NITROGEN TIMING AND SOURCES

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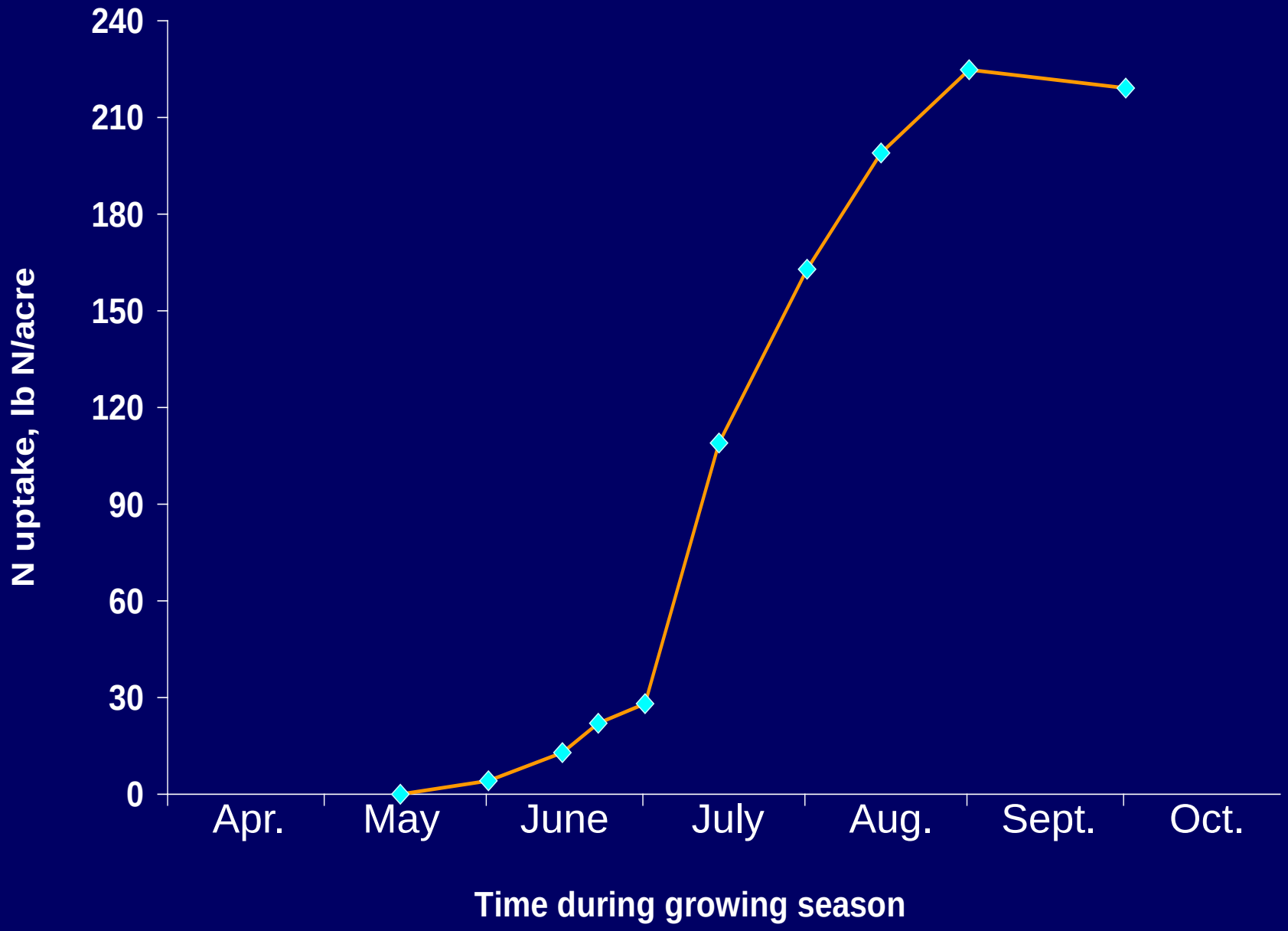
Timing of Nitrogen Uptake by Corn



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.

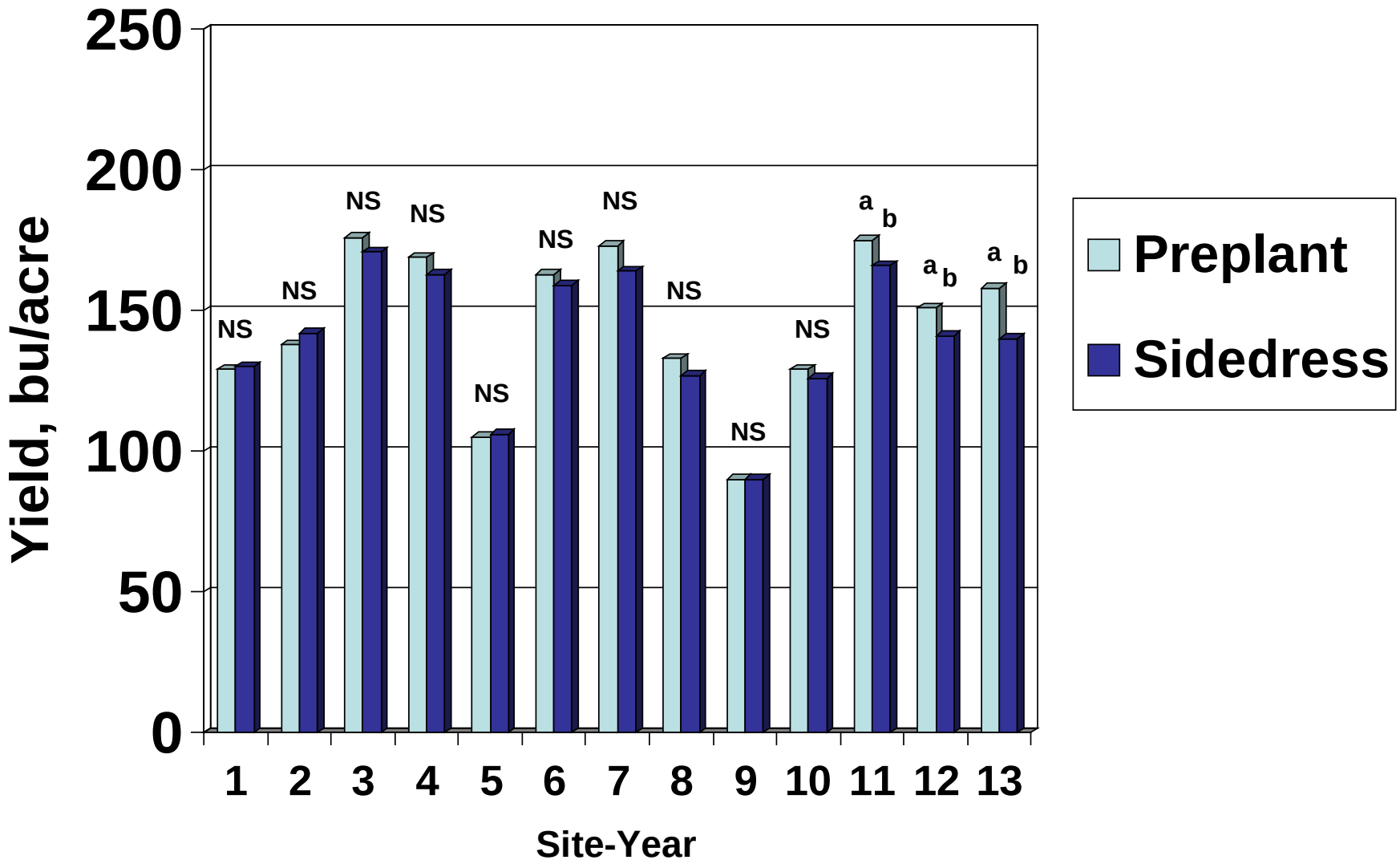
Nitrogen timing and inhibitor effects on corn yield, Fond du Lac Co, WI

N timing	N-Serve	Yield (bu/a)
None	---	70
Fall	no	132
Fall	yes	143
Sidedress	no	169
Sidedress	yes	166

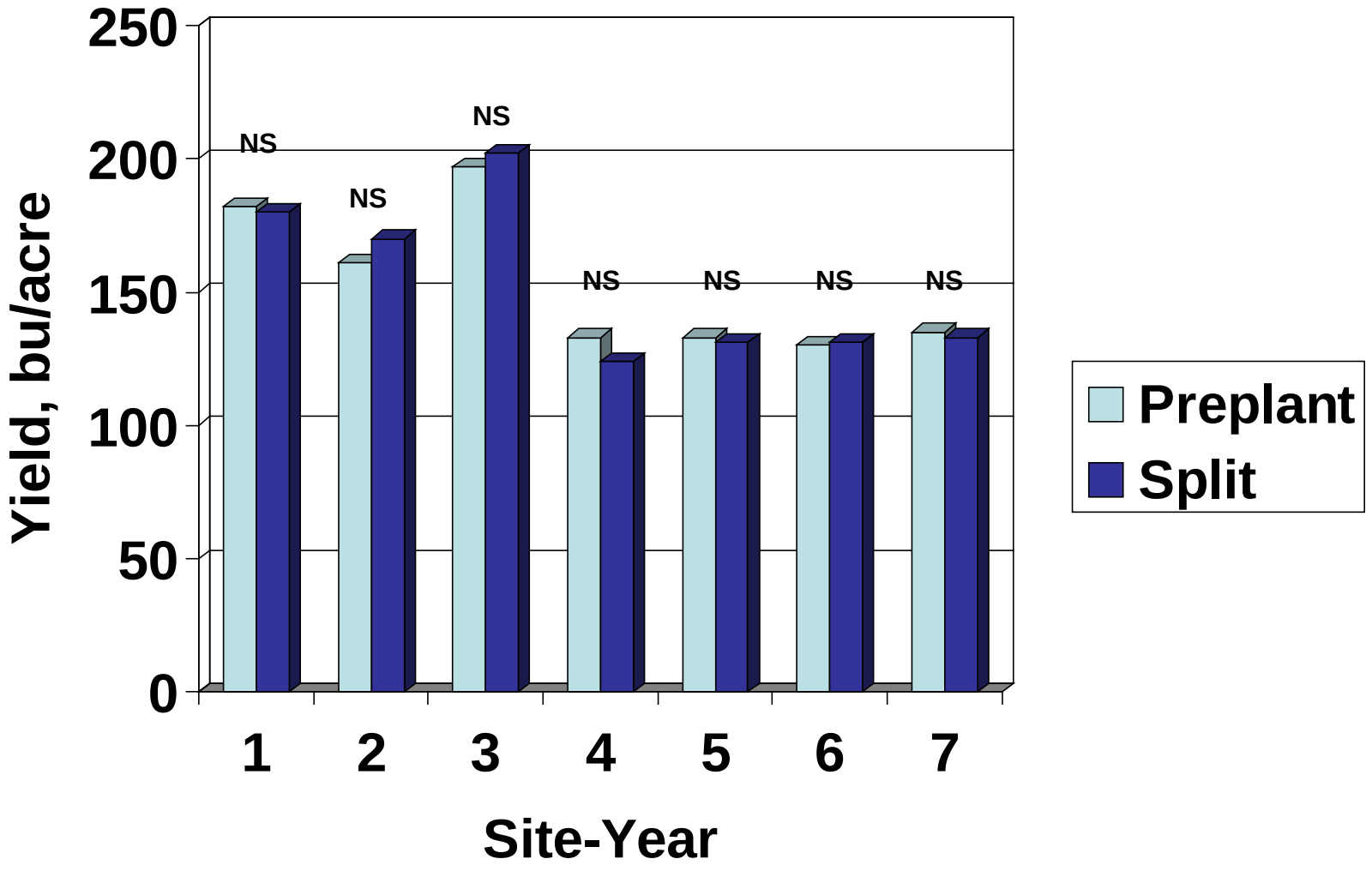
M. Rankin, UW-Extension

140 lb N/acre as anhydrous ammonia

Corn yield response to preplant and sidedress N on silt loam soils in Wisconsin, 1990-1992



Corn yield response to preplant and split N timing on silt loam soils in Wisconsin, 1991-1992

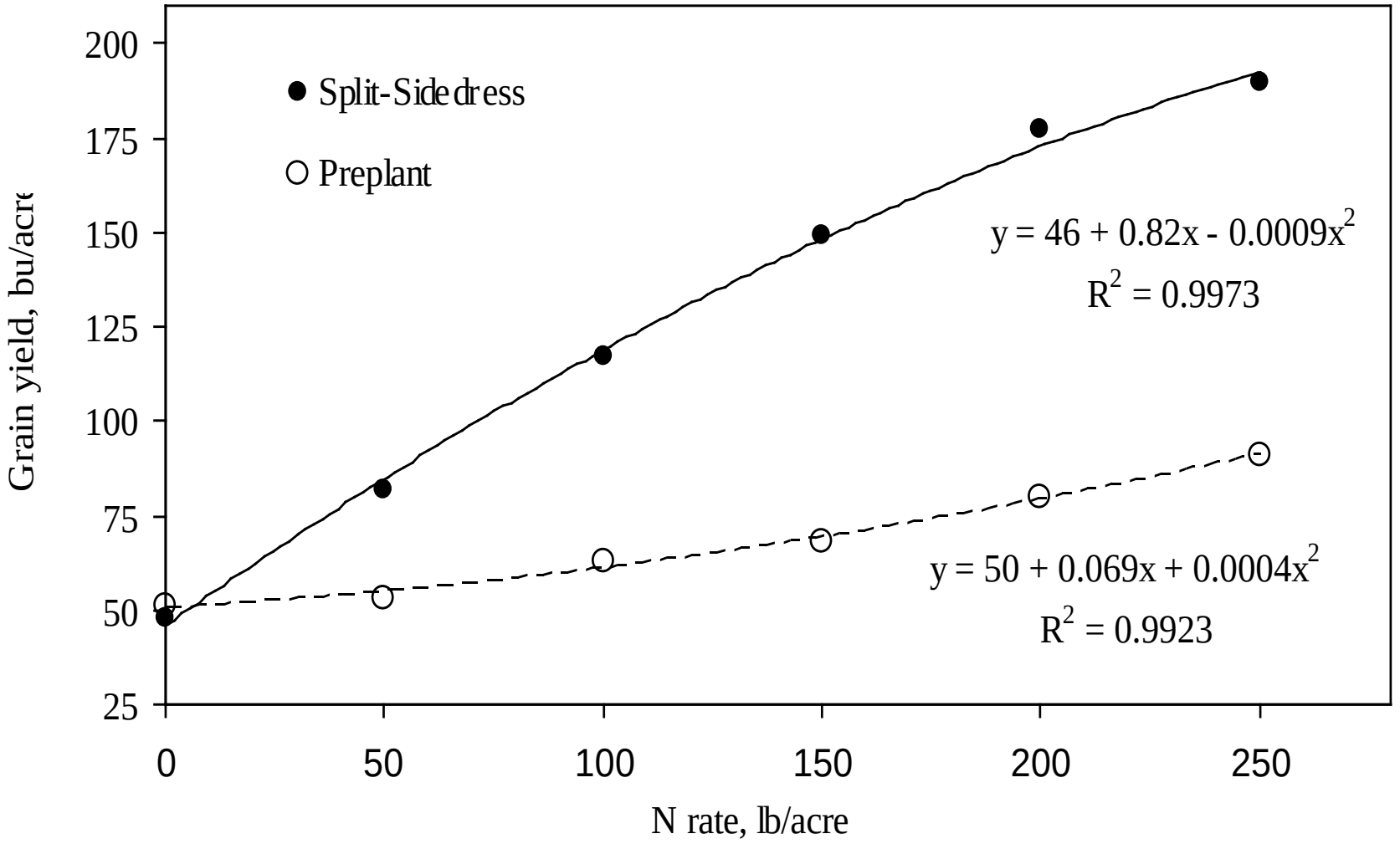


Corn yield response to preplant, sidedress, or split N timing in Iowa and Minnesota

Sites	Location (years)	
	Iowa (1987-1991)	Minnesota (1989-1992)
Total	65	32
N responsive	25	28
Preplant = SD/Split	15	16
Preplant > SD/Split	8	4
Preplant < SD/Split	2	8

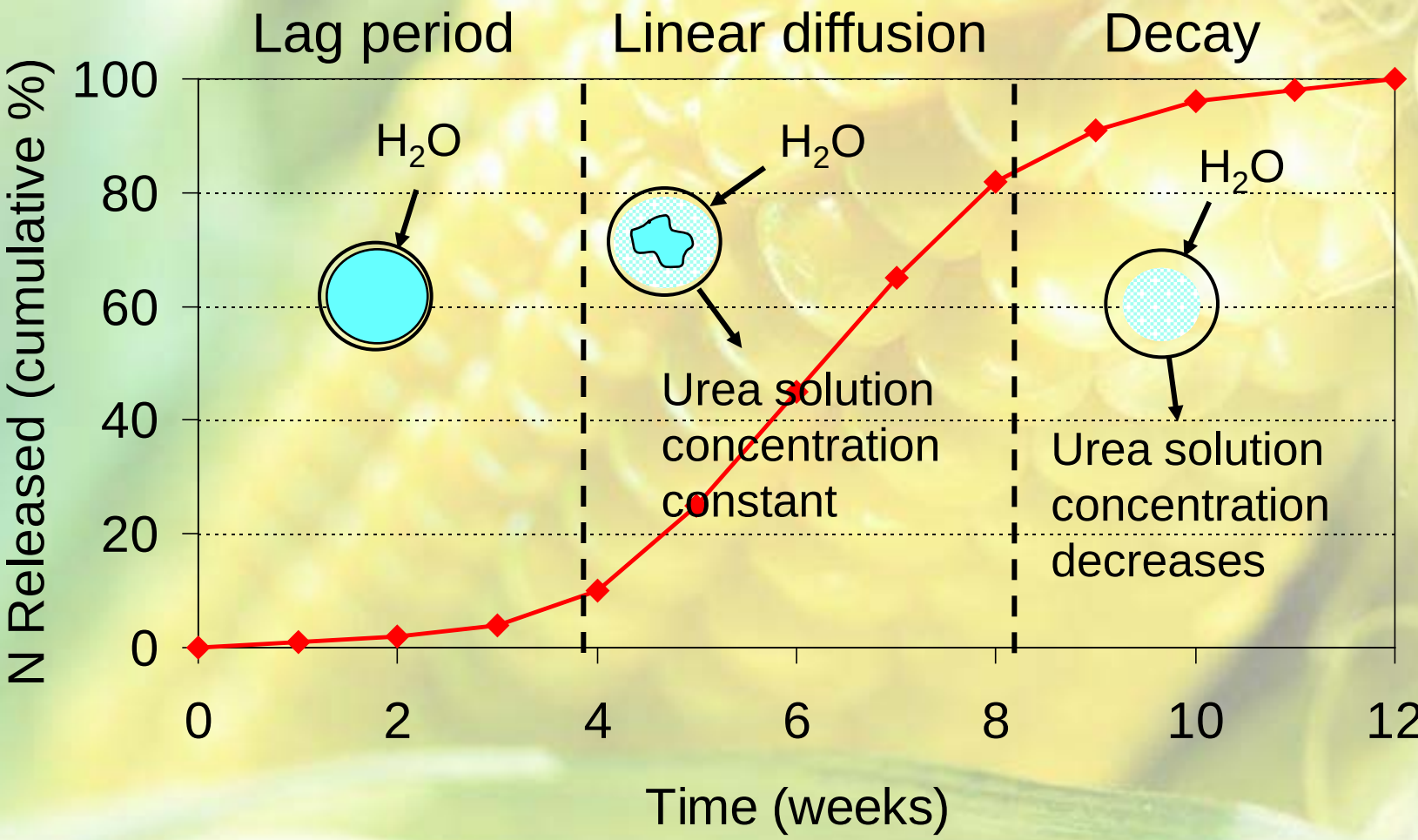
Killorn, et al., ISU; Randall, MN

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



Performance of polymer-coated urea (ESN) as a nitrogen source for corn

ESN Release Mechanism



Agrium

TREATMENTS - 2003 & 2004

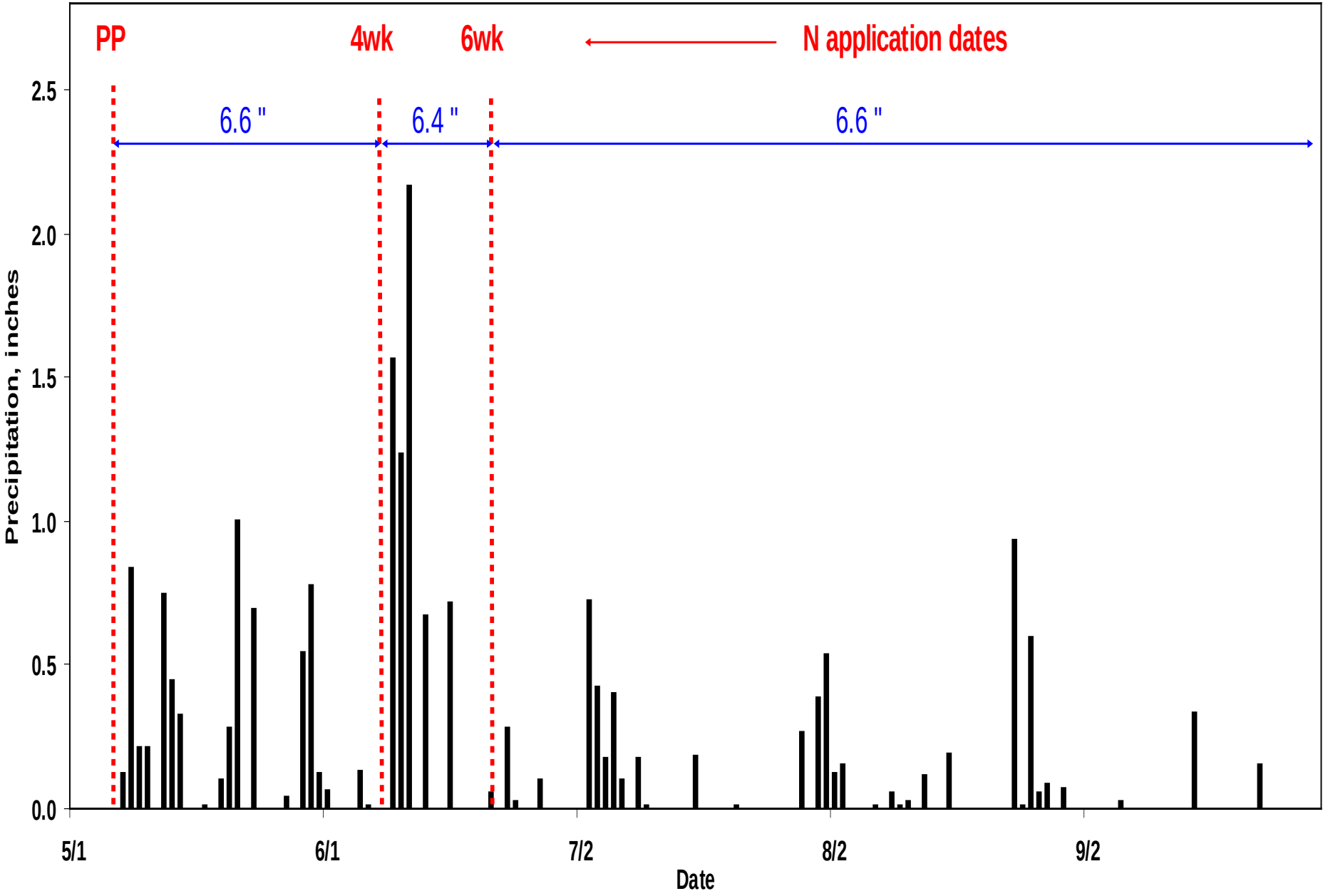
- N Sources: PCU(ESN), Ammonium Sulfate, Urea
- N Timing: Preplant, Sidedress, Split(s)
- Rates: 0-250 lb N/acre, +/- Sulfur*

*S source = gypsum

N Source & timing effects on corn grain yield at Hancock, WI, 2003

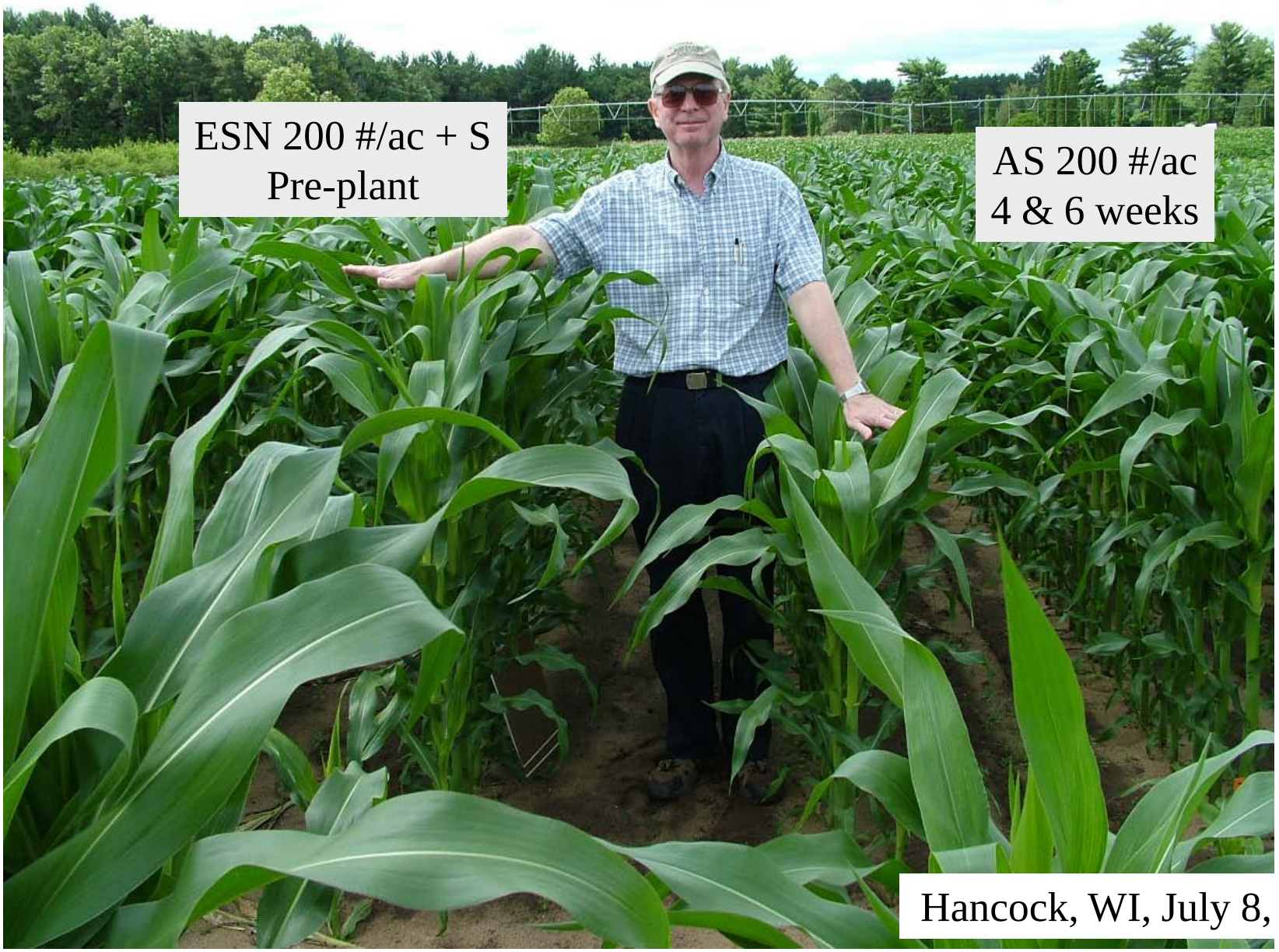
N source	N timing	N rate, lb/acre 150	200	Mean
		--- grain yield, bu/acre ---		
PCU (ESN)	PP	199	208	204a
	PP+4 wk	203	206	205a
Am. Sulf.	PP	204	190	196ab
	PP+DCD	203	200	202ab
	4wk & 8 wk	184	204	194abc
	4wk w/NI & 8wk	201	216	208a
	8 wk	190	190	190bcd

Time of N application relative to precipitation from May to September at Hancock, 2004.



Control
No N+ Sulfur
8 July 2004

Ammonium sulfate, preplant
200 lb N/acre
8 July 2004


ESN 200 #/ac + S
Pre-plant
AS 200 #/ac
4 & 6 weeks
Hancock, WI, July 8, 2004

N Source & timing effects on corn grain yield at Hancock, WI, 2004

N source	N timing	N rate, lb/acre 150	200	Mean
		--- grain yield, bu/acre ---		
PCU (ESN)	PP	170	163	167c
	PP+4 wk	177	185	180b
Am. Sulf.	PP	126	137	132e
	PP+DCD	128	143	136e
	4 wk	179	183	181b
	4 wk & 6 wk	189	202	196a

No N control = 115 bu/acre

Optimum N rates and yield with several N source/timing options, Hancock, WI, 2004

N Source & timing	R^2	EONR	Yield @ EONR
		lb/acre	bu/acre
ESN:PP	0.79	227	173
ESN:PP&4wk	0.88	215	190
Am. Sulf. 4&6 wk	0.95	193	202
Overall	0.99	207	187

Nitrogen timing, placement and source effects on corn yield, Waseca, MN, 2004*

Timing	Placement	Source	Yield bu/a
Fall	band (4 in)	Urea	164
Fall	band (4 in)	ESN	168
Fall	bcast	ESN	149
PP	bcast incorp	Urea	179
PP	bcast incorp	ESN	176
Post plt	surf bcast	ESN	185
PP	inject	AA (120)	185
None	----	----	97

*corn after soybean, 100 lb N/acre rate for all treatments.
G. Randall, Univ. Minn. LSD (0.10) = 6.2 bu/acre

SUMMARY - 2004

- Rainfall patterns favored leaching
- Preplant N treatments showed N deficiency (except PCU/ESN)
- Sidedress or split N applications were superior to preplant
- PCU/ESN shows potential for lowering N losses where all or part of the N is applied preplant

Corn yield response to preplant or sidedress N at 65 sites in Iowa, 1987-1991

Sites	Number
Total	65
N responsive	25
Preplant = SD	15
Preplant > SD	8
Preplant < SD	2

Killorn, et al., ISU

Corn yield response to preplant or split N at 32 sites in Minnesota, 1989-1992

Sites	No.	Soil parent material		
		Glacial till	Loess	Outwash
Total	32	14	11	7
N responsive	28	14	9	5
Preplt. = Split	16	7	7	2
Preplt. > Split	4	3	1	0
Preplt. < Split	8	4	1	3

Randall, MN

Prioritizing N Applications

- Apply some N to all potentially responsive acreage.
- Credit N from non-fertilizer sources
- Use diagnostic tests to identify N needs
- Manage N to avoid losses