

Improving K Fertilizer Recommendations for Corn on the Delmarva Peninsula

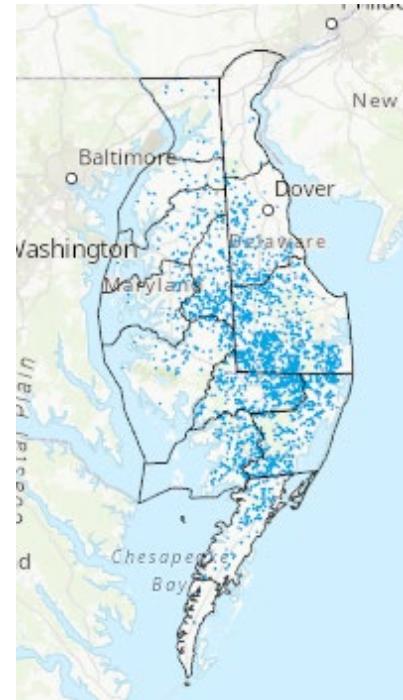
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FRST Team Meeting – 13 October 2022



Agricultural Profile of Delmarva

- 14 counties (DE, MD, VA) with 1.4M people
- 570 million broilers produced
- Corn and soybean for feed
- Small grains common
- Some vegetables and specialty crops

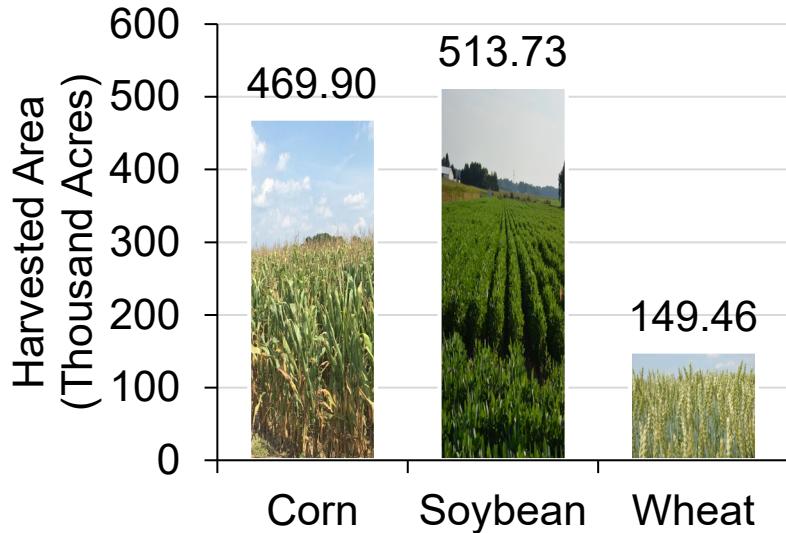


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This Photo by University of Delaware Extension

Hey Toto, Are We in Kansas?



USDA-NASS (2020)

- Total Harvested Cropland = 1,132,950 acres
- Corn Yields
 - 158 bu/A average
 - 218 bu/A irrigated (DE)
 - 164 bu/A non-irrigated (DE)



Soil Potassium Balance



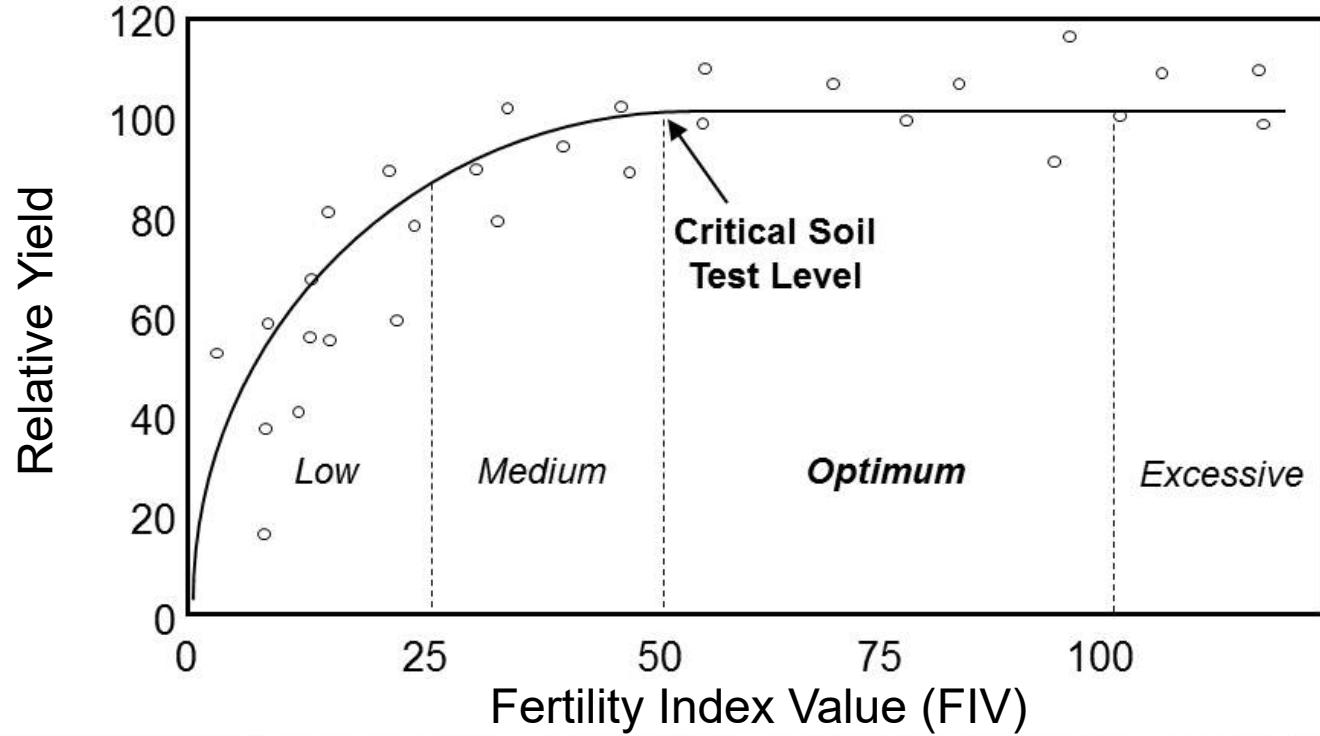
NUGIS (2022)

- Historic and ongoing K surpluses
- Sandy, low organic matter soils
- Drainage systems
- Leaching a concern
- Farmers remain concerned that K recommendation are too low

DE/MD Soil Test Interpretation

Correlation/
calibration
based on
Mehlich-1

Switched to
Mehlich-3 in
1990s



What is Fertility Index Value (FIV)?

UD-FIV	Mehlich 3		Mehlich 1	
	P	K	P	K
mg/kg				
0-25	0-25	0-45	0-12	0-35
26-50	26-50	46-91	13-25	36-69
51-100	51-100	92-182	26-50	70-139
>100	>100	>182	>50	>139

Shober et al. (2017)

Delaware

- Simple conversions based on analysis of 400+ samples
- UD-FIV =
 $0.55 \times \text{Mehlich-3 K (ppm)}$
 $0.72 \times \text{Mehlich-1 K (ppm)}$

What is FIV?

Maryland

- Uses lab/method specific equations
- For K data from UD lab:

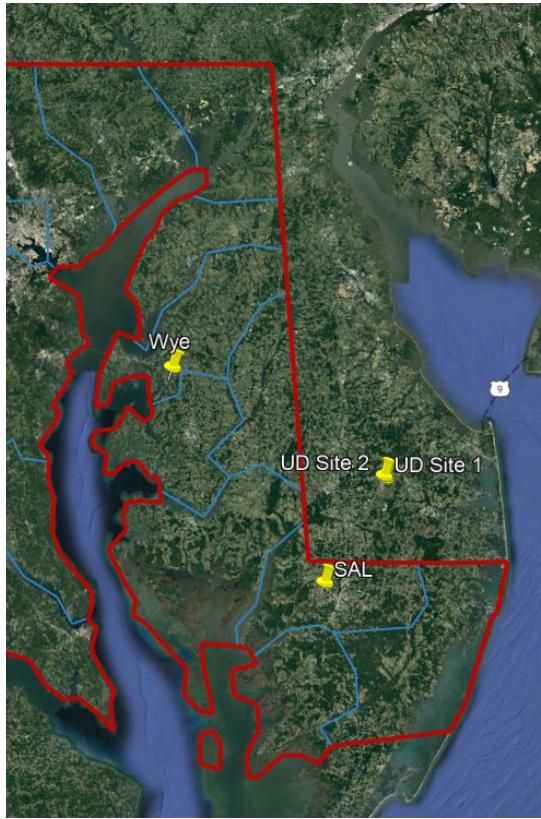
$$\text{UMD-FIV} = (1.0964 \times \text{UD-FIV}) + 0.9$$

Regional Soil-Testing Laboratory	Units	Soil-test nutrient							
		Phosphorus (P)		Potassium (K)		Calcium (Ca)		Magnesium (Mg)	
		A	B	A	B	A	B	A	B
AgroLab	ppm	1.086	2.5	0.648	(-1.8)	0.126	(-26.6)	0.757	3.1
Brookside	Ppm*	1.1964	3.5	0.7182	(-2.8)	0.1354	(-22.8)	0.7866	11.5
Brookside	lb/a ^t	0.2596	3.5	0.3591	(-2.8)	0.0677	(-22.8)	0.392	11.6
Penn State	Ppm*	1.1138	6.9	0.5973	0.1	0.1171	(-21.3)	0.7555	(-1.1)
Penn State	lb/a ^t	0.245	6.9	0.2509	0.1	0.0422	(-21.3)	0.2267	(-1.1)
Spectrum	lbs/a	0.7544	9.1	0.3318	(-1.5)	0.0763	(-15.9)	0.4273	8.5
Spectrum	ppm	1.056	9.1	0.558	(-1.5)	0.114	(-15.9)	0.752	8.5
U. Delaware	index	1.0092	6.9	1.0964	0.9	1.0547	(-8.6)	0.9675	9.6
Waters (Mehlich 1)	lbs/a	1.1785	4.1	0.03795	(-1.5)	0.0582	(-12.1)	0.4255	3.6
Waters (Mehlich 3)	lbs/a	0.5569	6.9	0.29865	0.1	0.05855	(-21.3)	0.3778	(-1.1)
Waypoint VA & PA (Mehlich 3)	ppm	1.086	2.5	0.648	(-1.8)	0.126	(-26.6)	0.757	3.1
Waypoint VA (Bray P & ammonium acetate bases)	ppm	1.6854	6.3	0.6263	0.8	0.1335	(-18.4)	0.6691	21.4

* Use ppm phosphorus (P), potassium (K), magnesium (Mg), and calcium (Ca) values.

^t Use lb/a phosphate (P₂O₅), potash (K₂O), magnesium oxide (MgO), and calcium oxide (CaO) values.





Delaware/Maryland K Rate Trials 2021

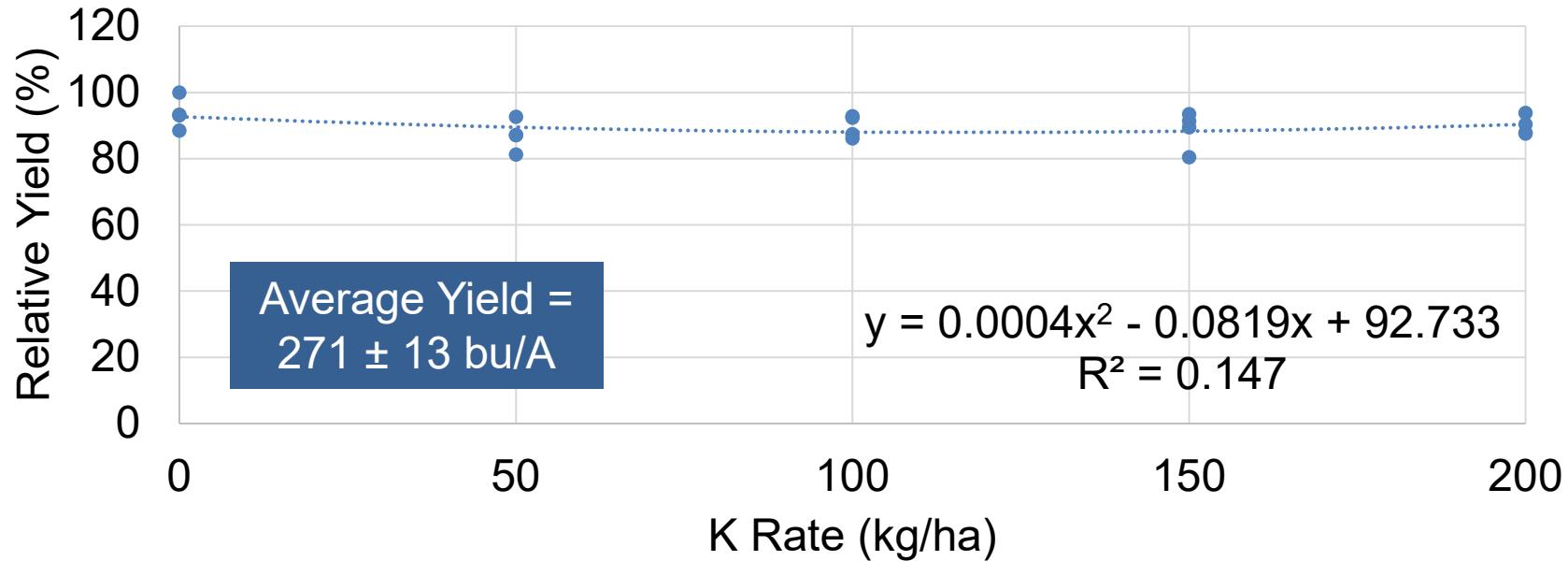
- Four small plot grain corn trials
- Three irrigated
- Broadcast K with incorporation at 5 rates (4 or 5 replications)
- Soil test interpretations based on 8-inch samples
- Yield corrected to 15.5% moisture

Delaware Trial (UD1)



Parameter	Value
Soil Texture	Loamy sand
Mehlich-3 K, mg/kg	108 ± 5
Mehlich-3 K, UD-FIV	60 ± 3
STK Interpretation	Optimum
K Application	28 Apr
Planting date	29 Apr
Harvest date	28 Sep
Irrigation	Yes

Delaware FRST Trial (UD1)

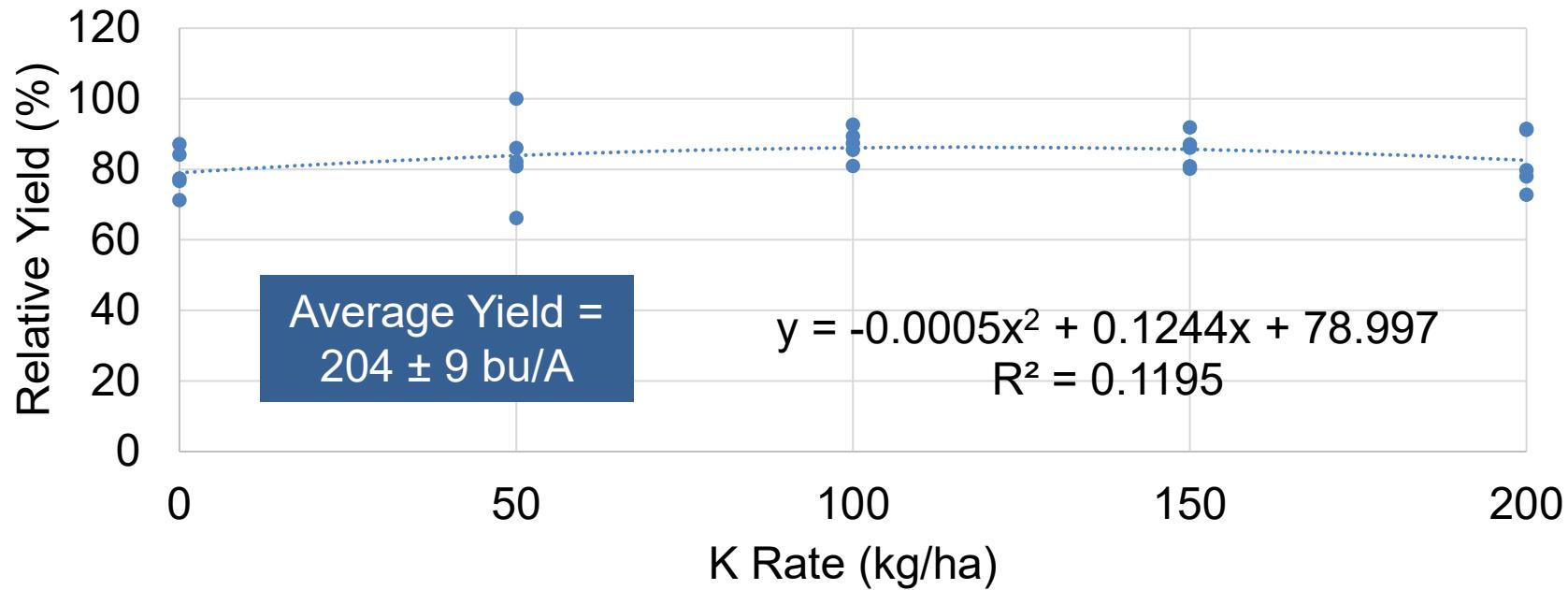


Parameter	Value
Soil Texture	Silt Loam
Mehlich-3 K, mg/kg	35 ± 13
Mehlich-3 K, FIV	$22 + 8$
STK Interpretation	Low
K Application	10 May
Planting date	11 May
Harvest date	14 Oct
Irrigation	No

Maryland (WYE)

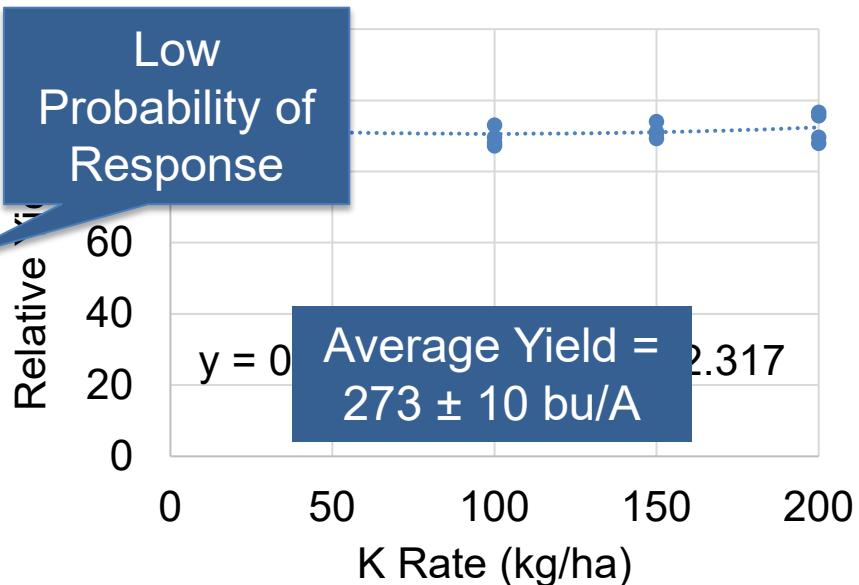


Maryland FRST Trial (WYE)

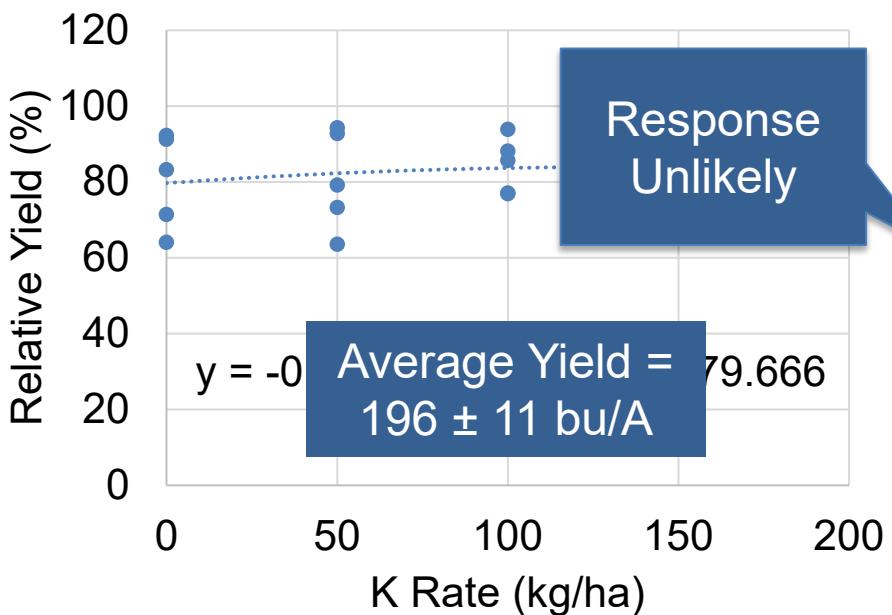


Parameter	Value
Soil Texture	Sandy loam, Loamy sand
Mehlich-3 K, mg/kg	106 ± 13
Mehlich-3 K, UD-FIV	58 ± 7
STK Interpretation	Optimum
K Application	28 Apr
Planting date	4 May
Harvest date	27 Sep
Irrigation	Yes

Delaware (UD2)



Maryland (SAL)



Parameter	Value
Soil Texture	Loamy sand
Mehlich-3 K, mg/kg	188 ± 47
Mehlich-3 K, UMD-FIV	114 ± 28
STK Interpretation	Excessive
K Application	4 May
Planting date	5 May
Harvest date	11 Oct
Irrigation	Yes

Sample Depth and Methods Impact on Interpretation

Location	UD 1	UD 2	UMD WYE	UMD SAL
UD-FIV (M3-6)	56	57	22	84
UD-FIV (M3-8)	59	58	19	104
UD-FIV (M1-6)	24	33	10	36
UD-FIV (M1-8)	28	27	9	35
UMD-FIV (M3-6)	62	64	25	92
UMD-FIV (M3-8)	66	65	22	114



Conclusions and Next Steps

- No response in fields with Optimum or Excessive
- Additional trials in 2022 (results pending)
- Participated in NE FRST CIG grant (adds soybean)
- Revisit Mehlich-1 conversions for K?



Questions?



- Thank you! Shawn Tingle,
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Board