

# Short and Long Term Economics of Fertilizer Banding



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# Today, There Is No Stability

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- fluctuation in input costs and commodity prices
- makes short term planning difficult, if not impossible
- must think long term
- therefore, go with proven practices and concepts



# Thinking Ahead

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- management practices for mobile nutrients (N,S) can fluctuate
- placement of immobile nutrients affects costs (band vs. broadcast)
- what about repeated banding?
- sampling technique is an issue
- sampling will be used to monitor rather than predict



# Some Basics

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- 1/3 of applied P absorbed in the year of application
- small amounts in subsequent years
- remainder increases soil test P or is fixed (tied up)
- banding reduces soil/fertilizer contact thereby reducing fixation



# Soil Temperature and P Uptake By Corn

P in a band	Soil Temperature		
	59	68	77
	milligrams/pot		
35 lb./acre	3.5*	10.4	18.0
70 lb./acre	6.7	13.5	19.6

\*measurements taken 5 weeks after emergence

# Soil Volume Fertilized: Root and Top Growth

Soil Volume Fertilized	Tops	Roots
%	gms/plant	feet/plant
3	5.1	120
6	4.3	148
12	4.3	139
25	4.0	104

Soil Test P=low; 32 days after planting

# RELATIVE SOURCES OF NUTRIENTS AT DIFFERENT SOIL TEST LEVELS

SOIL  
TEST  
LEVEL  
HIGH

SOIL → FERT.\* →

IGH

SOIL → FERTILIZER →

DIUM

SOIL → FERTILIZER →

OW

SOIL → FERTILIZER →

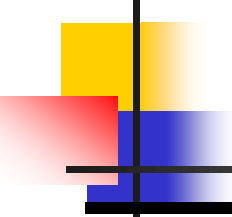
LOW

SOIL → FERTILIZER →

NUTRIENTS  
AVAILABLE  
FROM SOIL

NUTRIENTS REQUIRED FROM FERTILIZERS

\*(Fertilizers used at "very high" levels are for "starter" or "maintenance" purposes.)



# Long Term Phosphate Application

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Location	Ave. Phos lb./acre	Initial soil test P, ppm	Control soil test P, ppm	UNL rec
Mead	40	8	10	20
North Platte	0	21	20	28
Northeas t	15	18	15	15

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# Questions About Banding

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- Will soil test levels change?
- Can I get the same yields with lower rates?
- How long can I do this before there's trouble?



# Fertilizer Strategy -- Morris

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Treatment	Phos Rate	Phos Cost	Ave Yld	STP
	lb./acre	\$/acre	bu./acre	ppm*
control	0	0	169.0	4.0
removal	49	44.10	174.0	8.0
U of M bdcst	35	31.50	174.8	7.7
U of M band	25	22.50	175.0	5.0

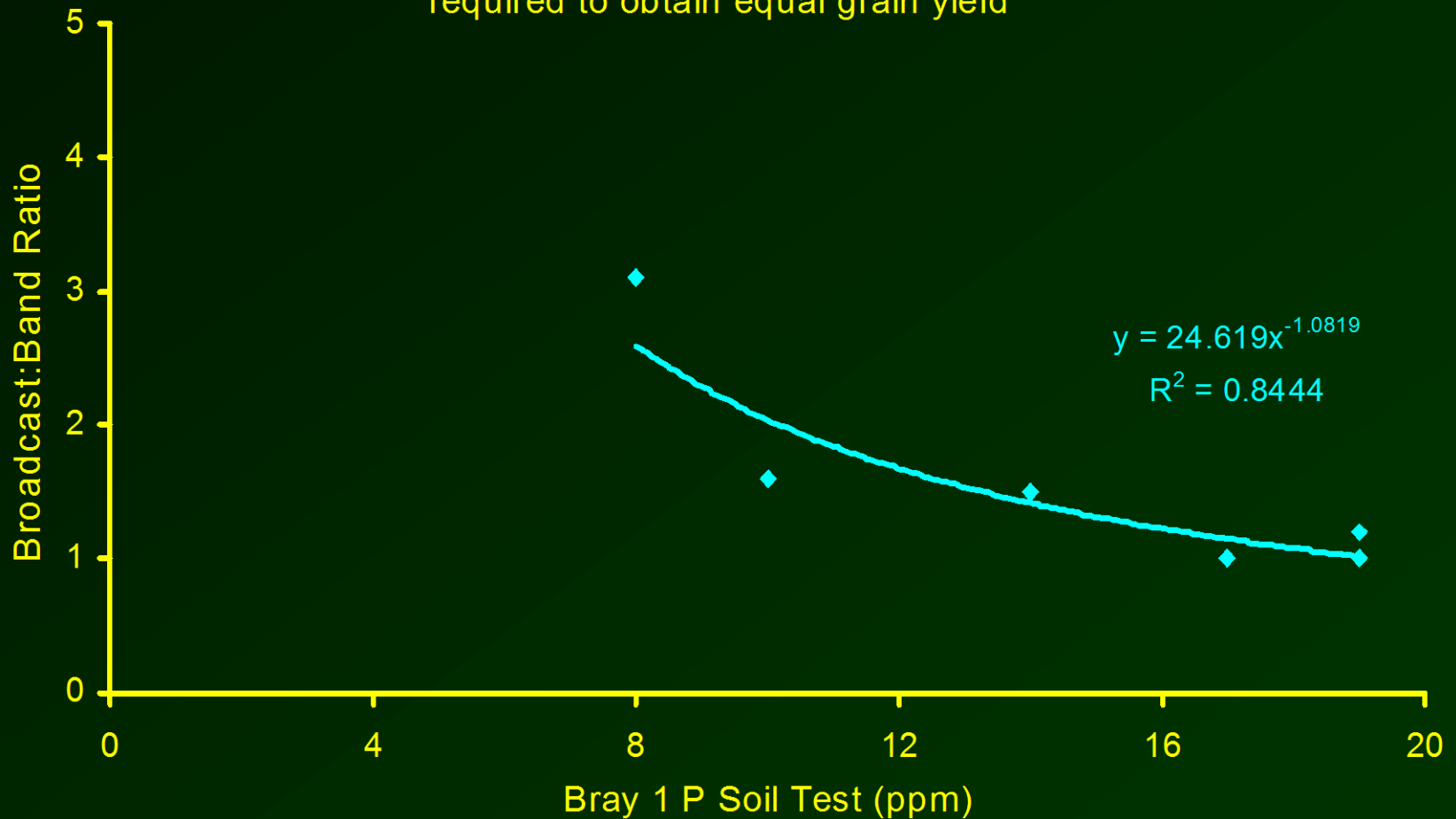
# Soil Test P—Response To Phosphate??

Site	STP ppm	Rate (lb. phosphate/acre)		
		0	20	40
McLeod	5.3 (O)	127	153	176*
Renville	13.5 (O)	159	164	157
Lamberton	9.1 (B)	109	131	140*

\*= significant yield increase:: O= Olsen; B= Bray

# How Effective is Banding vs Broadcast?

Relationship of Soil Test P level of ratio of broadcast and banded P required to obtain equal grain yield

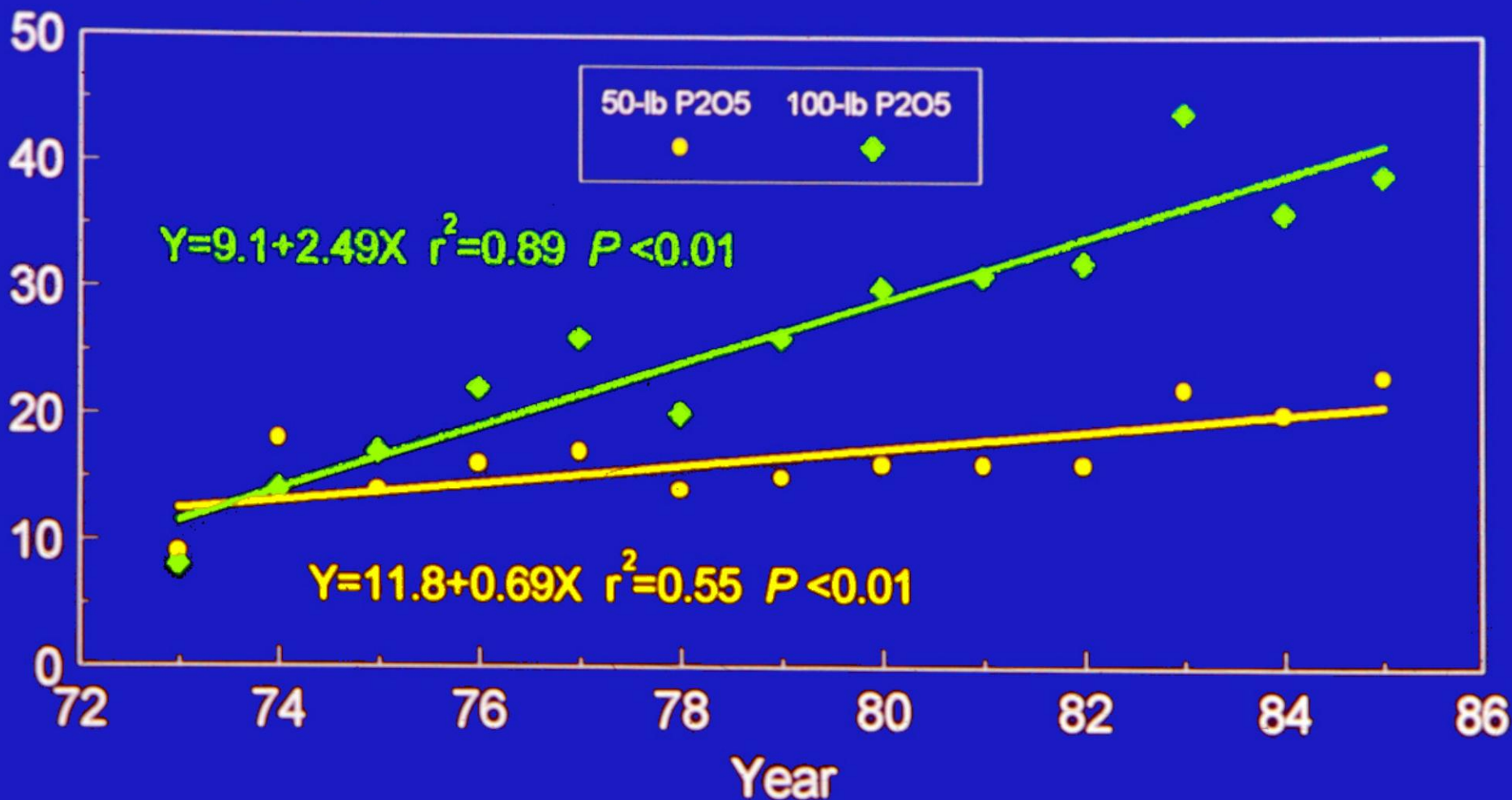


Peterson et al., 1981. *Agronomy J.*

# Incline rates of STP during a 12-yr period of annual application as influenced by P rate.

## Morris

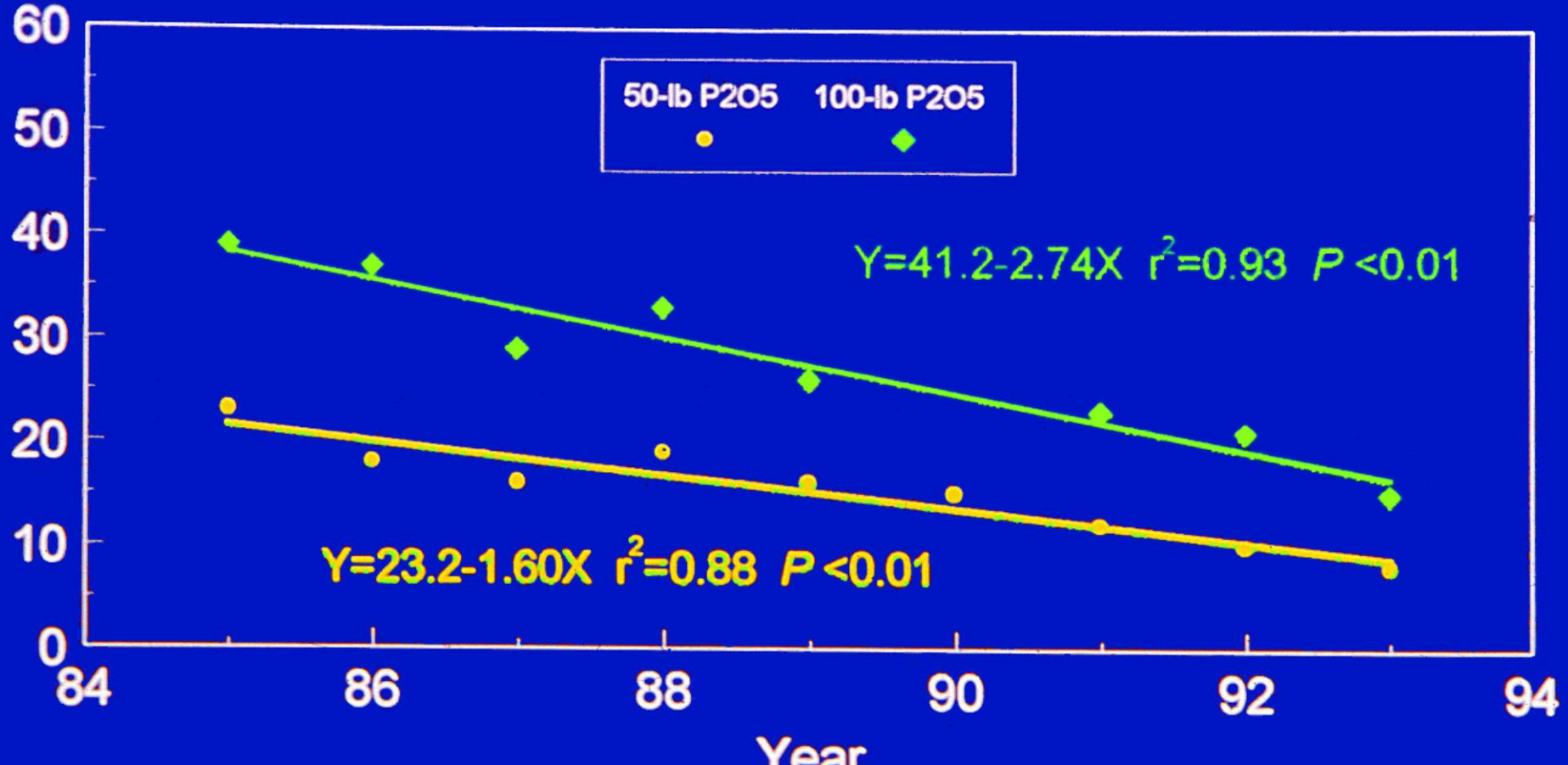
Soil Test P (ppm)



# Decline rates of STP for an 8-yr period when no fertilizer P was applied to a high testing soil.

## Morris

Soil Test P (ppm)



# The Economics of Phosphate for Soybeans

Fall Chisel				No-Till		
Phos	Yield	Cost	Return	Yield	Cost	Return
lb./a	bu./a	\$/a	\$/a	bu./a	\$/a	\$/a
0	37.0	---	---	36.7	---	---
46	44.3	34.50	31.99	44.6	34.50	32.23
92	51.8	69.00	49.40	46.0	69.00	5.40

soil test P=4.3ppm (O) soybeans=\$8/bu.;  
phos=\$.75/lb.



# Questions About Banding

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- How do I soil sample?





# Concerns

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- what will happen to soil test levels?
- how do I sample?
- residual effect of repeated banding?
- cost?
- repeated banding for 30 in. corn and narrow row soybeans?



# Soil Sampling In Banded Fields

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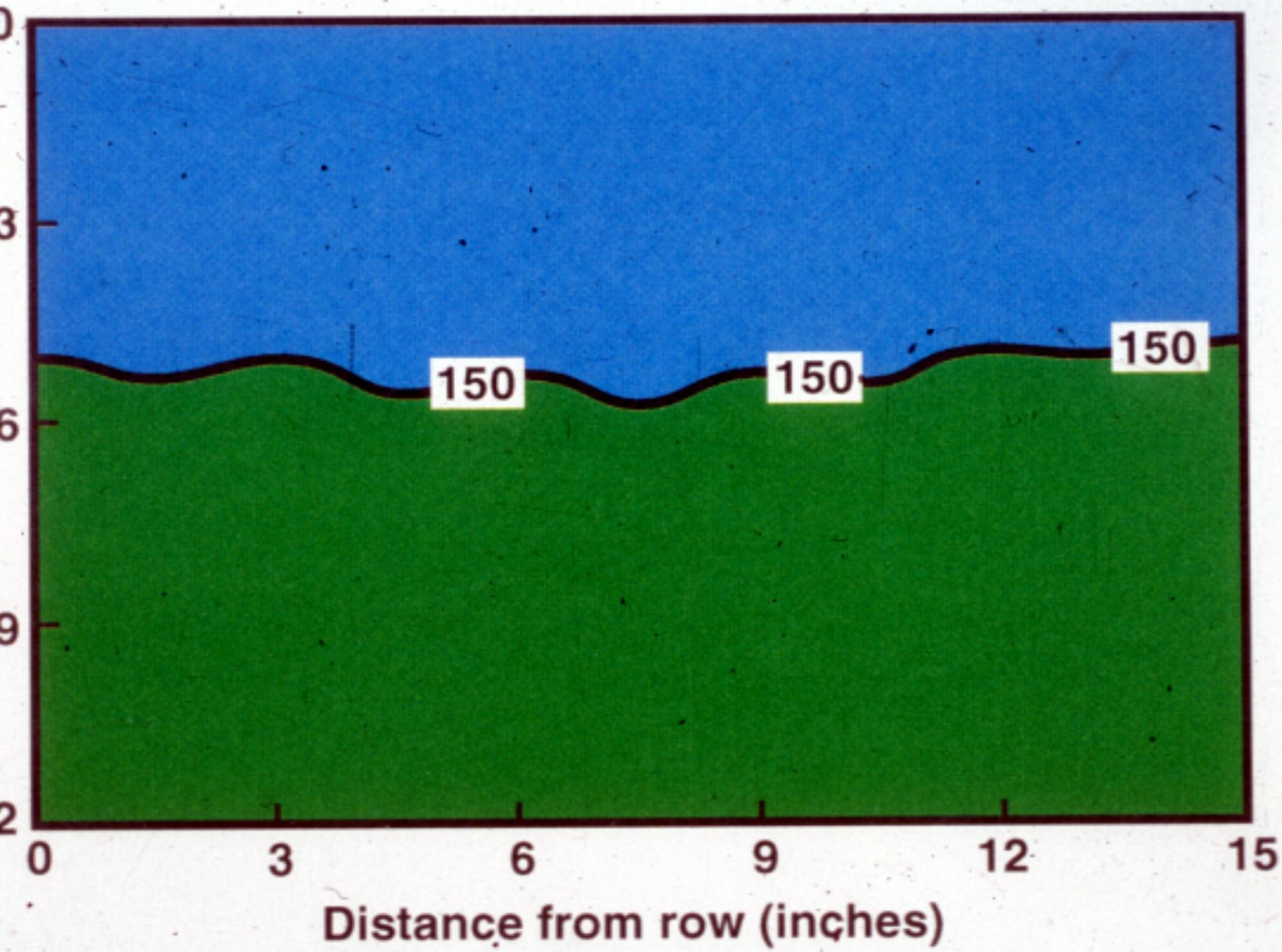
- an Idaho study evaluated 3 methods
- 1. systematic (8 cores equally spaced from row to row at 20 sites)
- 2. controlled (25 cores at random; no cores in the band)
- 3. random (50 cores at random = 1 sample)
- results:
- controlled < systematic = random

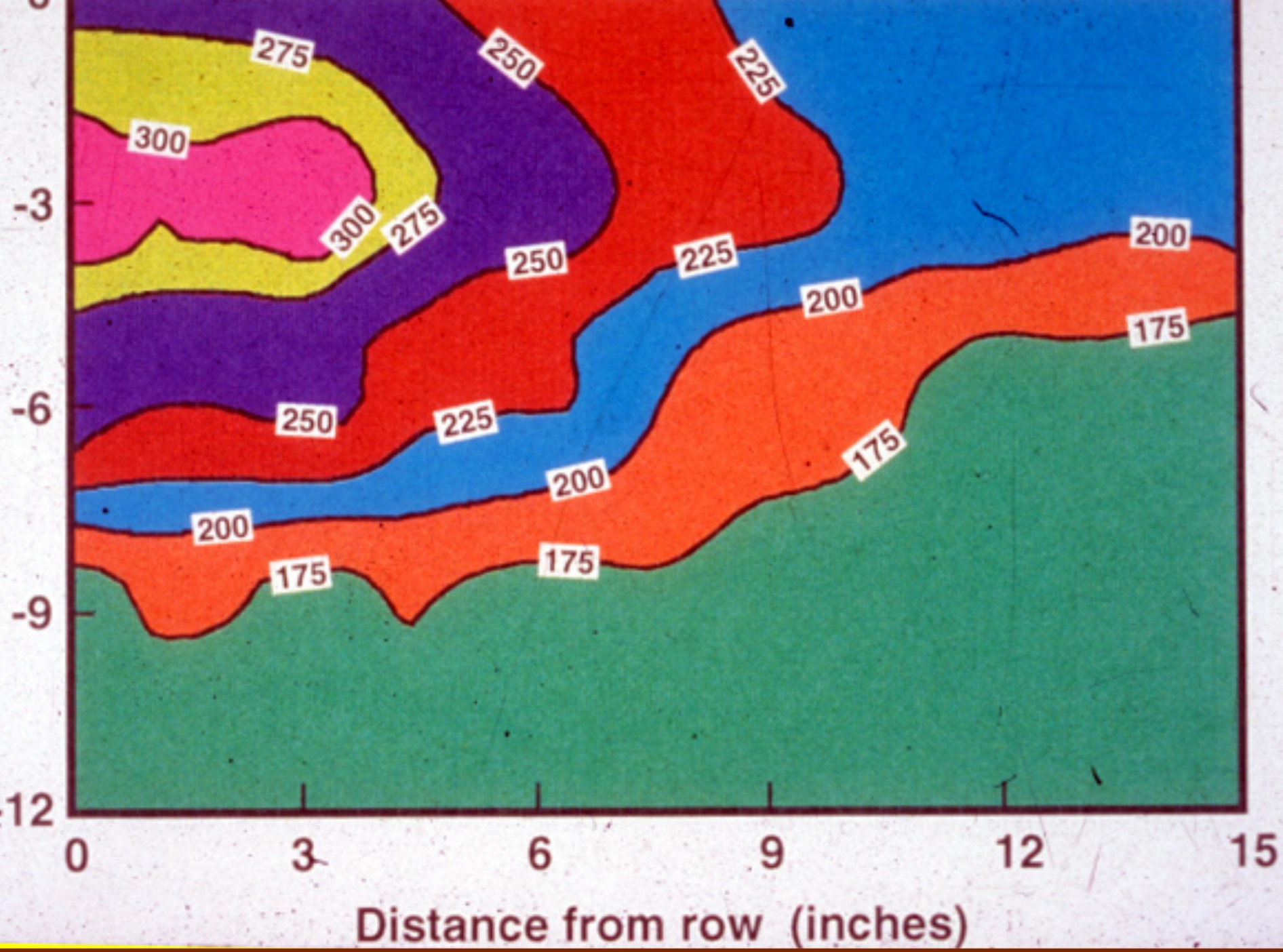


# Soil Sampling With Repeated Banding

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- collect cores 6 inches from the row to a depth of 6 inches







# Soil Sampling With Banded Fertilizer

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- role of soil testing changes in a banded production system
- emphasis on monitoring and diagnostics
- less emphasis on prediction
- I don't see this emphasis changing sample numbers



# The Future of Banding

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- bright; especially when combined with RTK
- repeated precise location increases availability of immobile nutrients



# Combination of Technologies

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- band + RTK
- repeat applications in relatively the same position
- variable rate in a band
- for corn/corn, variable band plus pop-up





# Summary

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- in the short term, band placement can substitute for broadcast
- band use also works in the long term
- role of soil sampling changes
- bright future for combination of RTK and variable rate banding

Thank You For Your Attention