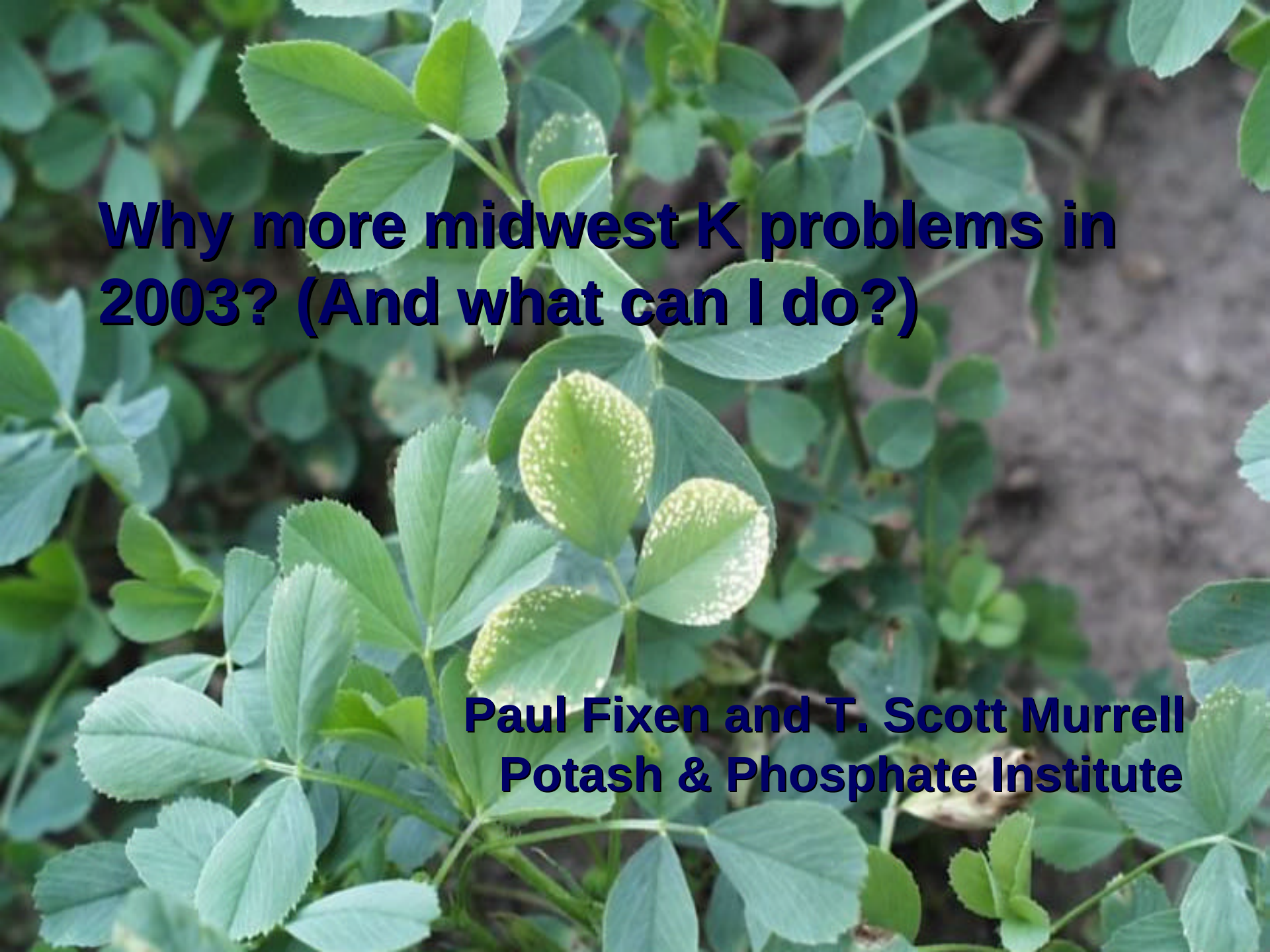


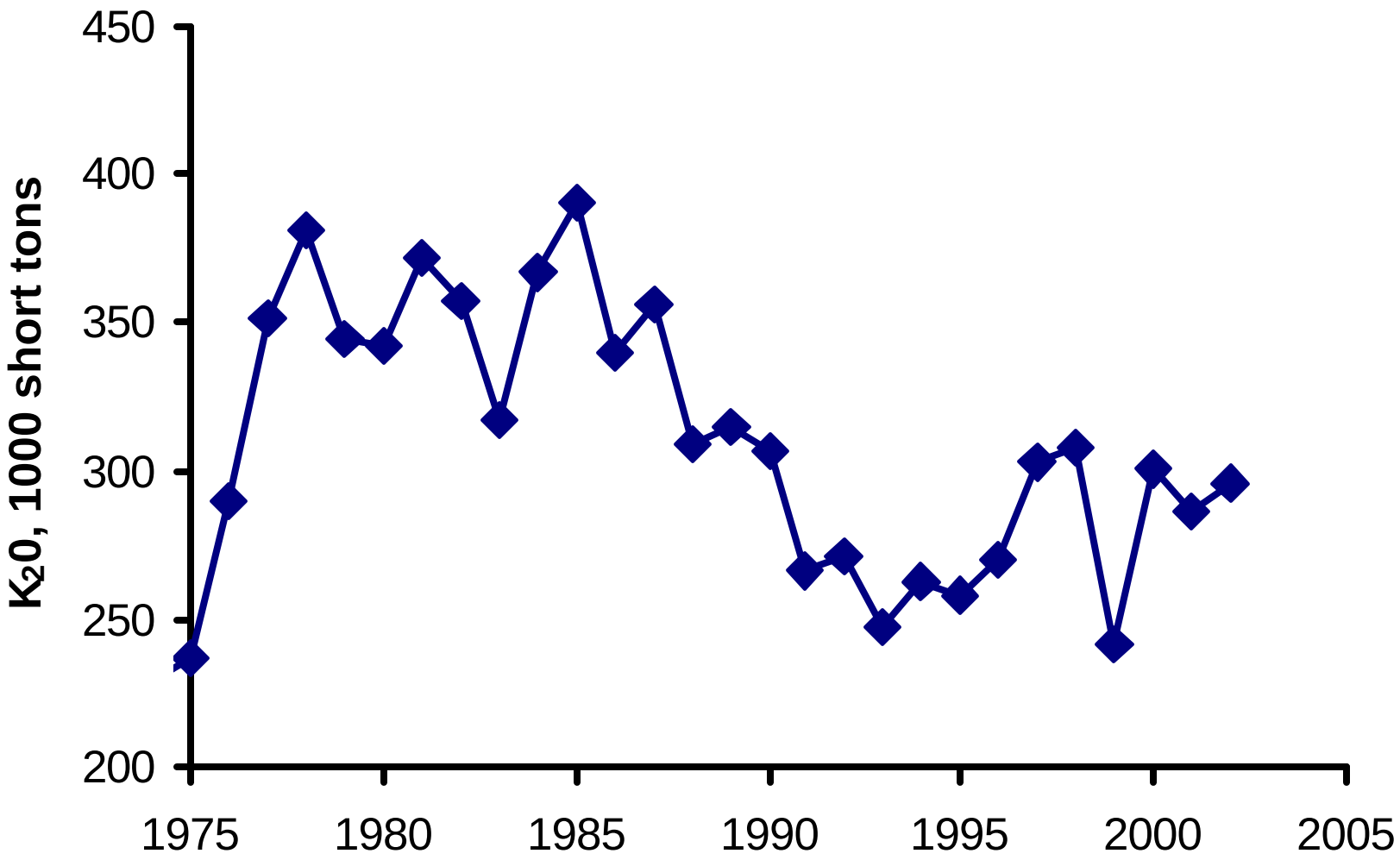
Why more midwest K problems in 2003? (And what can I do?)

Paul Fixen and T. Scott Murrell
Potash & Phosphate Institute

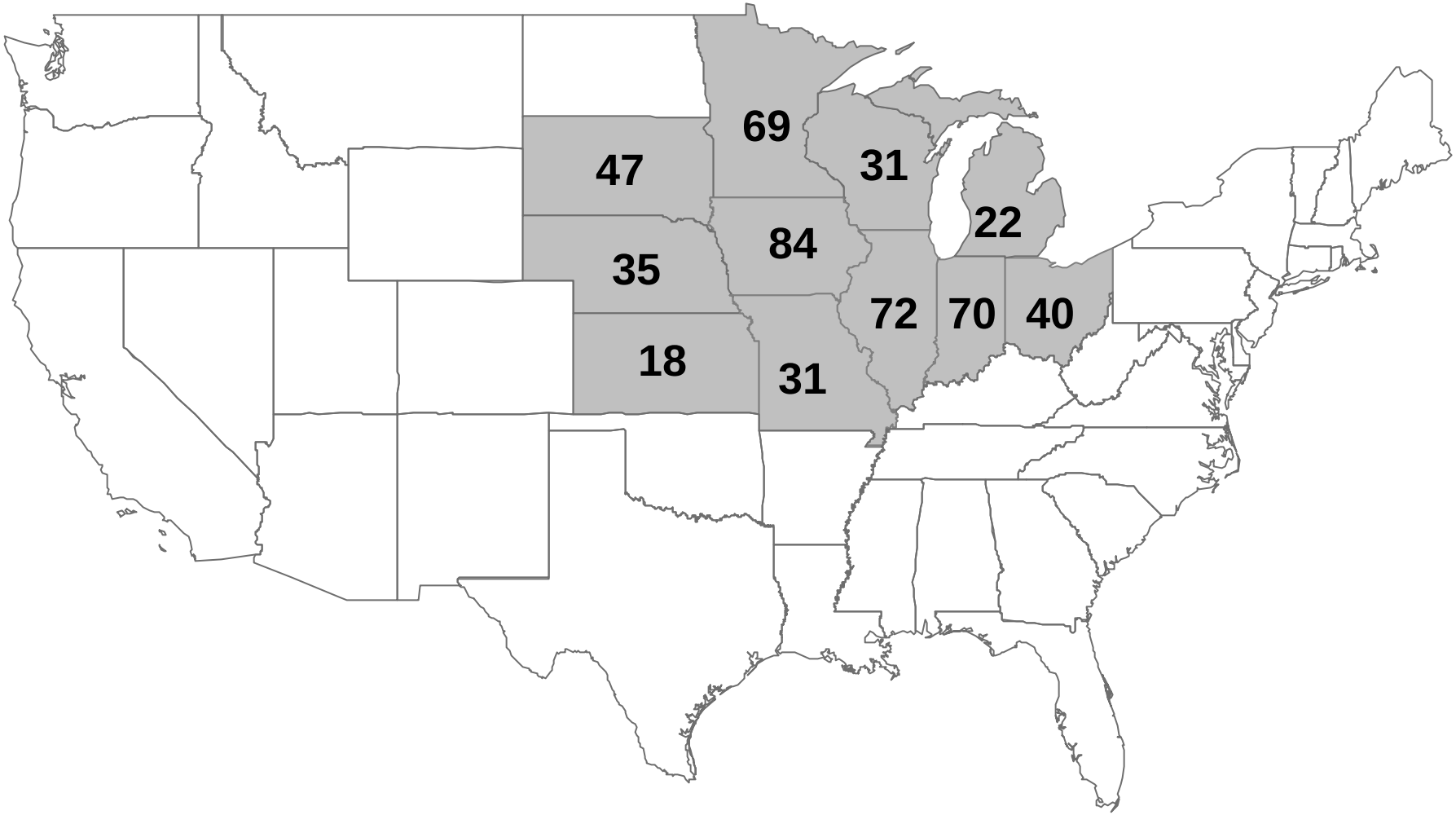
Some possibilities to be discussed

- K application vs crop removal
- Soil test K levels and trends
- Factors influencing soil test K measurement and interpretation

K fertilizer consumption in WI

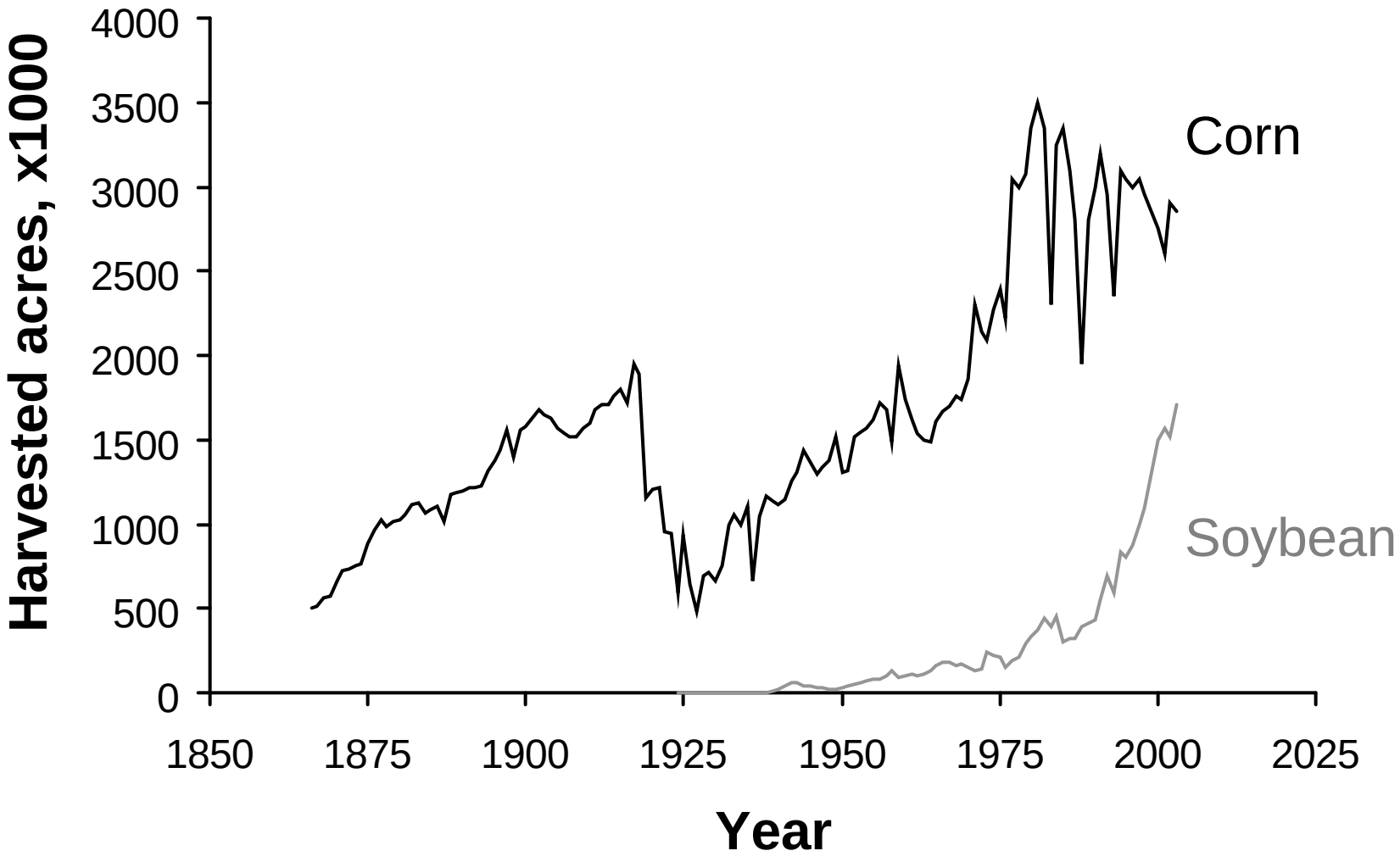


Percent of total area planted that is in a corn-soybean rotation



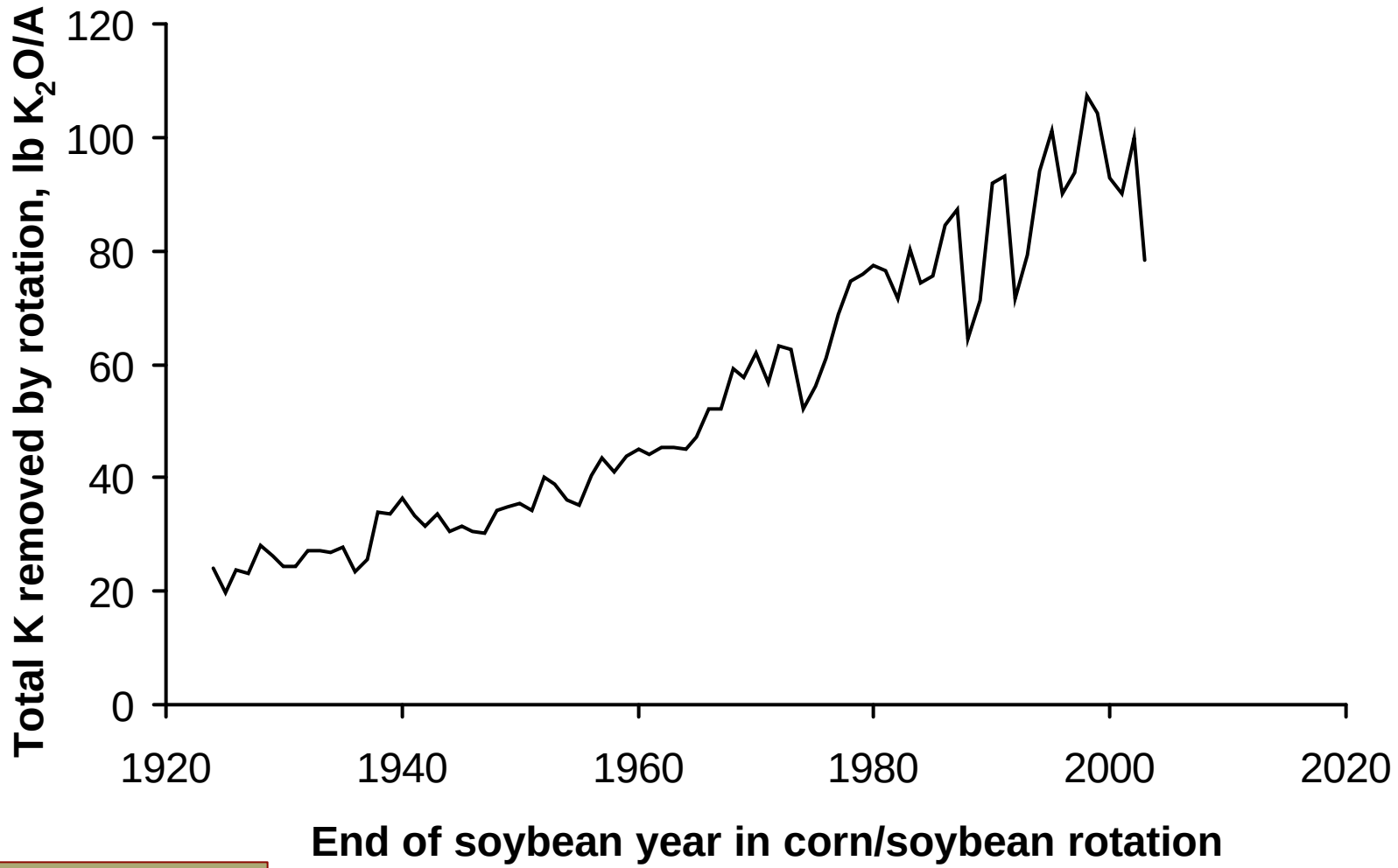
Padgitt et al., 2000

Historical corn and soybean acreage in WI



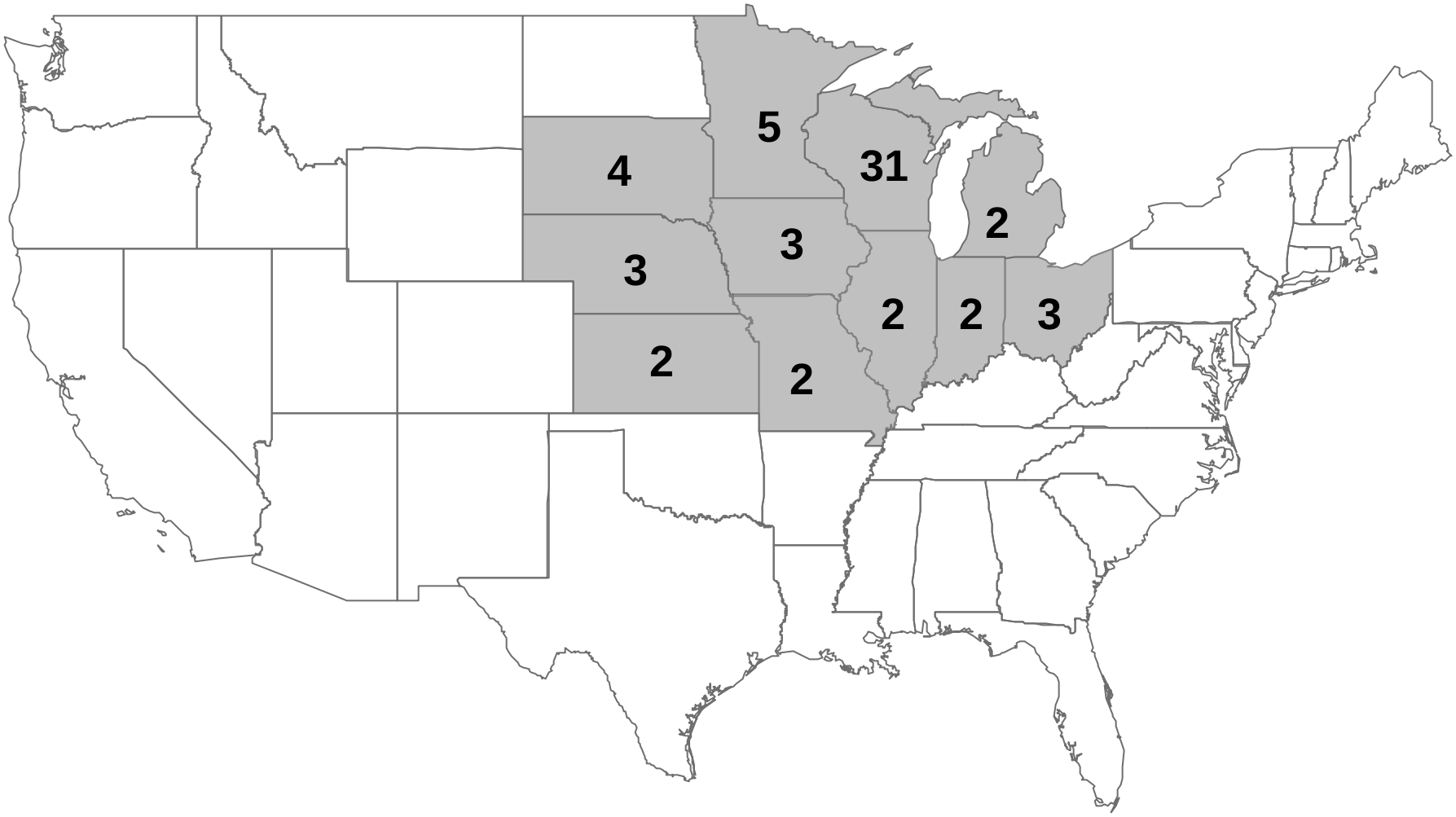
NASS, 2003

Historical K removal by corn/soybean rotation in WI



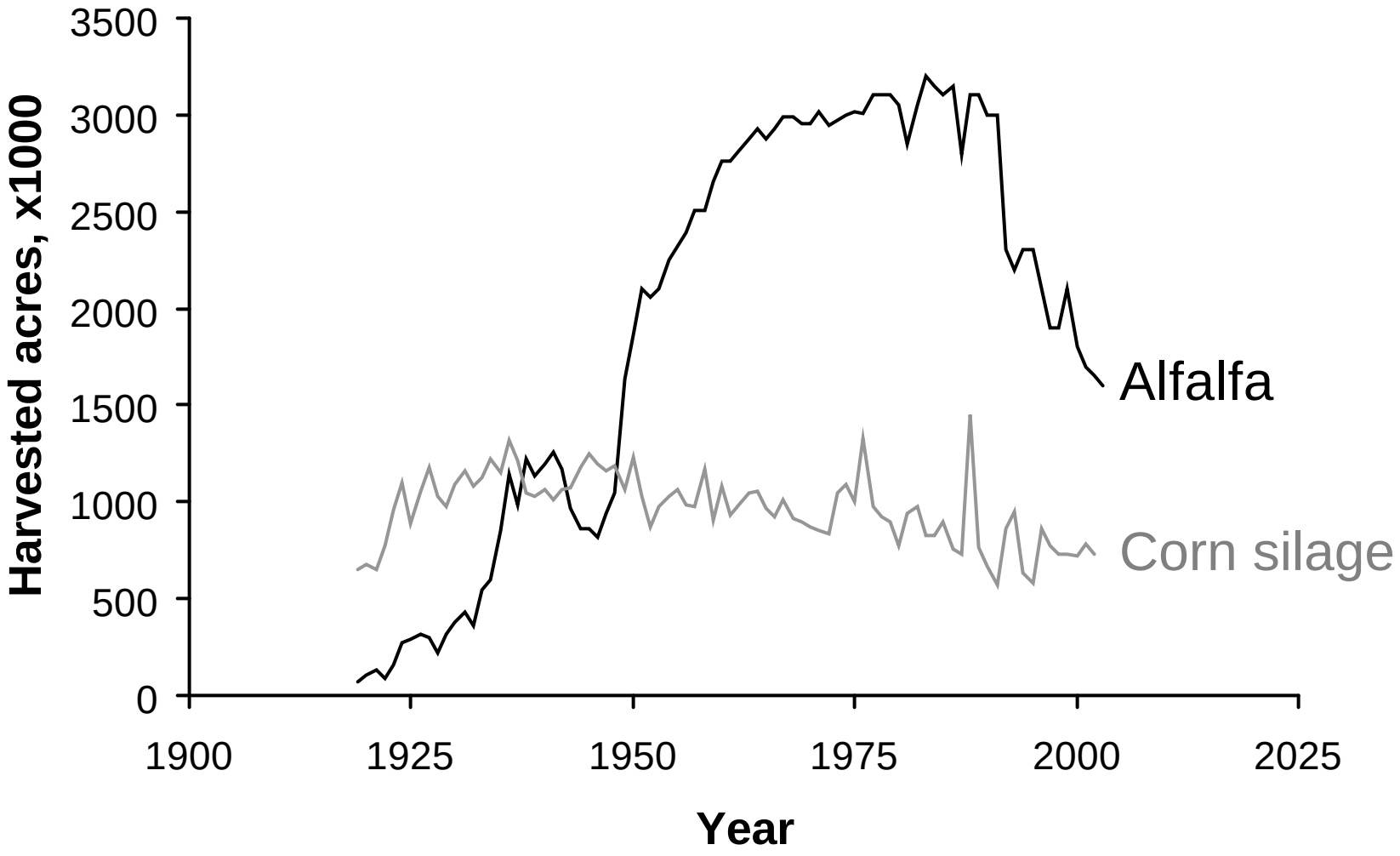
NASS, 2003; PPI, 2003

Percent of major field crop area where hay or pasture was a previous crop



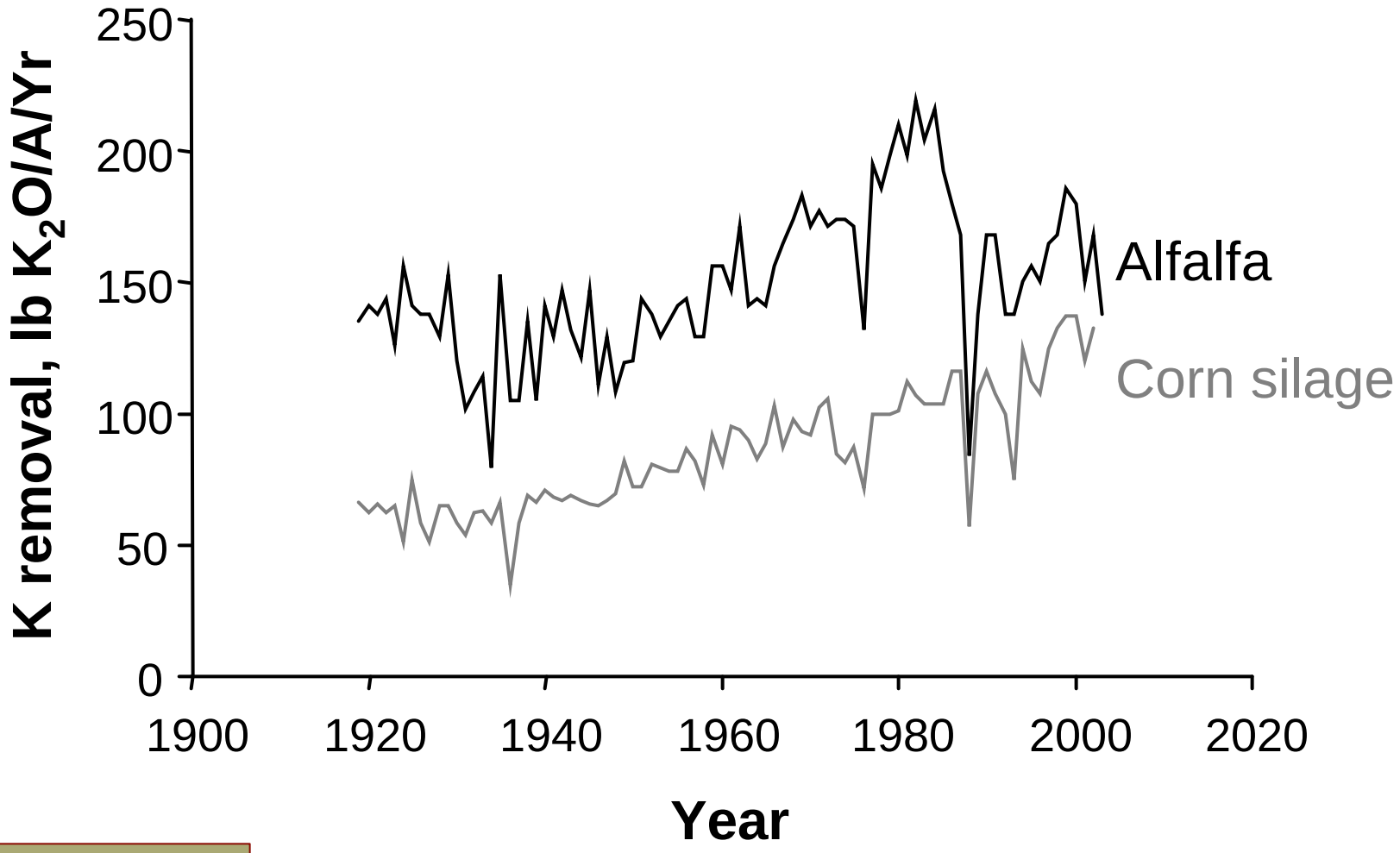
Padgitt et al., 2000

Historical alfalfa and corn silage acreage



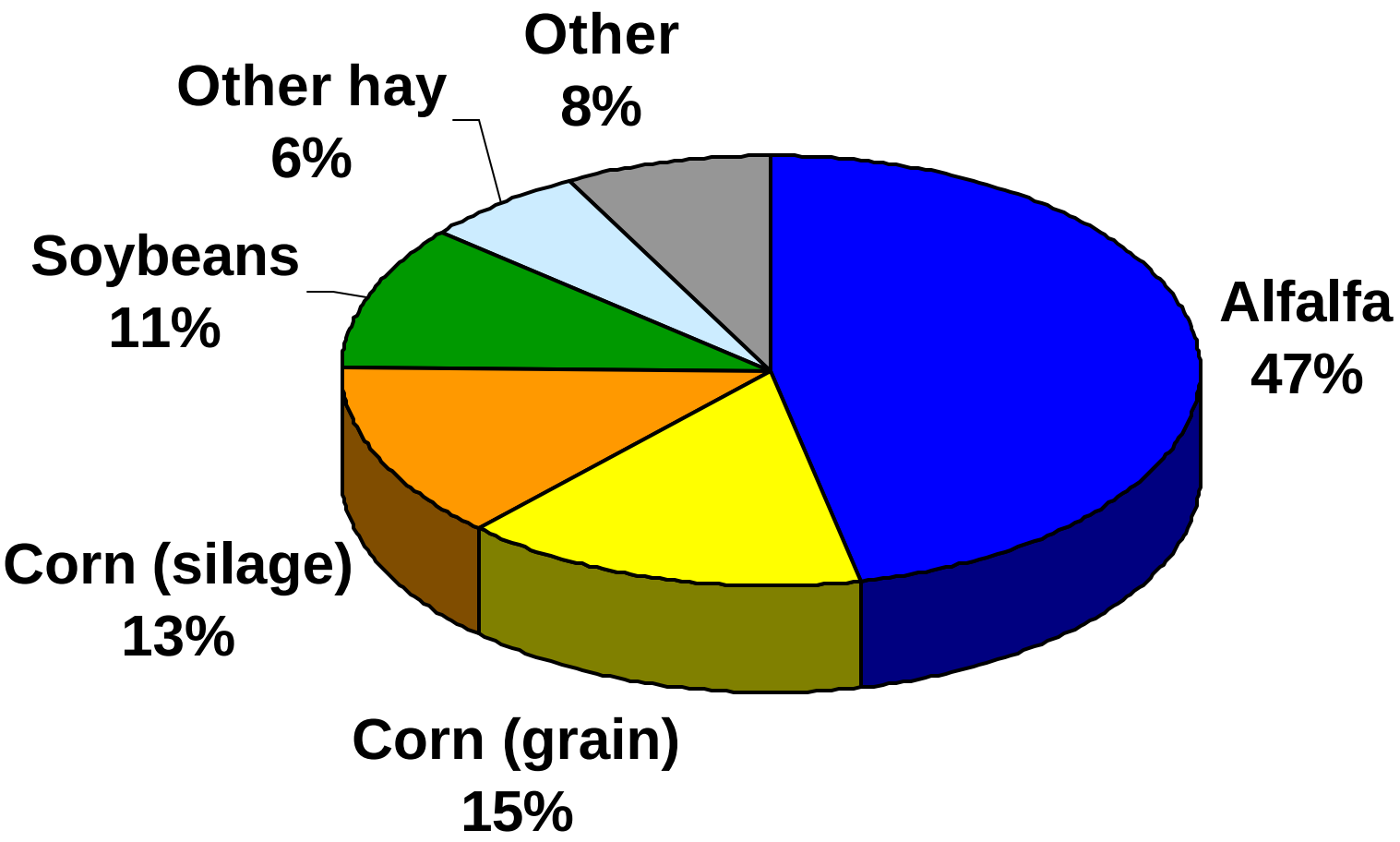
NASS, 2003

Historical K removal by forage crops in WI



NASS, 2003; PPI, 2003

Wisconsin K Removal by Major Crops

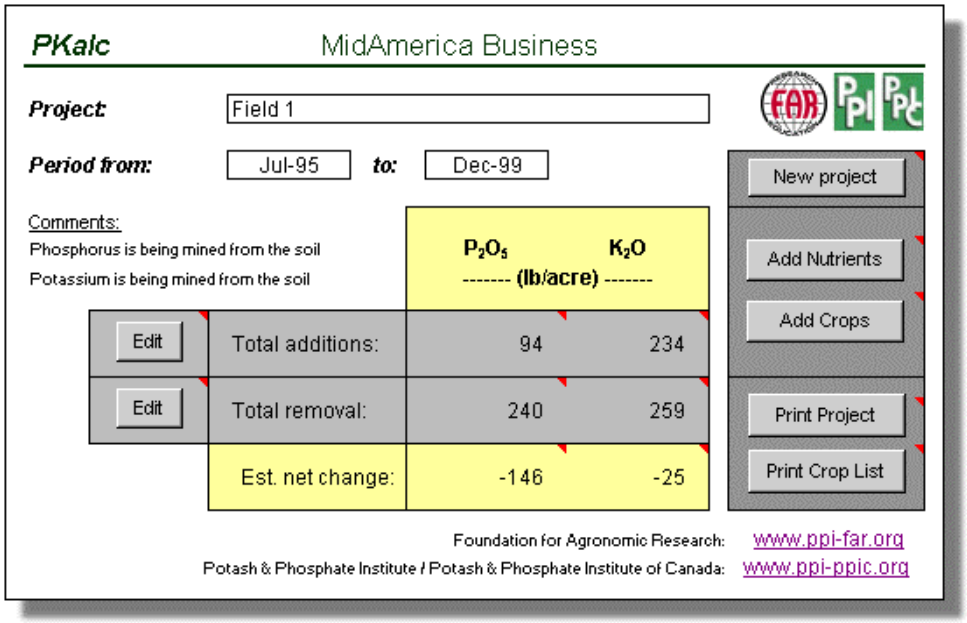


Wisconsin partial K budget

	Million lb K_2O
Crop removal (*R*)	739.0
Applied fertilizer (*F*)	567
Recoverable manure (*M*)	222
Balance: *F* – *R*	-172.0
Balance: (*F* + *M*) – *R*	50.0
Ratio: *R* / *F*	**1.30**
Ratio: *R* / (*F* + *M*)	**0.94**

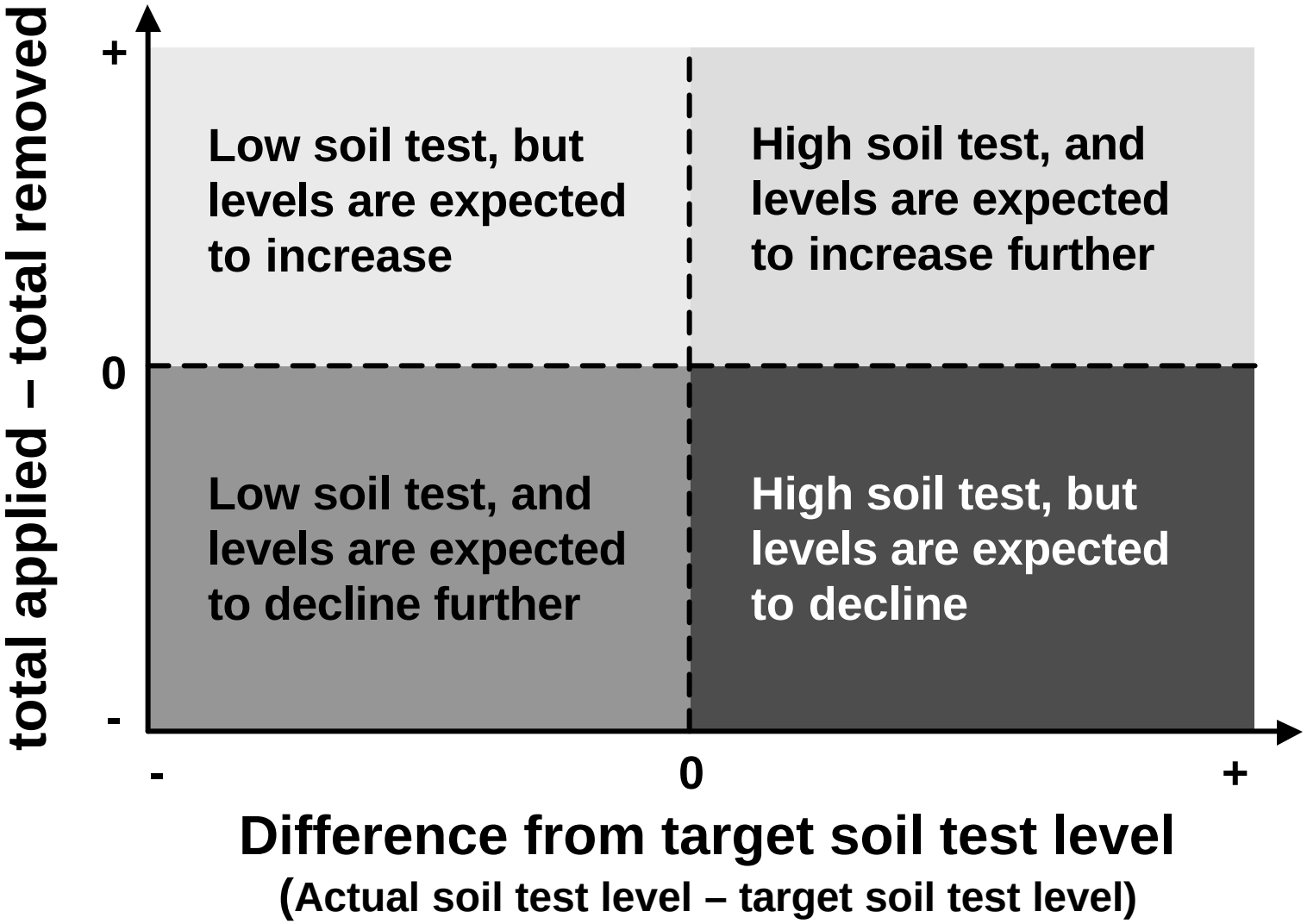
What can I do? Check K budgets.

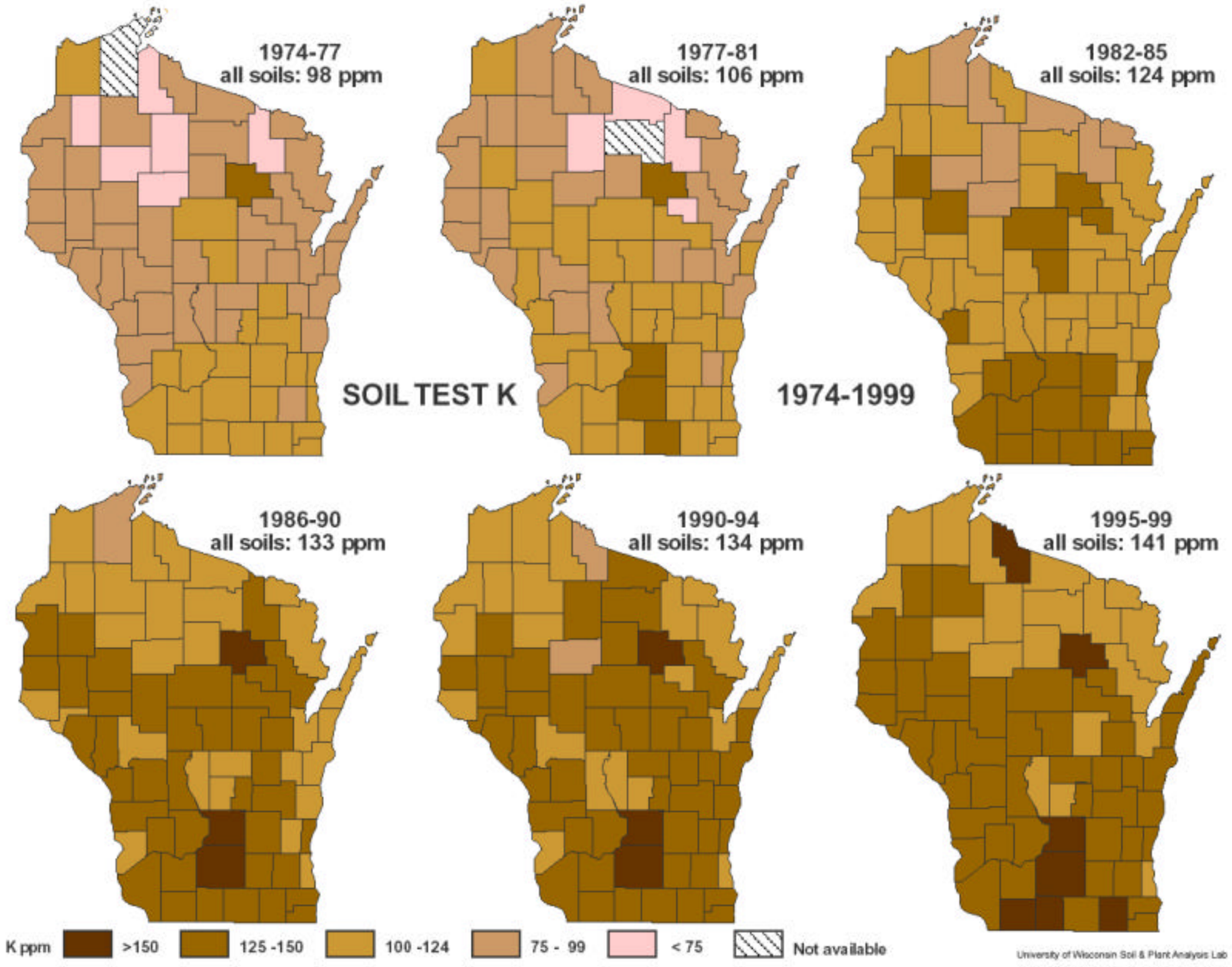
- Calculations can be
  - Done by hand
  - Performed in a spreadsheet
  - Performed by PKalc
    - Calculator that facilitates balance calculations
    - Minimizes calculation errors



www.farmresearch.com
www.ppi-ppic.org

Use a recent soil test to evaluate budgets

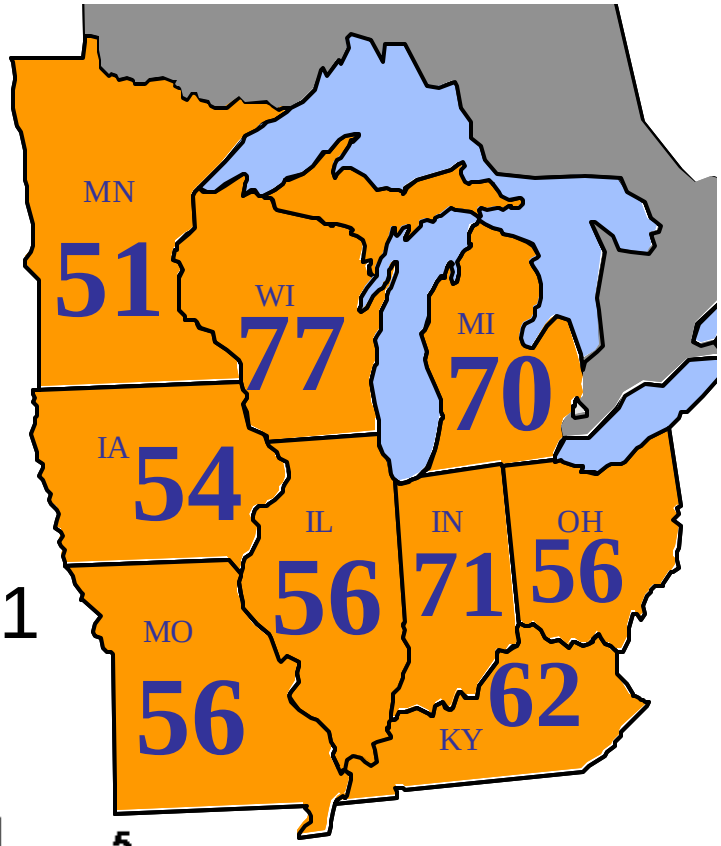




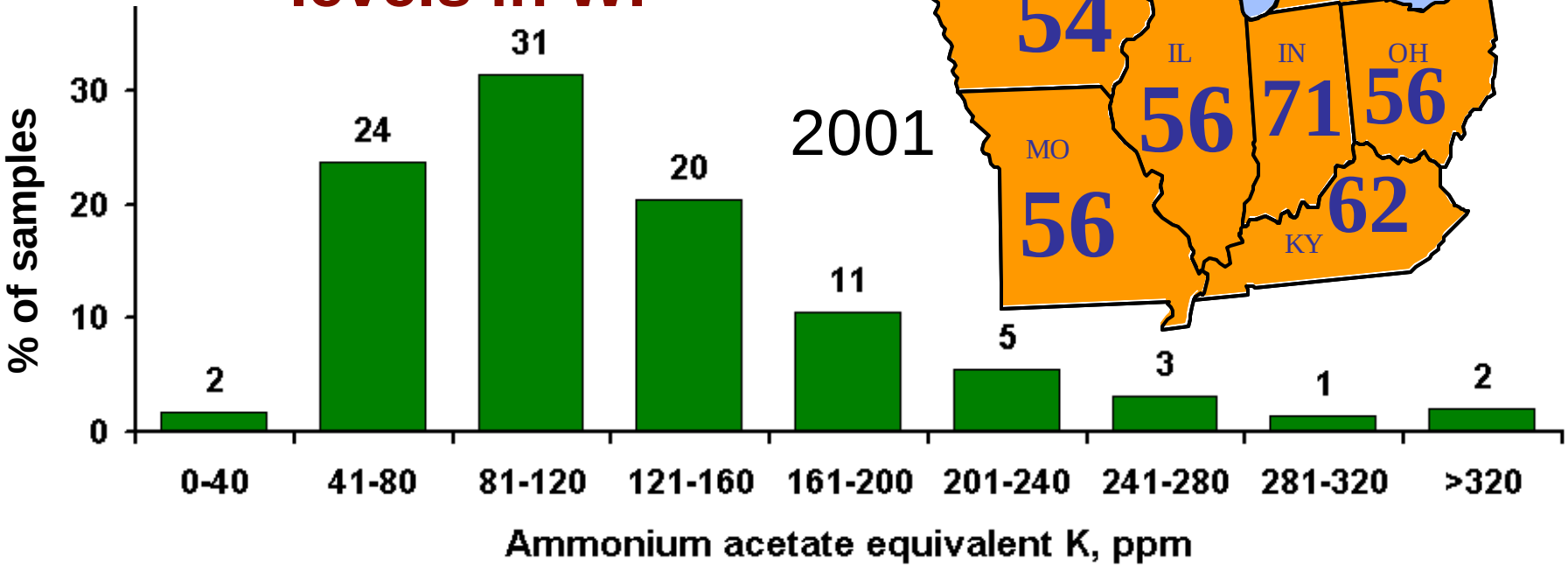
Combs and Peters

Central Corn Belt soils testing <160 ppm, %

Wisconsin has the highest frequency of soils below 160 ppm in the central Corn Belt



Distribution of soil K levels in WI

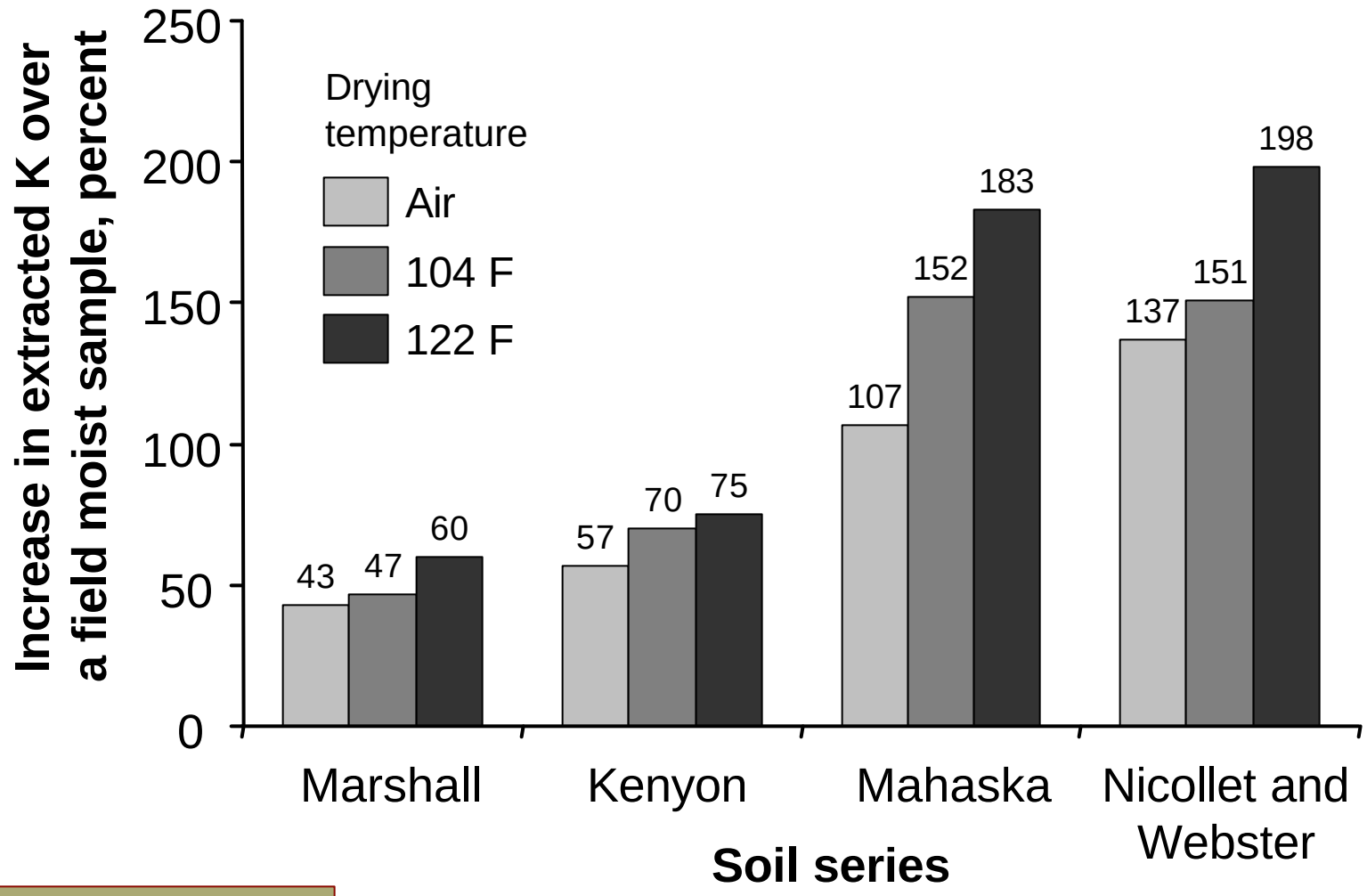


How soil test levels change depends on many factors

	Exchangeable K					
	Not fertilized			1080 lb K_2O/A		
Soil type	Moist	Dry	Change	Moist	Dry	Change
	----(ppm) ----		(%)	---- (ppm) ----		(%)
Antigo sil	46	61	33	421	376	-11
Carrington sil	69	109	58	471	349	-26
Miami sil	75	142	89	523	309	-41
Plainfield s	61	63	3	470	444	-6
Spencer sil	38	51	34	442	388	-12
Superior cl	64	72	13	505	281	-44

Attoe, 1947 (WI)

Laboratory drying temperature can affect soil test K differently for various soils



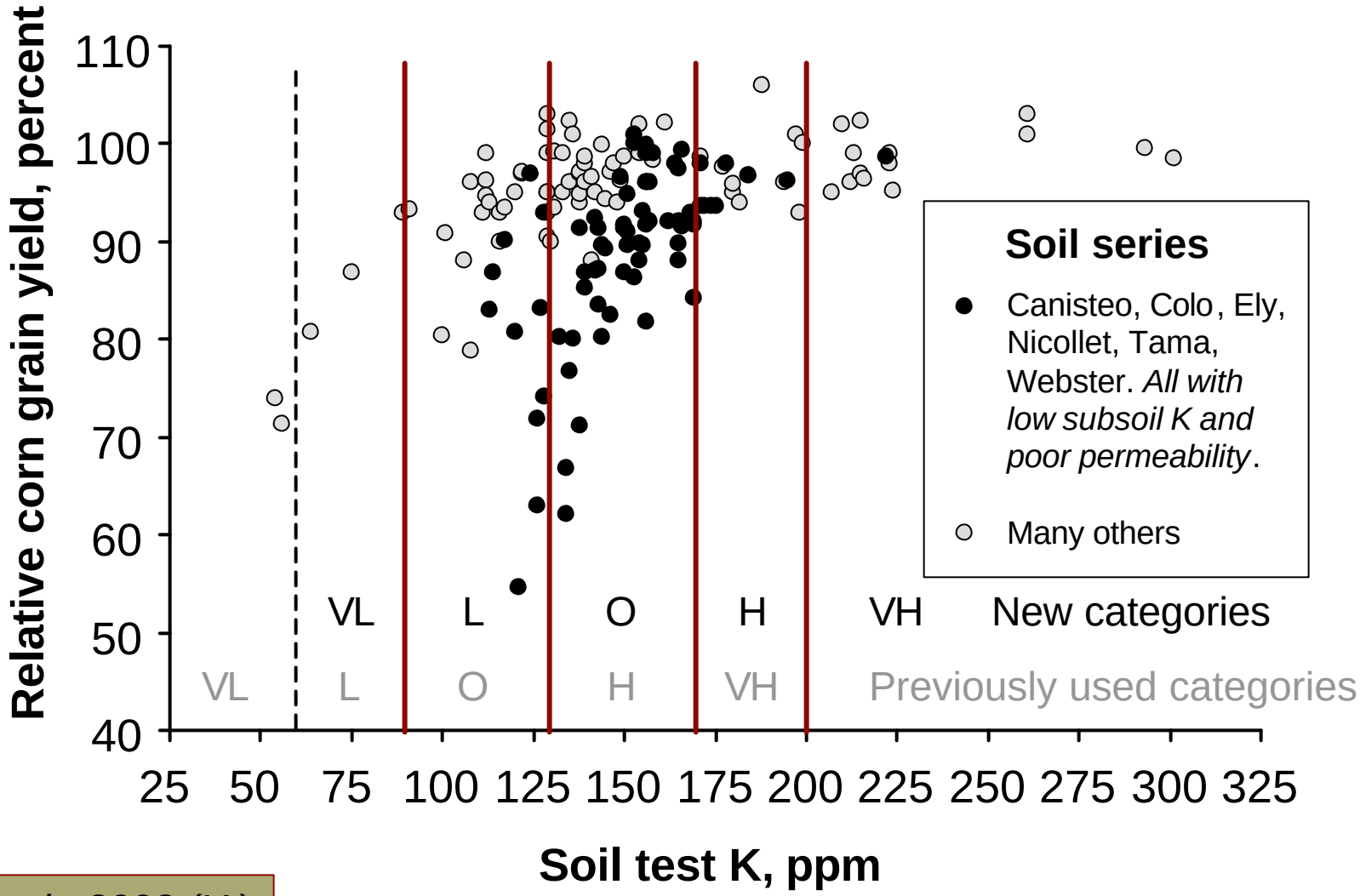
Mallarino et al., 2003 (IA)

Soil clay mineralogy can impact K variability

- Montmorillonite clays
  - **Fix K** under reducing (wet) conditions
    - Soil test levels may **decrease**
- Illite clays
  - **Release K** under reducing (wet) conditions
    - Soil test levels may **increase**

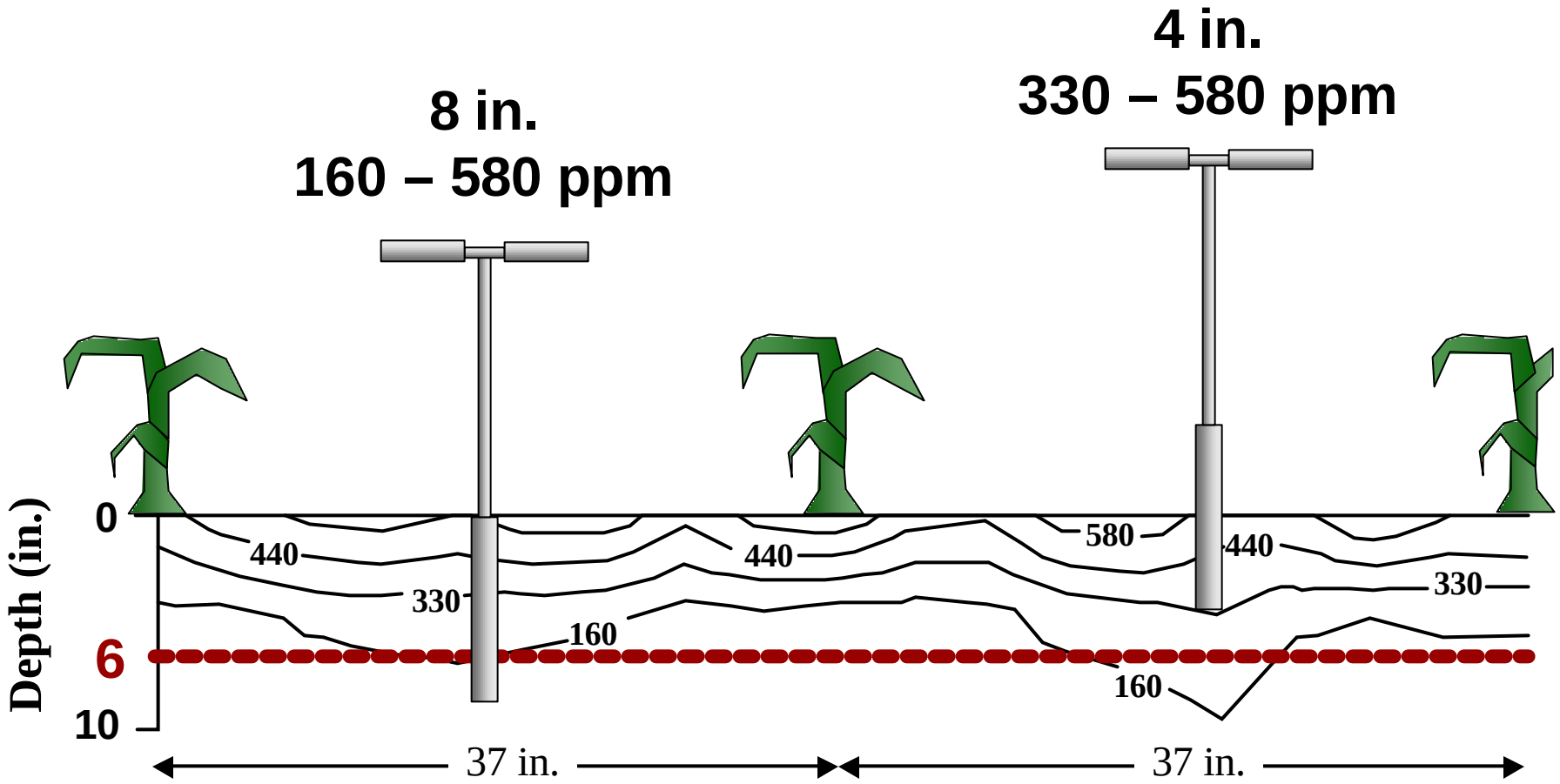
Stucki, 1996 (IL)

Response to K may depend upon soil series



Mallarino et al., 2003 (IA)

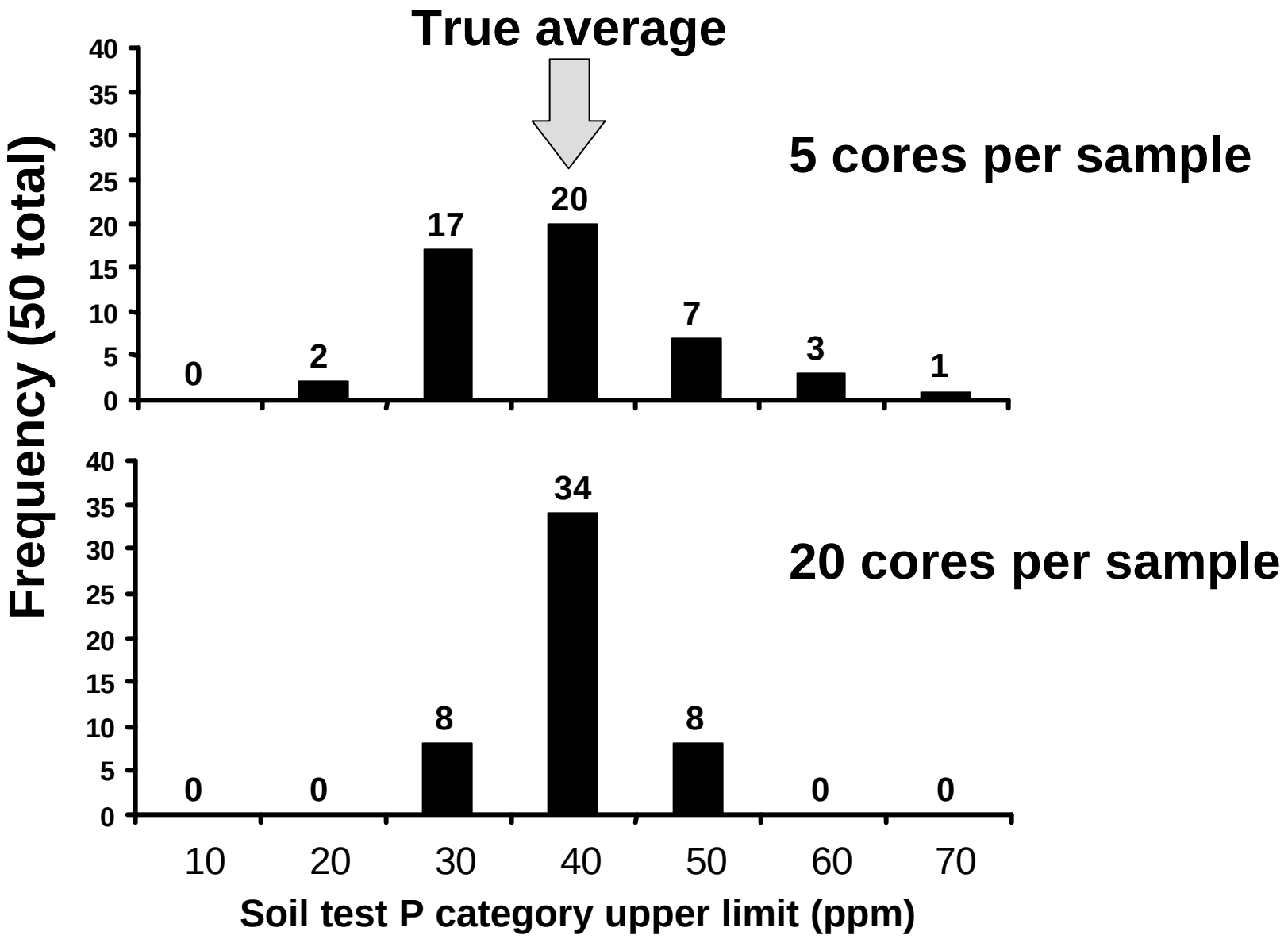
Depth and location of cores impacts variability



No-till field with 10-yr history
Tama silt loam

Robbins and Voss, 1991 (IA)

Core number impacts variability



What can I do? Monitor K status of crops and record metadata.

- Watch for visual symptoms of K deficiency
- Test plant tissue
  - Plants with and without visual deficiency symptoms
  - Consult “Using Plant Analysis as a Diagnostic Tool”, Kelling et al.
- Test soils properly and consistently
  - Note soil moisture conditions at sampling
  - Record soil series, landscape position, past cropping history, and nutrient applications

Strive for improved K management

- K management may require more vigilance
- Consider making more intensive K measurements part of an initiative at the retail outlet or consulting business
  - Let farmers know there is uncertainty in soil test K data and provide options
    - Tissue testing
    - Establishing monitoring areas for soil test K under different moisture conditions, soil series, and fertilization practices
  - Share findings during meetings to create awareness of your efforts and any results