Effect of Soil pH and Alfalfa Stand Density on Alfalfa Nitrogen Credits

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Alfalfa N fertilizer replacement value:

- Most states adjust N credits for stand
- Observations by several researchers support this concept
- 1989-1992 Wisconsin studies showed 0.6-0.8 lb N/% stand appropriate
- Current UW adjustment
  - 30 lb N/category
- Other factors (regrowth, soil type) also important

Experimental details:

Two sets of experiments

- Time
  - 1997 - Hancock and Spooner
  - 2002 - Hancock, Marshfield and Spooner
- pH
  - 4.8 - 6.9 Hancock (8 levels)
  - 4.2 - 7.1 Marshfield (6 levels)
  - 4.7 - 6.9 Spooner (5 levels)
- N rates
  - 0 - 210 lb N/a (30 lb N increments)
- Each pH had all N rates superimposed
- Only 2 replications

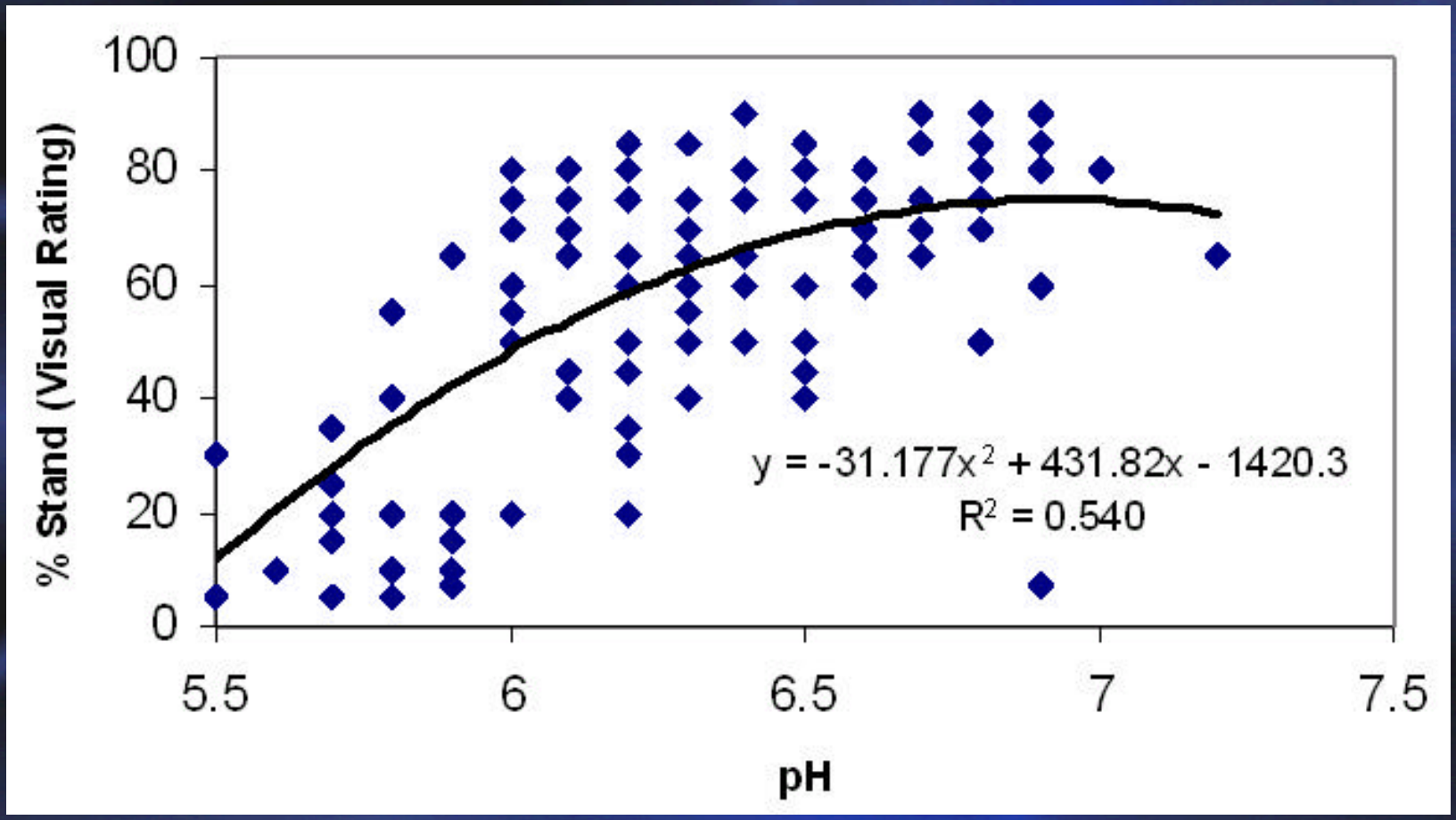
Experimental details

- Corn planted early May
- PSNT
- Harvested whole plants (silage) and grain
- Analyzed whole plants for N (not done for 2002 experiments)

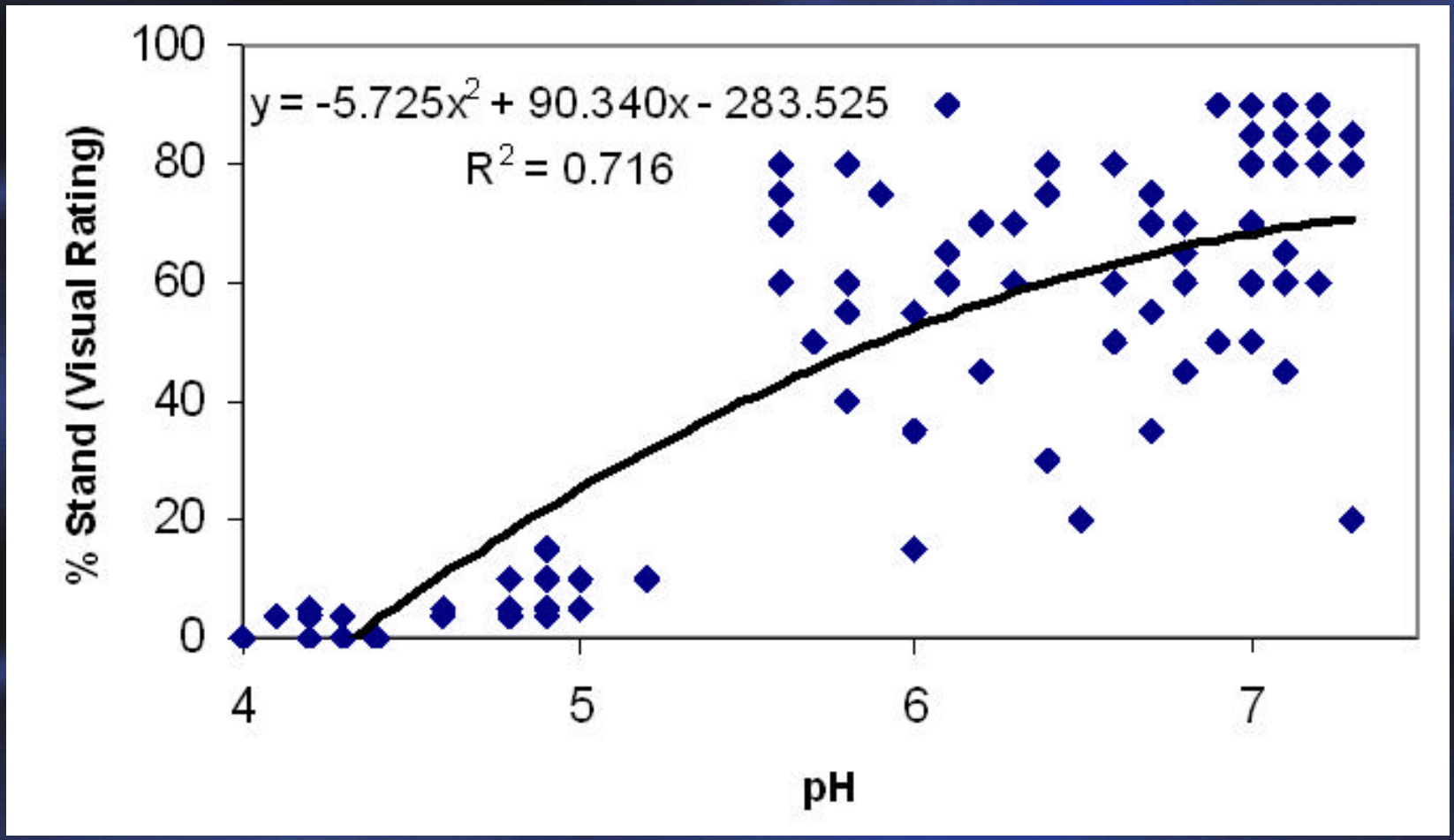
Effect of pH on stand

Target	1997		2001		
pH	Hanc	Spn	Hanc	Msh	Spn
	---------- % stand (visual test) ----------				
4.7	21	20	20	2	6
5.2	22	54	30	7	26
5.7	36	58	46	59	27
6.2	63	50	68	59	86
6.7	70	60	67	67	93
7.2	71	-	76	70	-

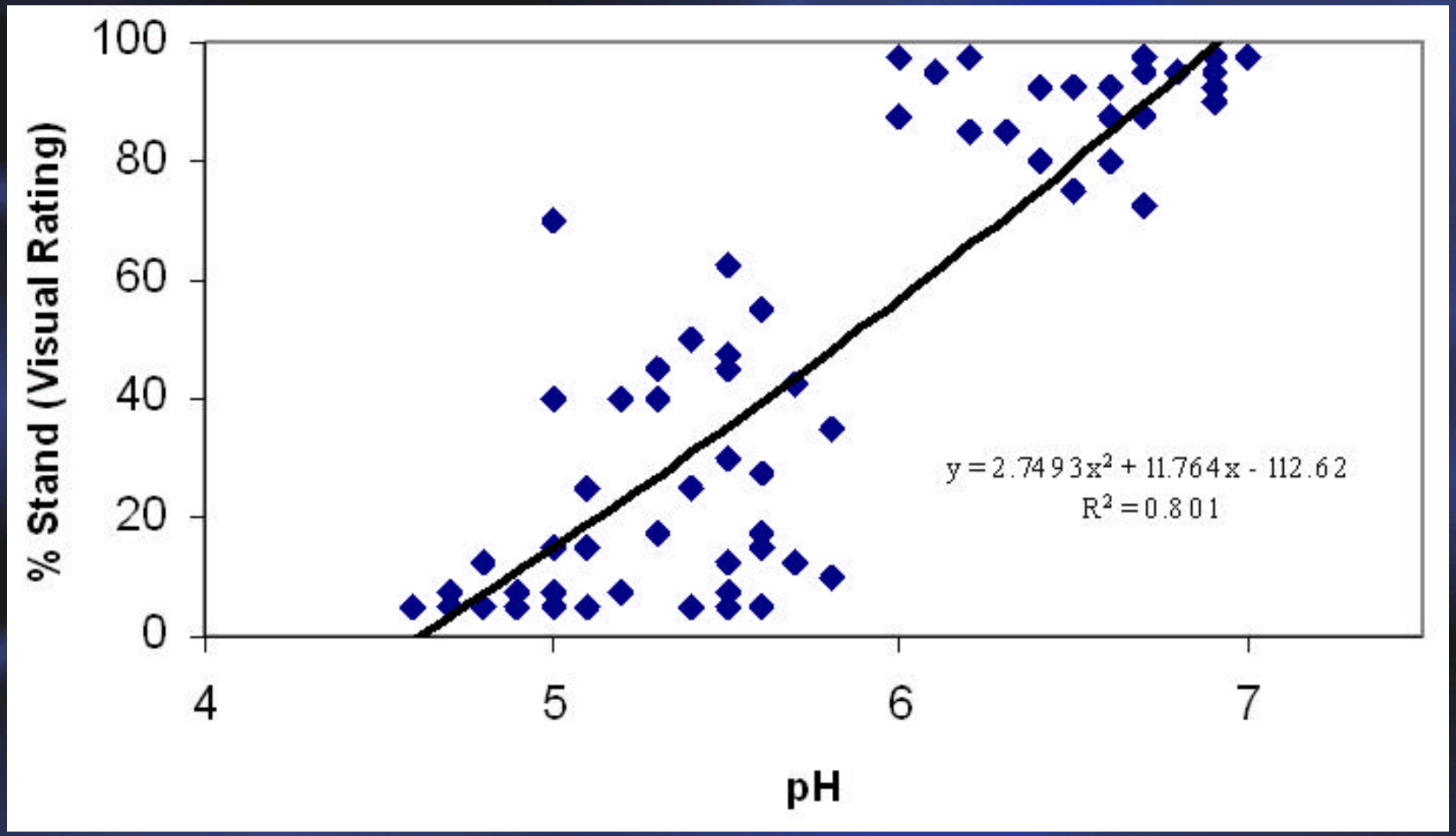
Effect of soil pH on alfalfa stand (visual rating) at Hancock, WI 2001.



Effect of soil pH on alfalfa stand (visual rating) at Marshfield, WI 2001.



Effect of soil pH on alfalfa stand (visual rating) at Spooner, WI 2001.



Average effect of stand density (pH) on corn grain and silage yield, Marshfield, WI, 2002.

2001 pH	Stand Density	Yield	
		Silage	Grain
		T/a	bu/a
4.25	2	6.25	122
4.89	7	6.85	129
5.83	59	7.22	134
6.48	59	7.37	144
6.95	67	7.95	151
7.11	70	7.58	154

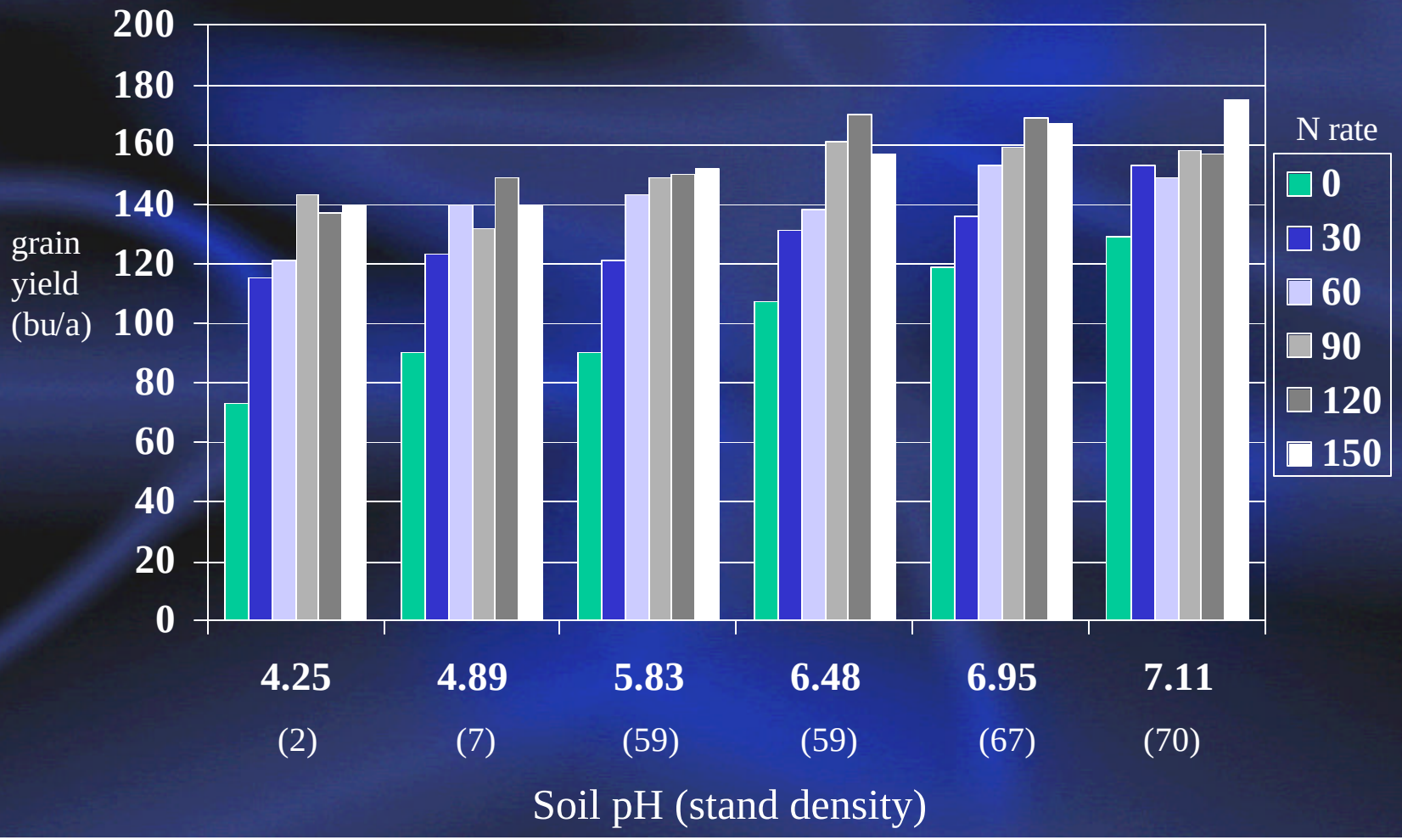
Averaged across fertilizer N rates

Average effect of fertilizer N rate on corn grain and silage yield, Marshfield, WI, 2002.

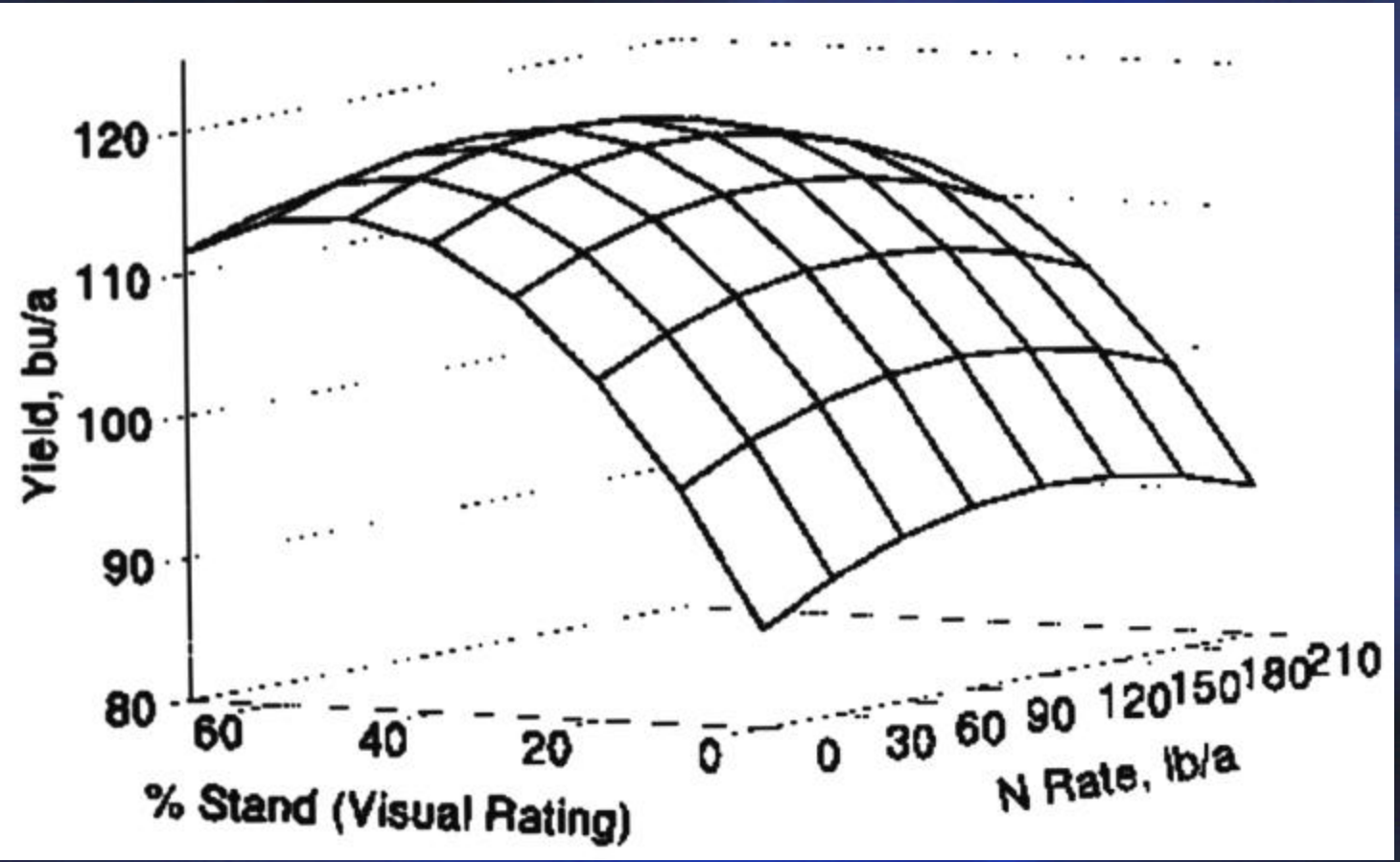
	Yield	
N rate	Silage	Grain
lb N/a	T/a	bu/a
0	6.08	101
30	6.52	130
60	7.35	141
90	7.52	150
120	7.93	155
150	7.82	155

Averaged across 6 pH levels

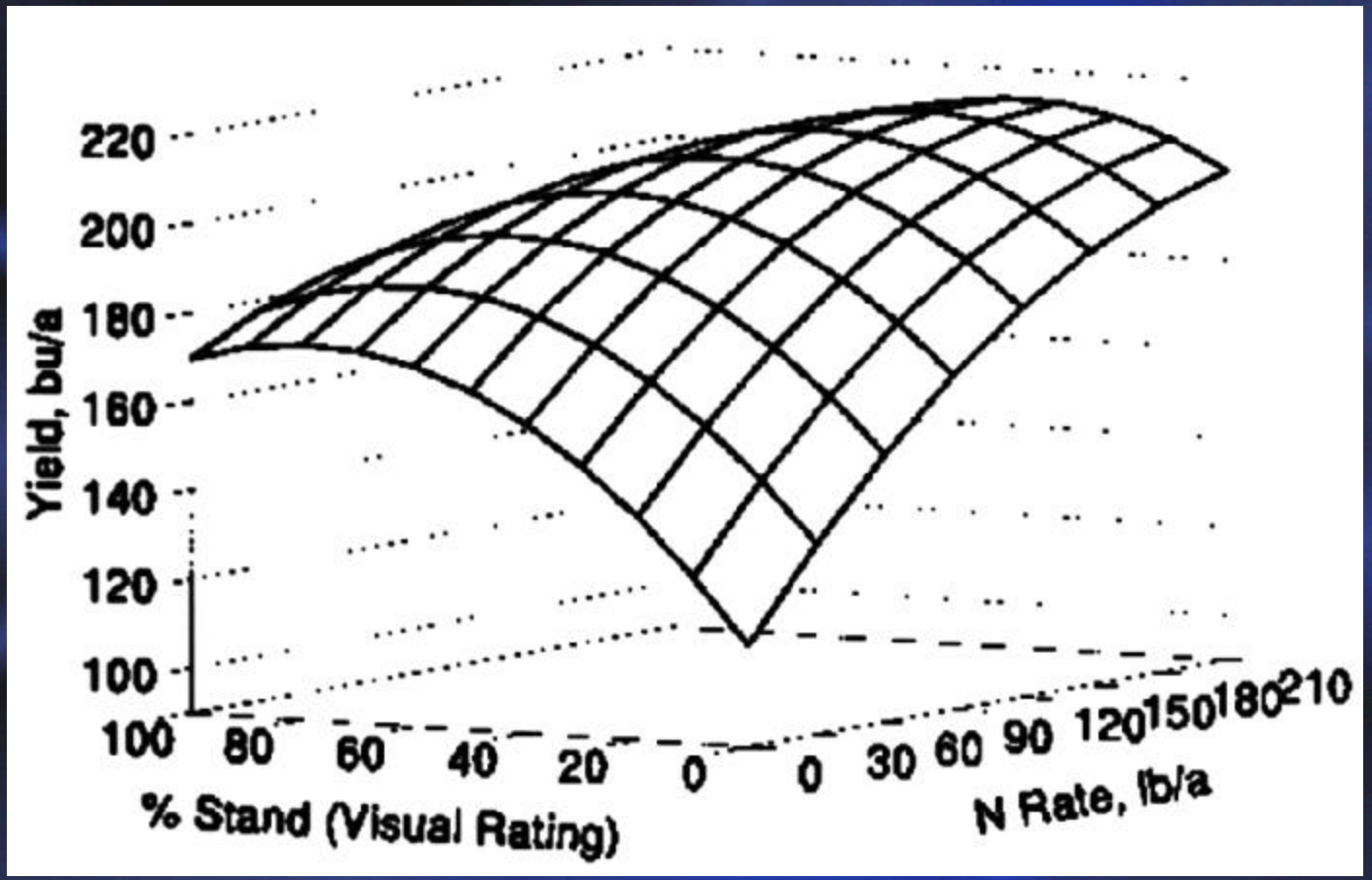
Effect of pH (and estimated alfalfa stand) on corn silage and grain yield response to N fertilizer at Marshfield, 2002.



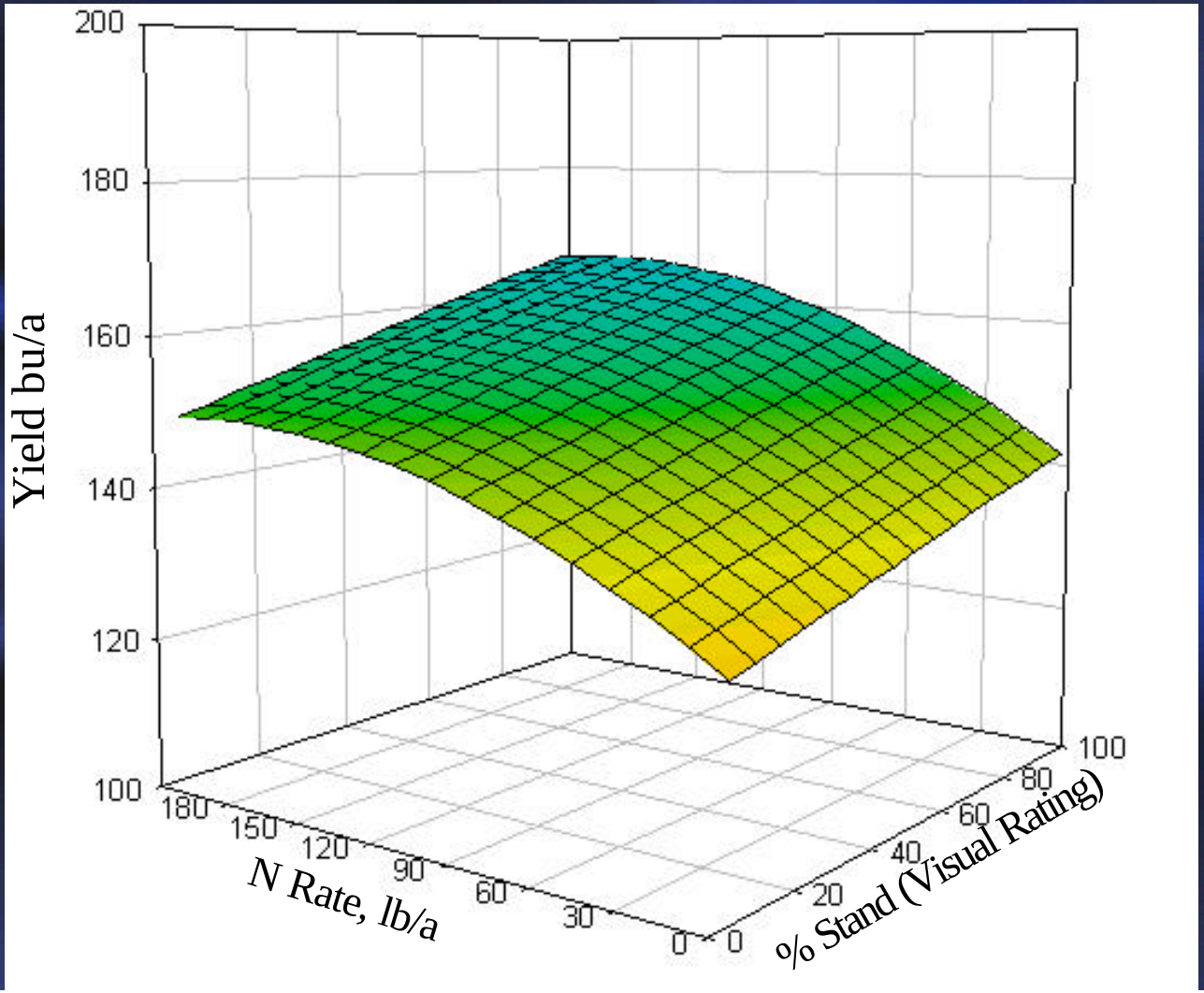
Effect of alfalfa stand (visual rating) and applied N on corn grain yield response to applied N at Spooner, WI, 1997.



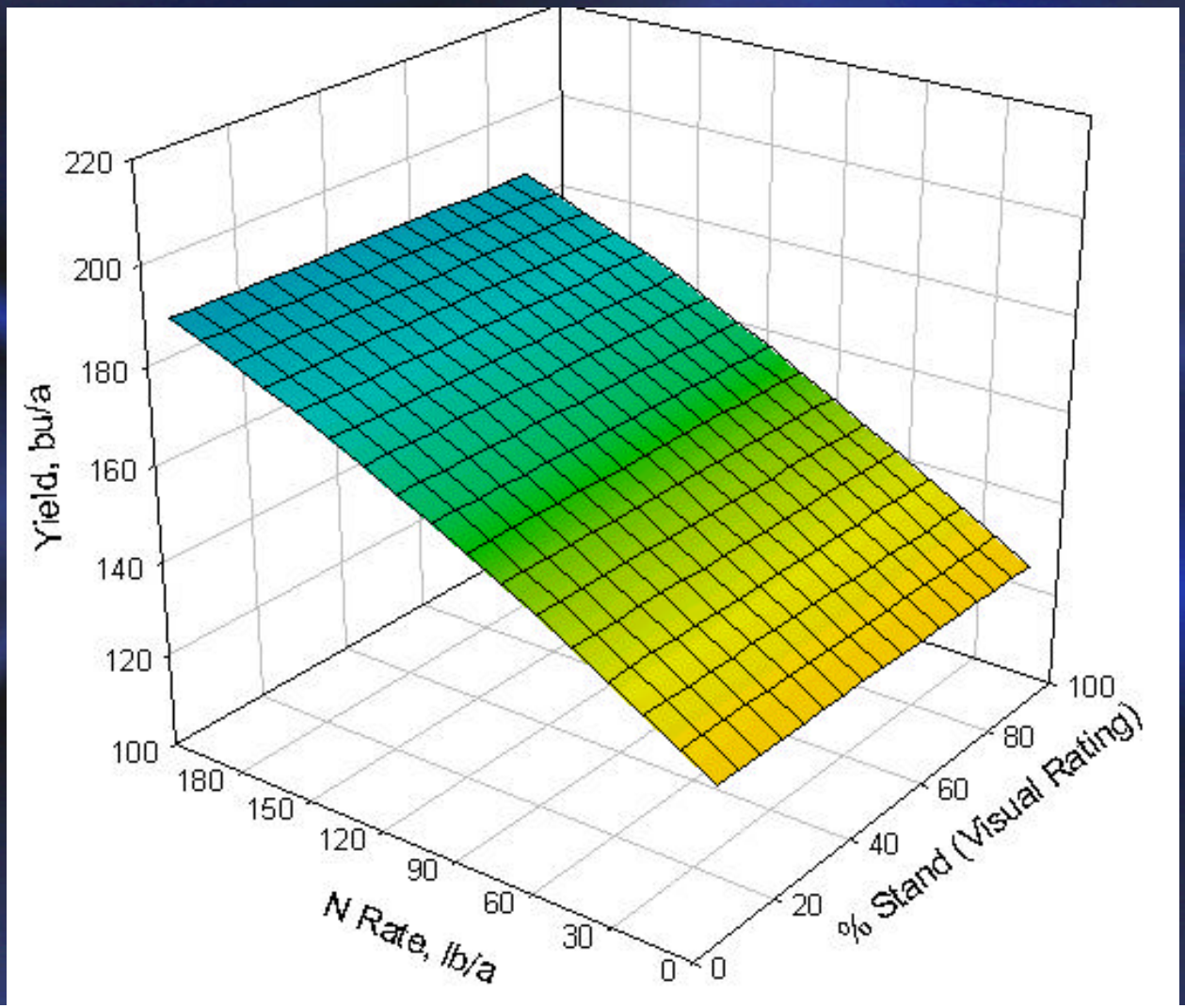
Effect of alfalfa stand (visual rating) and applied N on corn grain yield response to applied N at Hancock, WI, 1997.



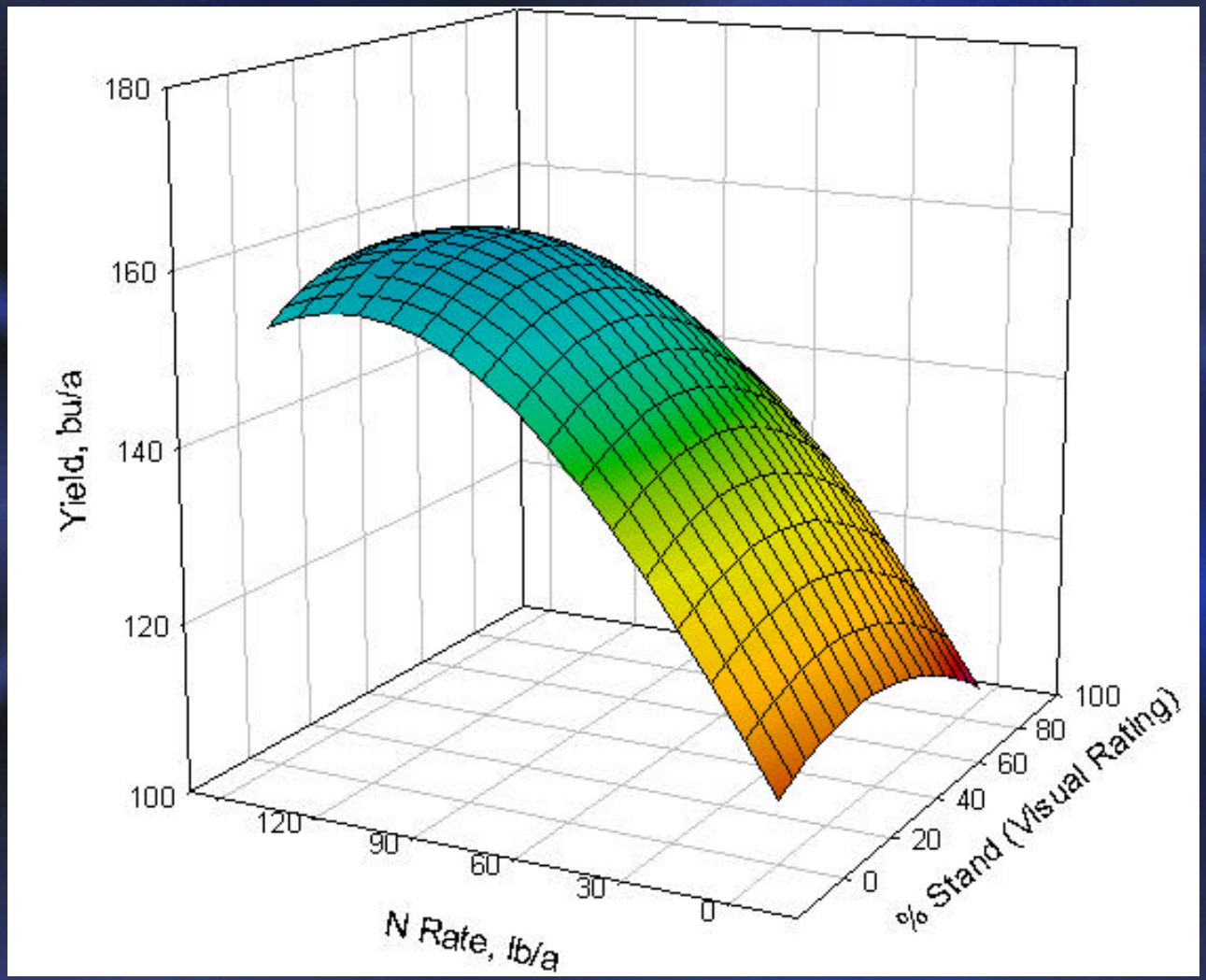
Effect of alfalfa stand (visual rating) and applied to N on corn grain yield response to applied N at Spooner, WI 2002.



Effect of alfalfa stand (visual rating) and applied to N on corn grain yield response to applied N at Hancock, WI 2002.



Effect of alfalfa stand (visual rating) and applied to N on corn grain yield response to applied N at Marshfield, WI 2002.



Summary

- pH >5.6 needed
- Significant N supplied by alfalfa
  - Environment can be important
- % stand affects optimum N rate
- About 1.3 lb N/% stand in 1997; 0.1-0.9 lb N/% stand in 2002
- UW recommendations are about right

Amount of N to apply to corn following alfalfa (less than 8” regrowth)

stand density	sands*	other soils+
	---------- lb N/a ----------	
poor (0-30%)	160	70
fair (30-70%)	130	40
good (>70%)	100	10

*Irrigated

+High and very high corn yield potential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