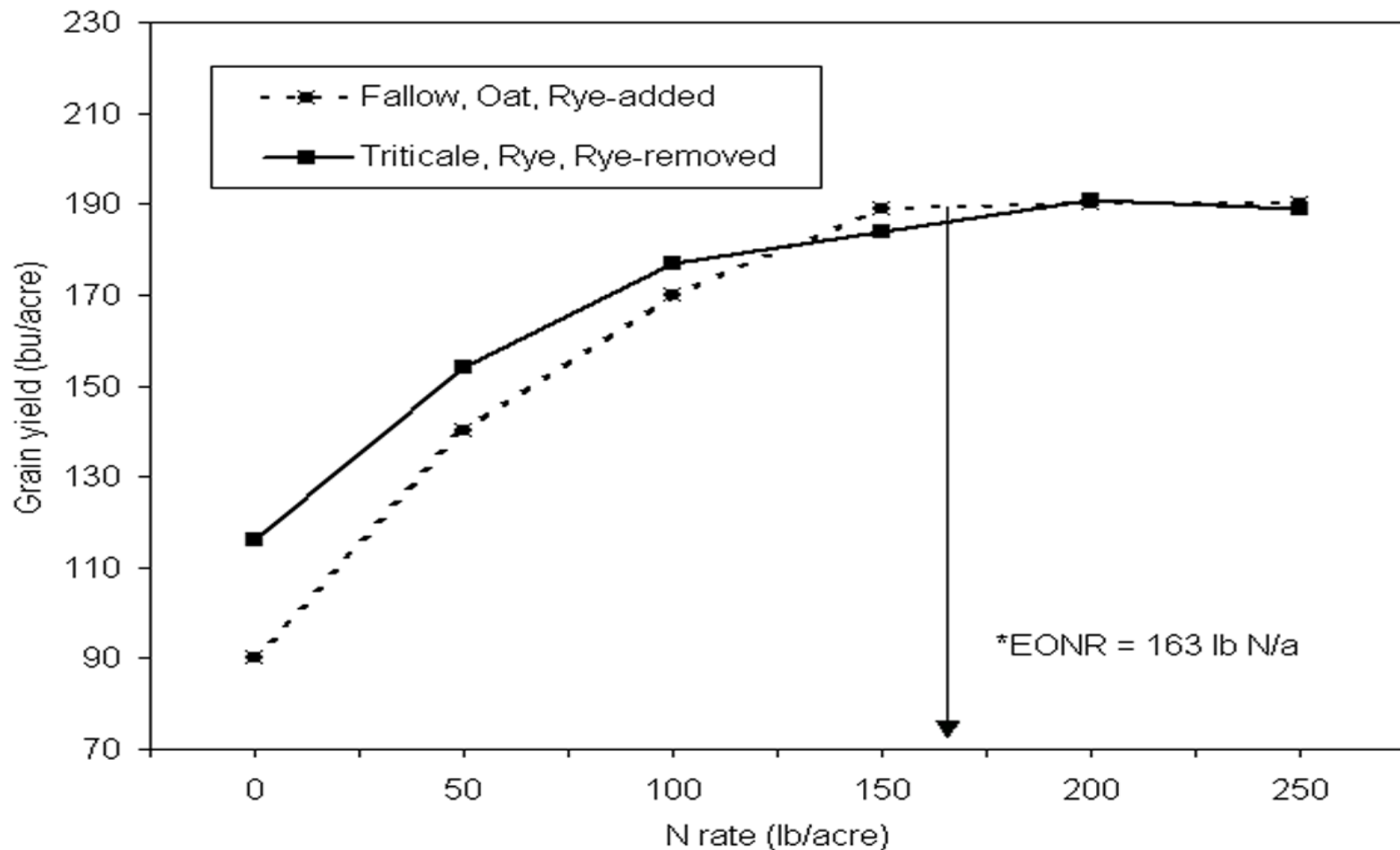
Optimum N rates and corn yields at six locations on sandy loam soils, Waupaca & Portage Cos. 1998-99

Year	Recom.	EONR	Yield @ ONR
	----- lb N/acre -----	-----	bu/acre
1998 (I)	200	142	192
1998 (I)	200	200	208
1998	120	137	178
1999	120	86	168
1999	120	141	166
1999	120	58	167

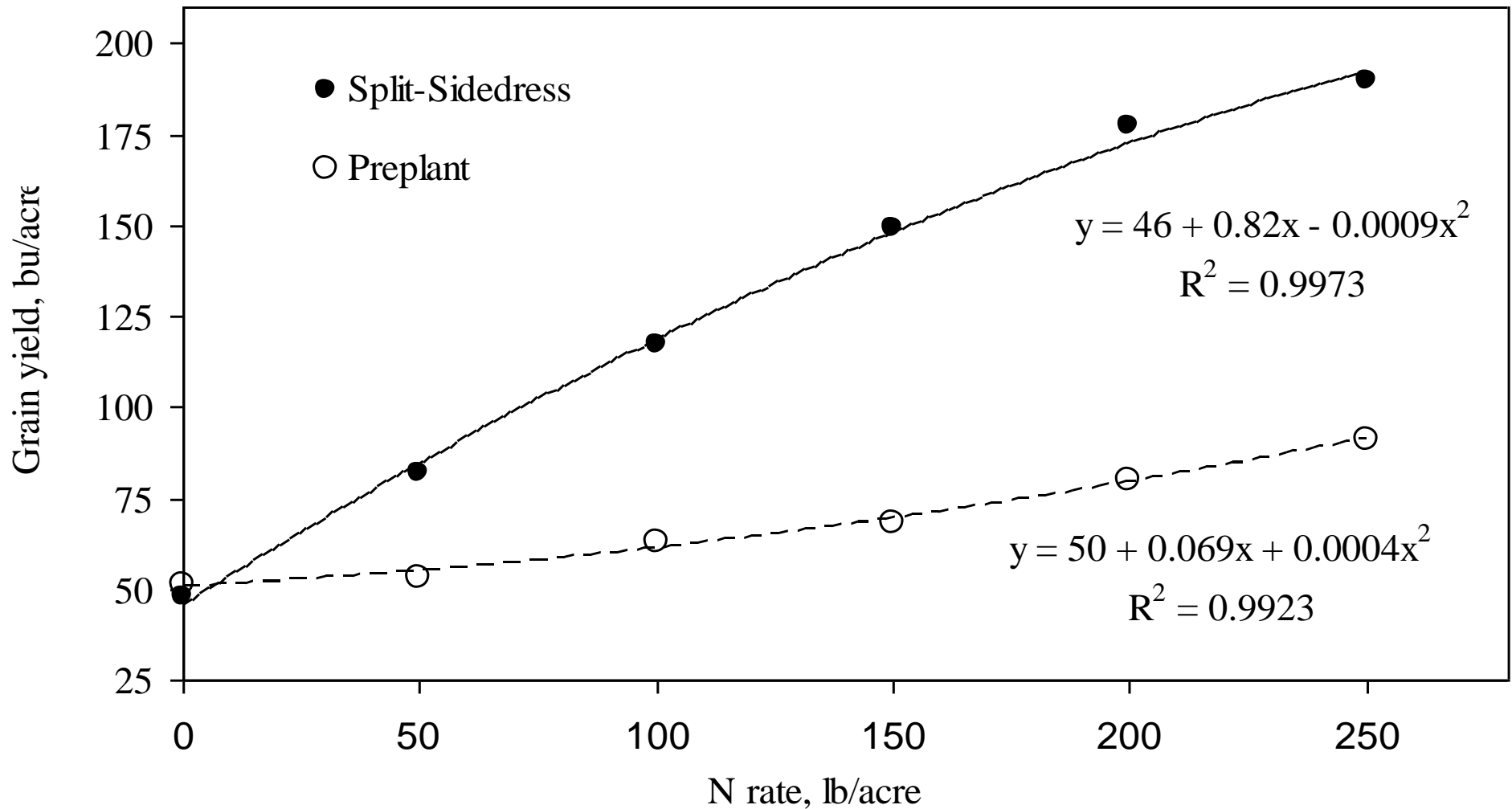
All sites corn/corn; (I) = irrigated; N applied sidedress. Data from Bill Pearson



Corn yield response to N rate , Hancock, 2001. (EONR=economic optimum N rate)



Effect of N timing on the relationship between N rate and corn grain yield, Hancock 2002.



N Source/timing and N rate effects on corn grain yield at Hancock, WI, 2003

N source	N timing	N rate, lb/acre				Mean
		100	150	200	250	
----- grain yield, bu/acre -----						
PCU	PP	203	199	208	219	208
	PP + 4 wk	183	203	206	198	198
Am. Sulfate	4 wk & 8 wk	175	184	204	189	188
	Mean	187b	195ab	206a	202a	

No N control = 107 bu/acre

EONR = 188 lb N/acre, Yield @ EONR = 206 bu/acre

Recommended Timing of Nitrogen Applications for Corn

Soil	Fall	Preplant	Sidedress
Medium/Fine Texture Well-Drained	OK*	Optimum	OK
Medium/Fine Texture Poorly Drained	No	OK	Optimum
Coarse texture	No	No	Optimum

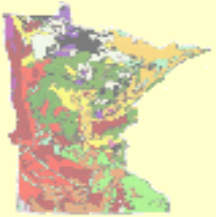
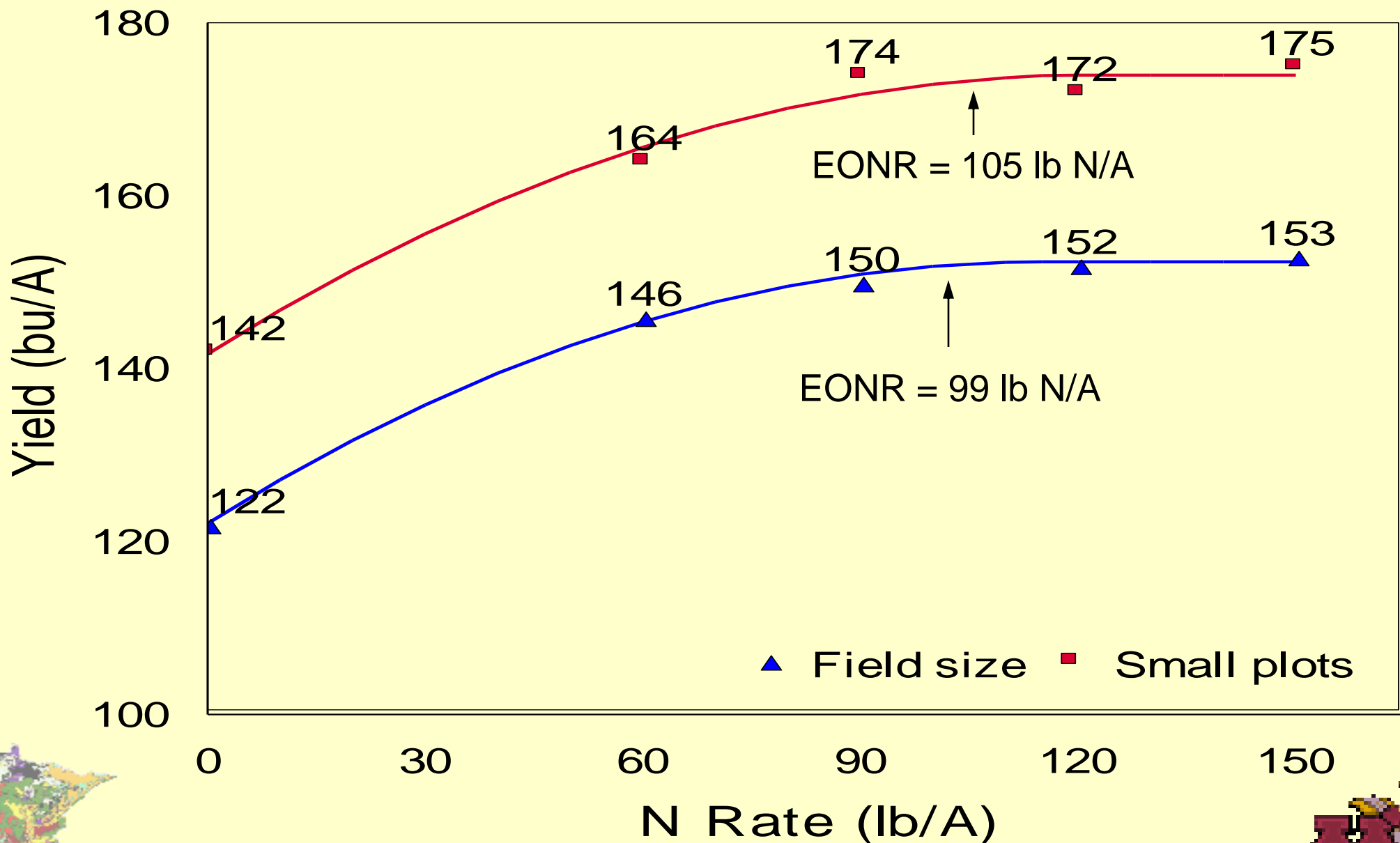
*Includes use of BMPs for fall-applied N.

Minnesota on-farm N response trials

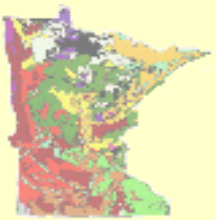
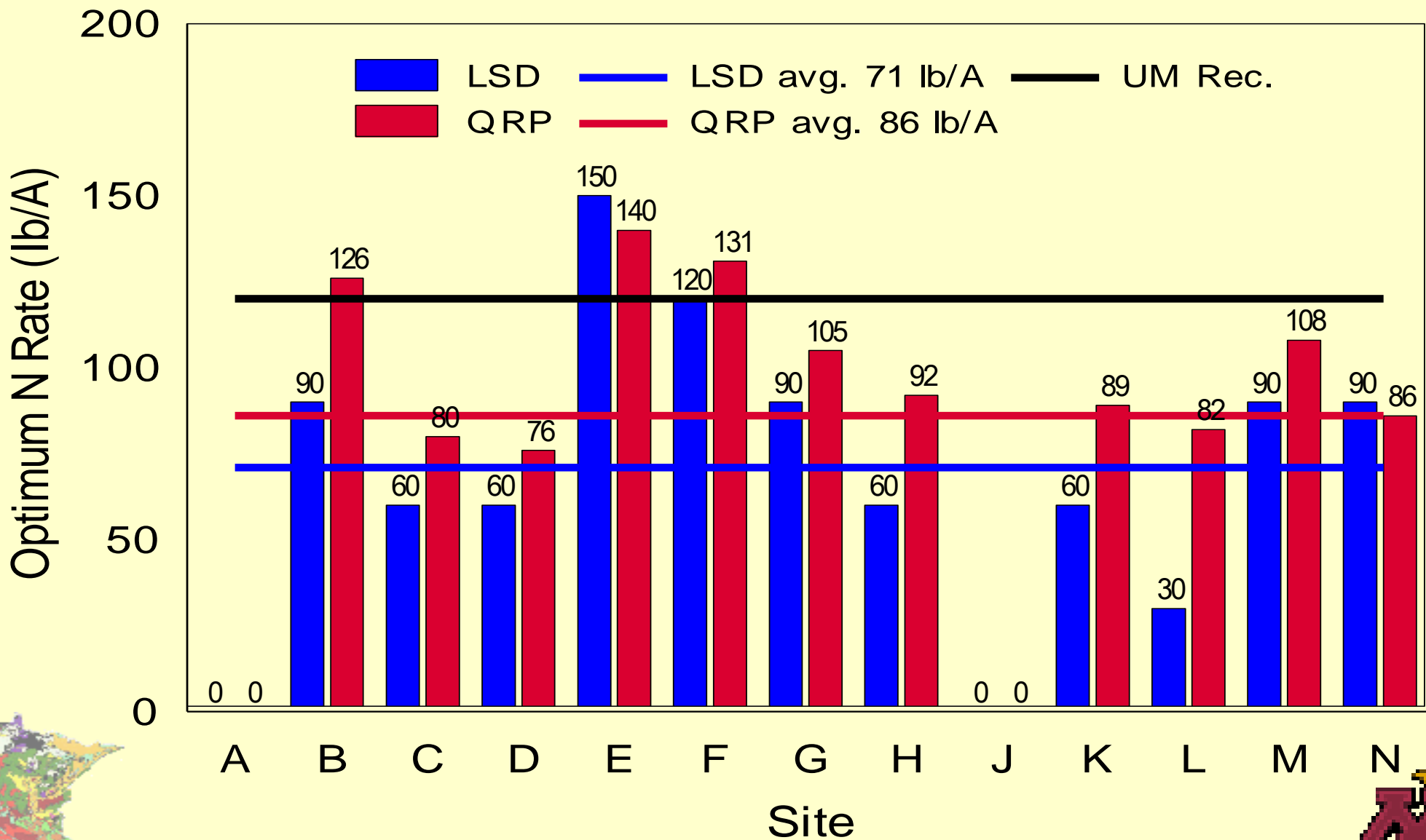
- N rates (7) 0-180 lb N/acre
- Small plot trials (14) 1989-1999
 - Corn after soybean
 - SE & SC Minnesota
- Field-size strip studies (15) 1997-2001
 - Corn after soybean
 - SC Minnesota

Randall et al., 2003

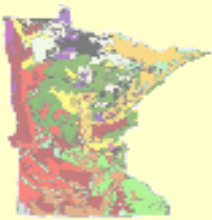
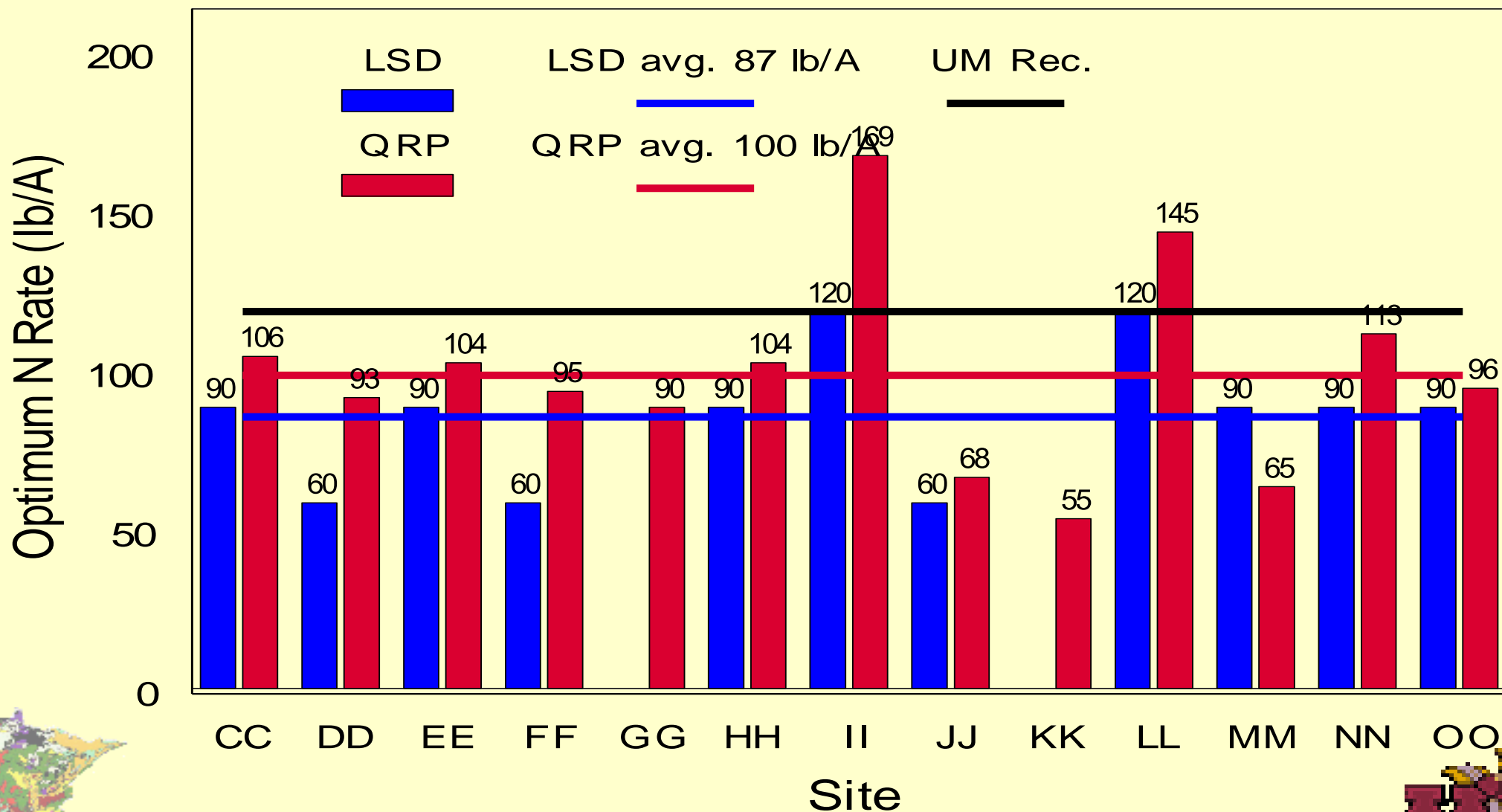
EONR from 13 small-plot and 13 field-size studies.



Optimum fertilizer N rates using the LSD (0.10) and QRP statistical models for 13 small-plot sites.



Optimum fertilizer N rates using the LSD (0.10) and QRP statistical models for field-size sites.



Summary

- On farm N response trials in Wisconsin support current N recommendations
 - Response data indicate recommended rates are usually higher than observed optimum
 - Similar findings in IA and MN
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