FRST Collaborator Meeting

February 9, 2024

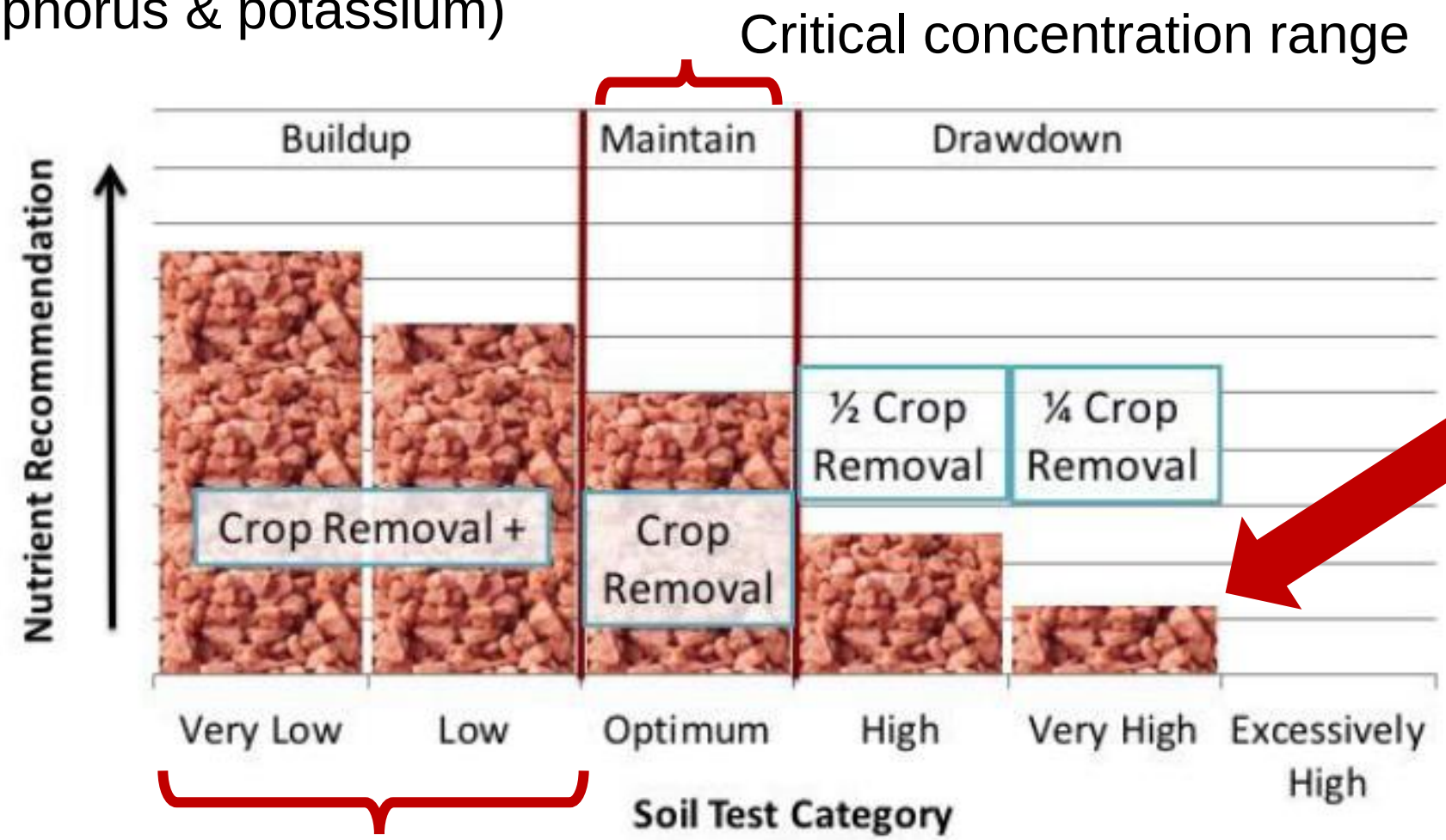
2023 FRST Field Trial Update

John Jones

Department of Soil Science, UW-Madison

Wisconsin fertilization strategy (hybrid)

(phosphorus & potassium)



Only K recommended in Very High

Maximizes economic return & builds over 6 (4-8) years

Laboski (2012)

Current UW Guidelines

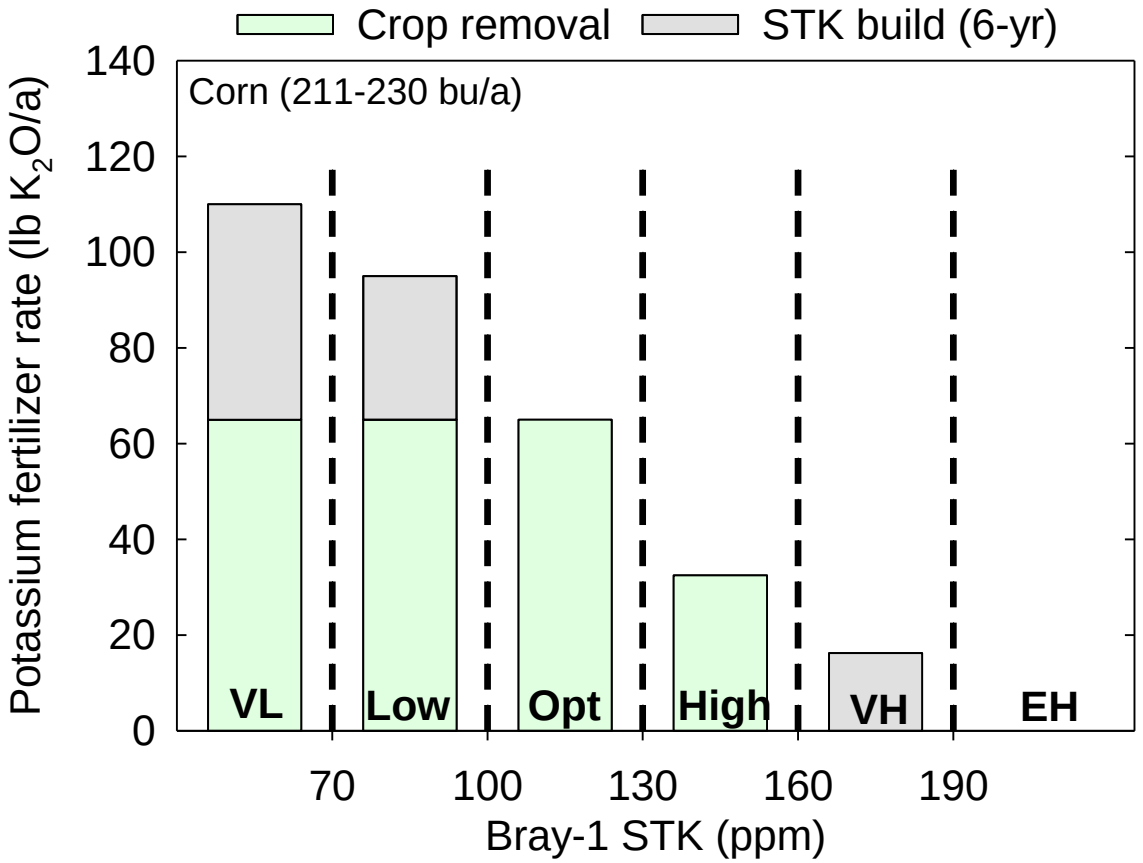
Soil group[a]	Soil test category				
	Very low (VL)	Low (L)	Optimum (O)	High (H)	Excessively high (EH)
	soil test P ppm[b]				
Demand level 1: corn grain, soybean, clover, small grains (but not wheat), grasses, oilseed crops, pasture					
Loamy	< 10	10–15	16–20	21–30	> 30
Sandy, Organic	< 12	12–22	23–32	33–42	> 42
Demand level 2: alfalfa, corn silage, wheat, beans, sweet corn, peas, fruits					
Loamy	< 12	12–17	18–25	26–35	> 35
Sandy, Organic	< 18	18–25	26–37	38–55	> 55
Demand level 3: tomato, pepper, brassicas, leafy greens, root, vine, and truck crops					
Loamy	< 15	15–30	31–45	46–75	> 75
Sandy, Organic	< 18	18–35	36–50	51–80	> 80
Demand level 4: potato					
Loamy	< 100	100–160	161–200	> 200	
Sandy, Organic	< 30	30–60	61–90	91–120	> 120

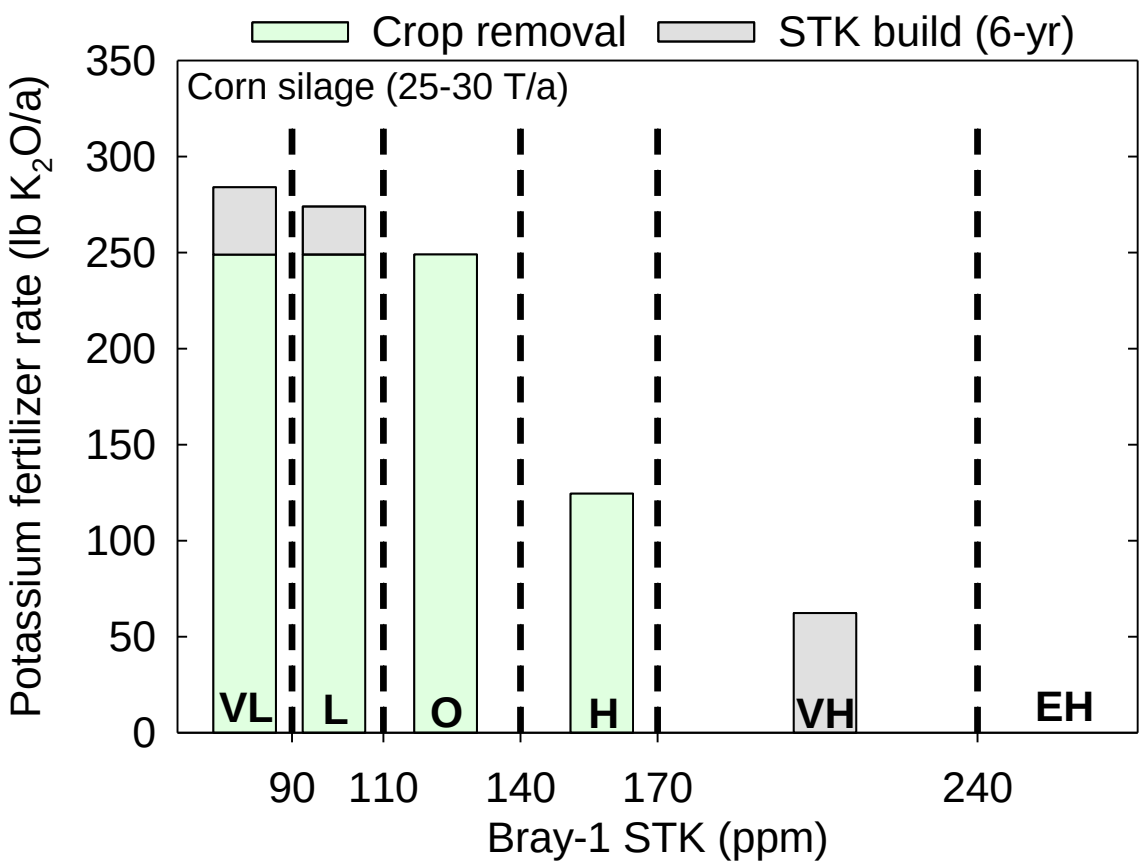
Soil group[a]	Soil test category					
	Very low (VL)	Low (L)	Optimum (O)	High (H)	Very high (VH)	Excessively high (EH)
	soil test K ppm[b]					
Demand level 1: corn grain, soybean, clover, small grains (but not wheat), grasses, oilseed crops, pasture						
Loamy	< 70	70–100	101–130	131–160	161–190	> 190
Sandy, Organic	< 45	45–65	66–90	91–130	—	> 130
Demand level 2: alfalfa, corn silage, wheat, beans, sweet corn, peas, fruits						
Loamy	< 90	90–110	111–140	141–170	171–240	> 240
Sandy, Organic	< 50	50–80	81–120	121–160	161–200	> 200
Demand level 3: tomato, pepper, brassicas, leafy greens, root, vine, and truck crops						
Loamy	< 80	80–140	141–200	201–220	221–240	> 240
Sandy, Organic	< 50	50–100	101–150	151–165	166–180	> 180
Demand level 4: potato						
Loamy	< 80	80–120	121–170	171–190	191–220	> 220
Sandy, Organic	< 70	70–100	101–130	131–160	161–190	> 190

Laboski and Peters (2012)

Components of WI rate recommendations

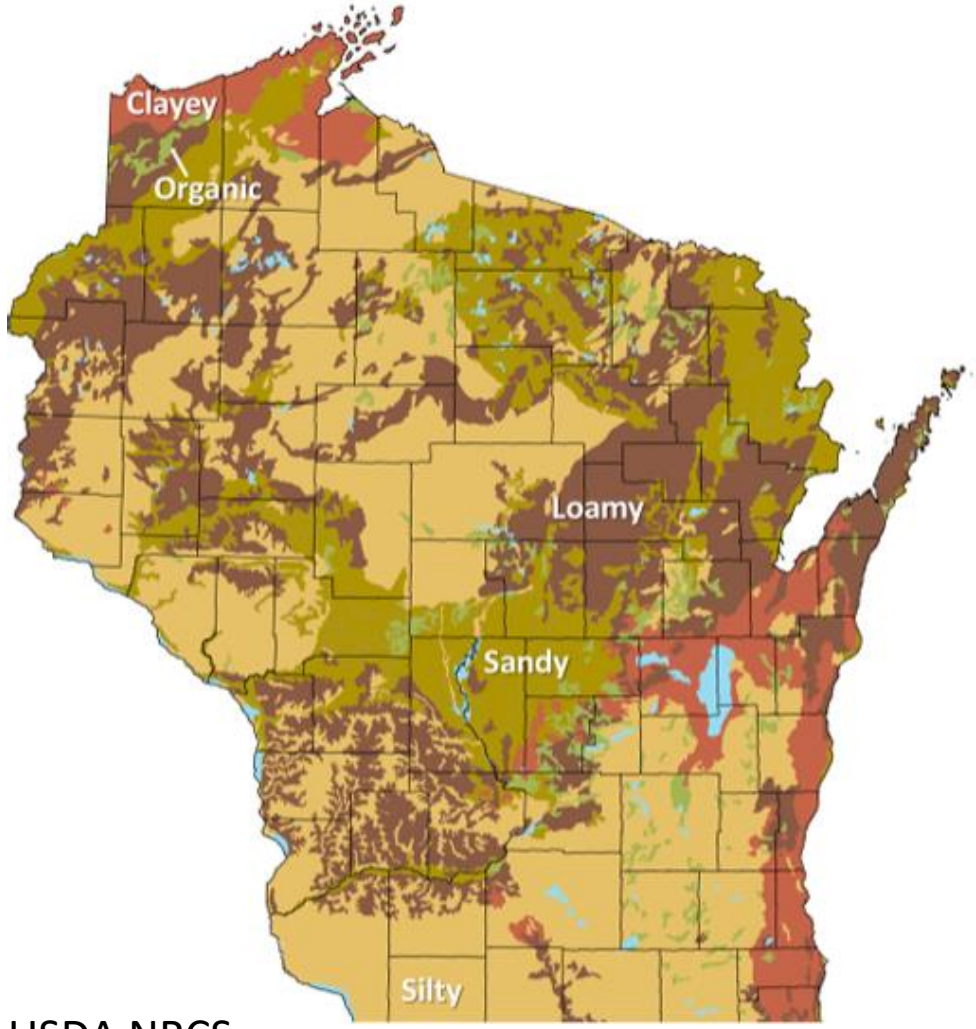
(corn grain & silage potassium example)



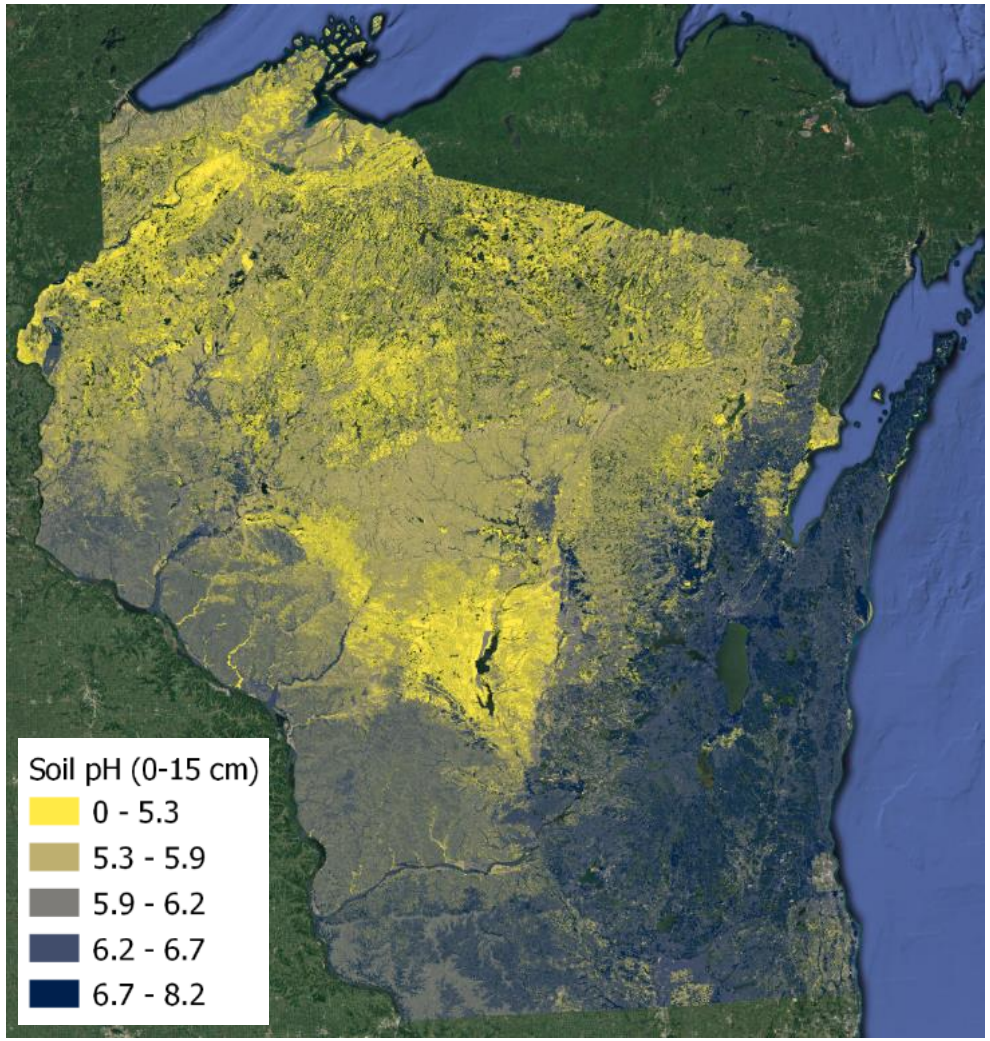


Fertilization rates where removal is a large component are more affected by removal estimates

Challenge in Wisconsin: >750 soil map units

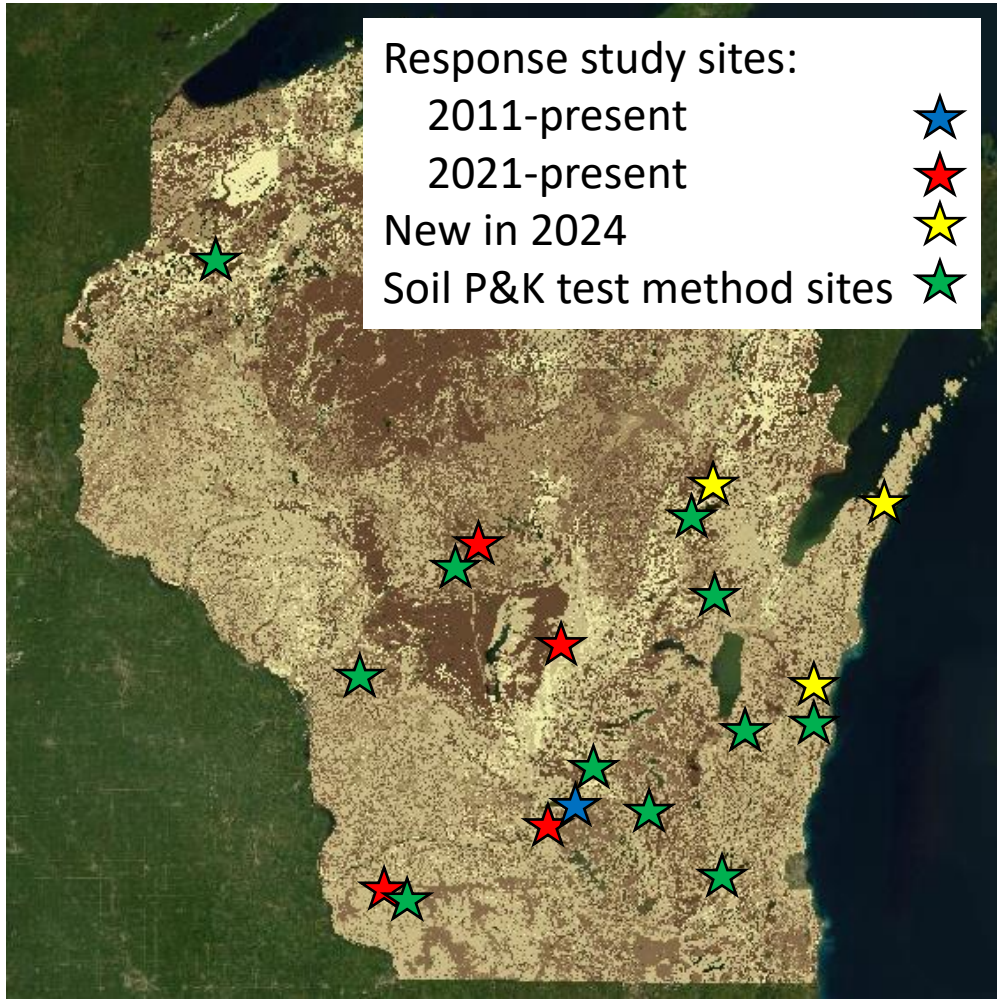


USDA NRCS



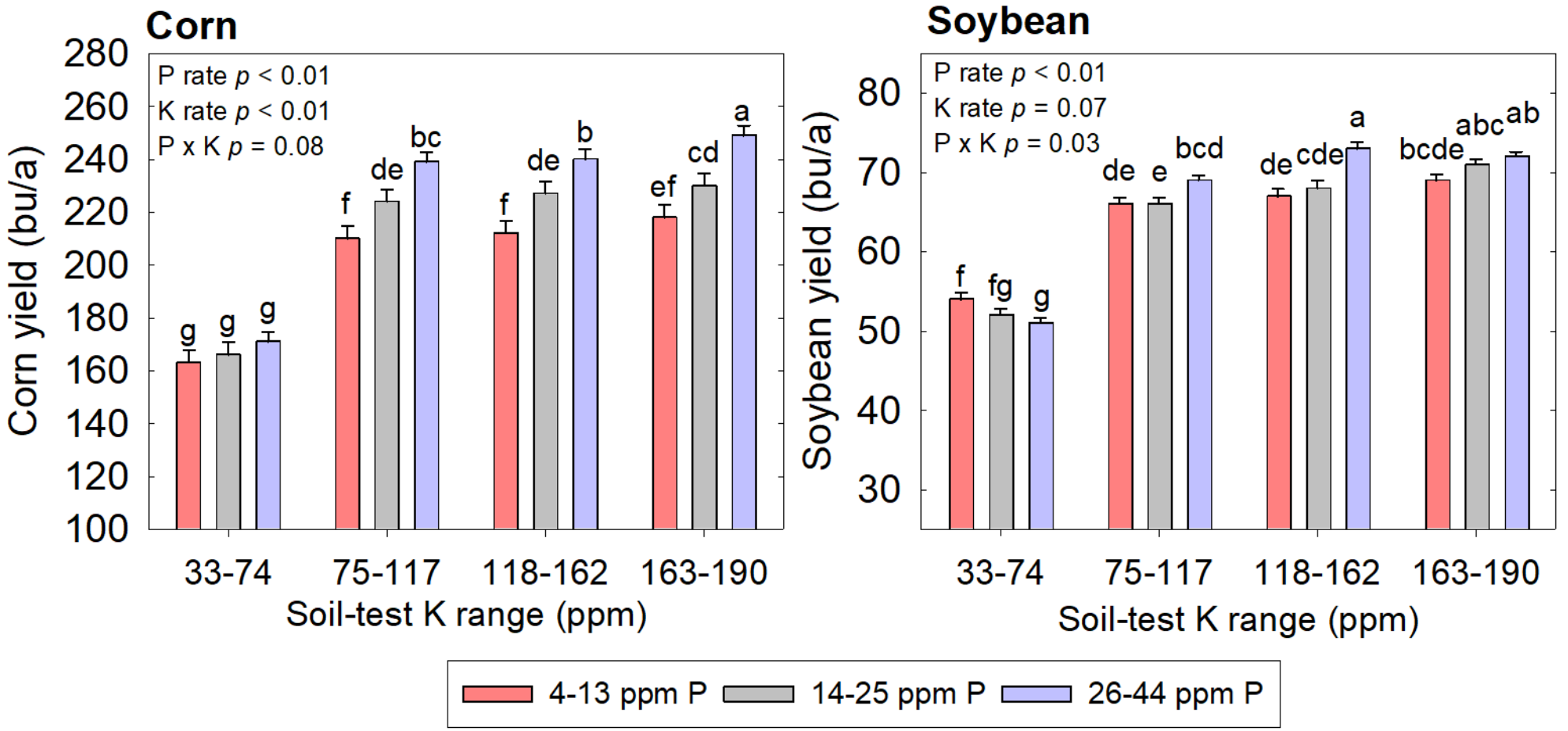
Studies to examine P&K in Wisconsin

- Two sites supported by FRST
- Total: 13 sites/yr across Wisconsin
- Corn, soybean, corn silage each year
- No-till and disk/chisel-plow (tillage comparison at 3 locations)
- 0.7 to 5.8% SOM, silty clay loam to sand surface textures, pH 5.5 to 7.4 (6”)
- Full factorial of P & K treatments
- STP (Bray-1, Olsen, M3 color, M3 ICP)
- STK (Bray-1, M3, ammonium acetate)



Yield response to soil-test P and K

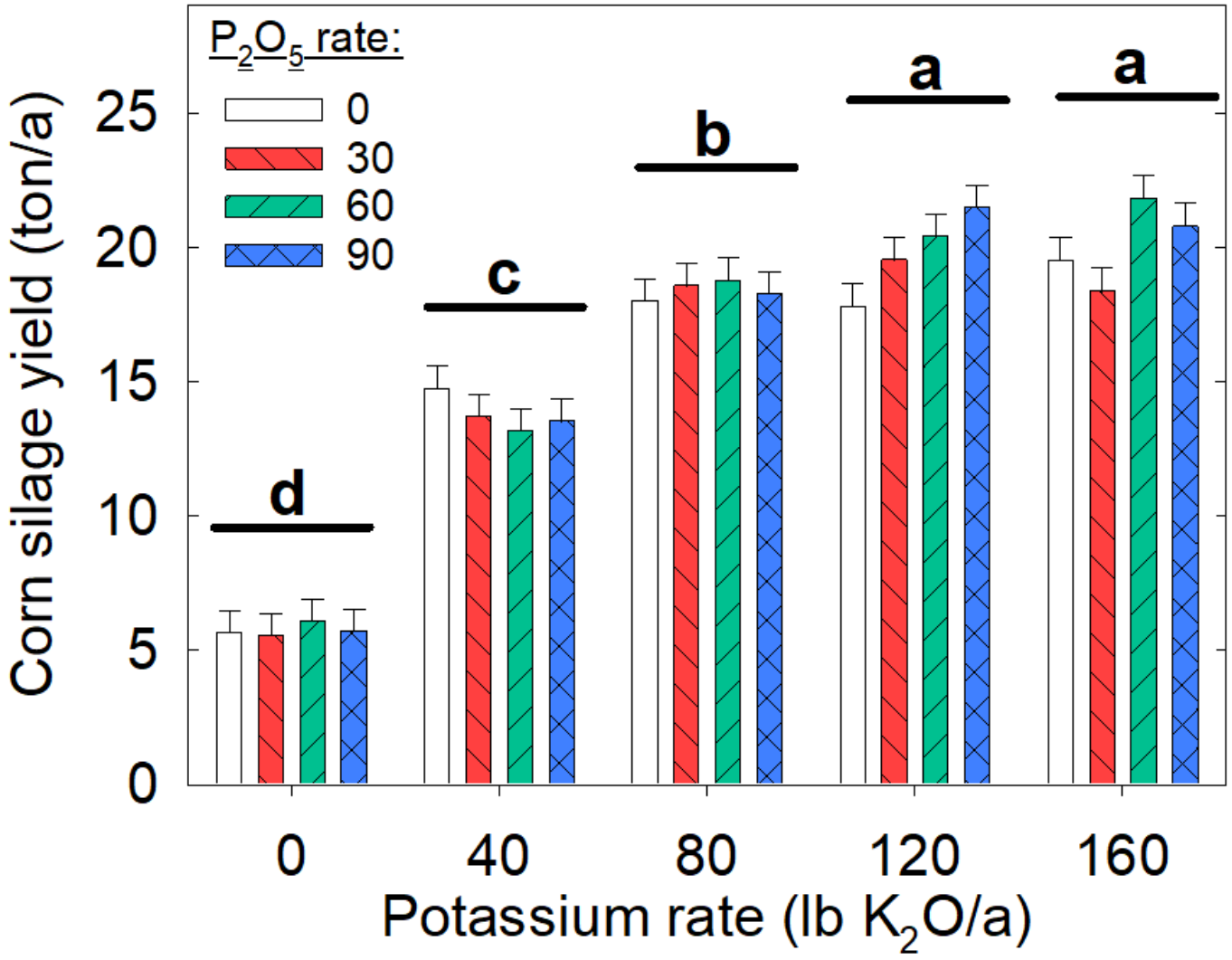
(3 locations in SC and SW Wisconsin)



- Corn and soybean yield affected by P rate, K rate, and P x K interaction

Jones (2023)

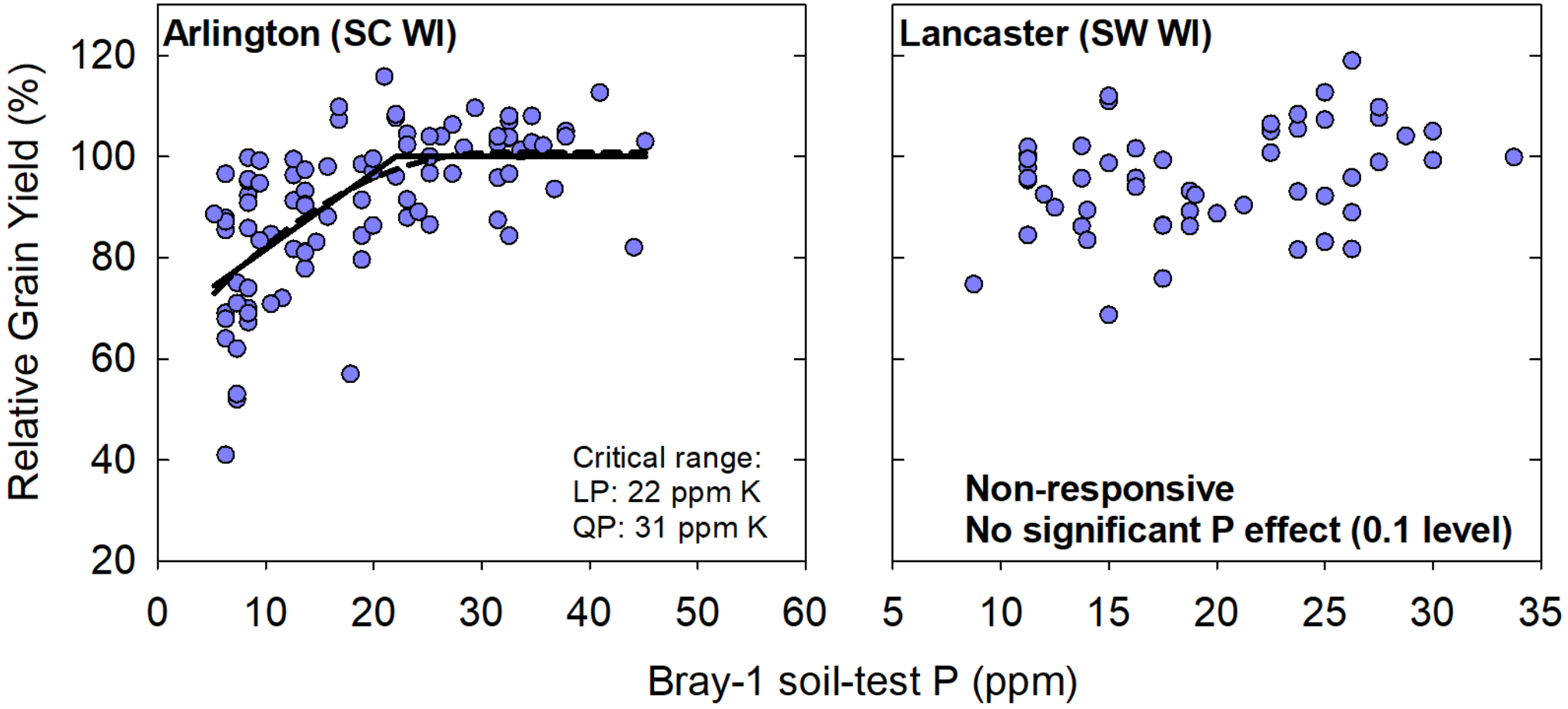
Corn silage yield response
(3 locations in SC and SW Wisconsin)



Only one soil-test level. Bray-1 Soil-test K: 76 to 109 ppm K

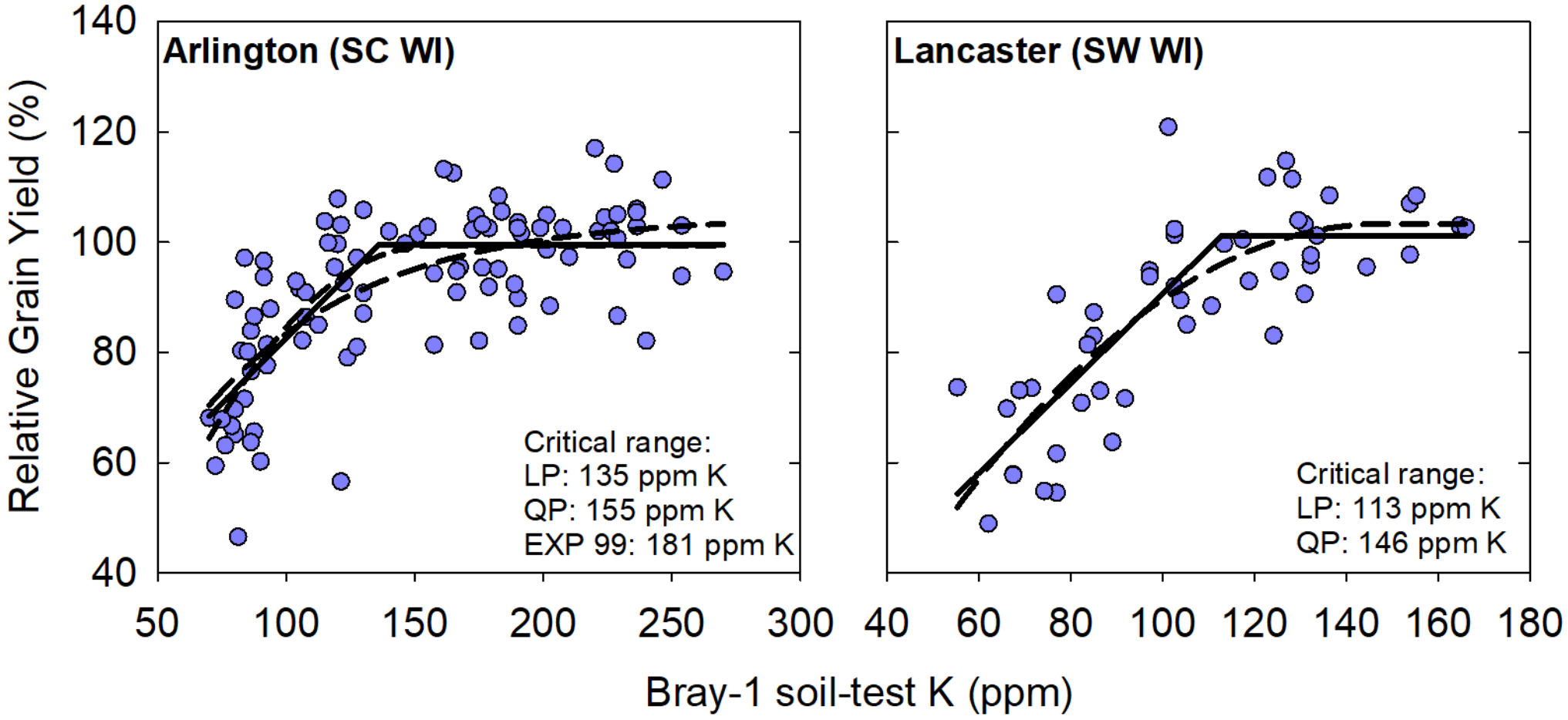
Jones (2022)

Corn and soybean STP field correlation
(two locations 2023)



Jones (2023)

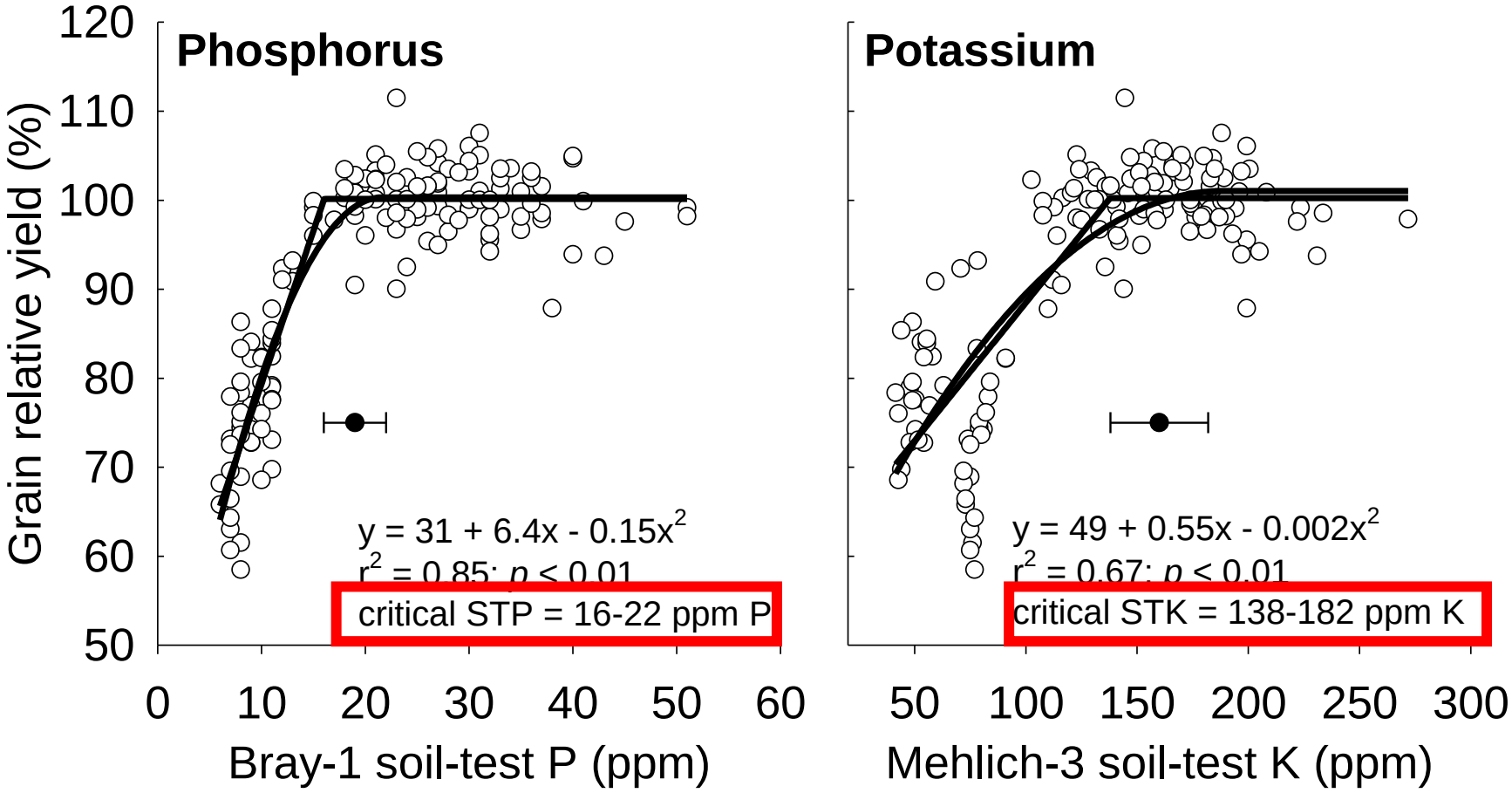
Corn and soybean STK field correlation (two locations 2023)



Jones (2023)

Separate study (same soil regions):

Critical soil-test P&K – fine textured WI sites

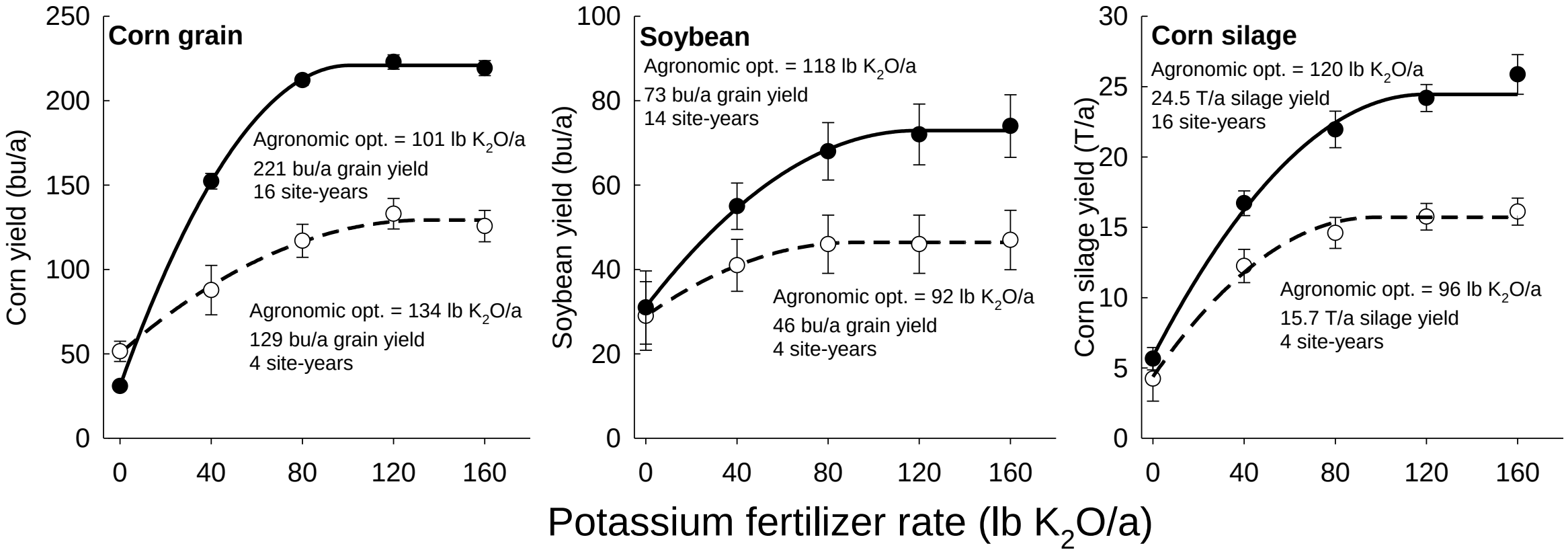


Slightly higher than current interpretation class “optimum” for P&K

Jones et al. (2023)

2023 – Potassium made the cover…

Benefits of long-term response studies



*Mehlich-3 soil-test K
93 to 101 ppm K

Jones (2023)

2023 Trial Summary

- Above average yields in southcentral and southwest WI. Trials/sites in central, northcentral, and northeast similar or slightly above
- Major concerns of K movement and availability in 2023, BUT only a concern if STK was below optimum levels
- Slightly higher critical levels identified, but more similar to previous year and other sites than current UW interpretation classes
- After 2023, >50 site-years (2021-2023) & ~12 years at one location field correlation phase will be complete for corn, soybean and all P and K tests
- Recent funding to move to field calibration, build-up, drawdown, and removal phases to complete effort (3 new sites in 2024)

Thank you!

John D. Jones, PhD, CCA

jjones58@wisc.edu, 920-306-9629
twitter: @JDjonesPKL

Collaborators: Andrew Larson, Daniela Orjuela Diaz, Francisco Arriaga, Carrie Laboski
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