



*Dark Tobacco Response to Potassium
Rate and Application Timing*

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Potassium in Tobacco

- Tobacco known to be a luxury consumer of K^+
- Total K^+ uptake is highest of all mineral elements
- Application rates often 2-3 times what is needed for maximum yield
- K^+ involved in leaf color, texture, combustion, and water holding properties

UK Potassium Recommendations for Tobacco

AGR-1: UK Lime and Nutrient Recommendations

- Based on potash levels in soil sample
- Based on crop removal from harvested portion of plant
 - Burley: 7.5 lbs K₂O/100 lbs leaf yield
 - Dark: 6.0 lbs K₂O/100 lbs leaf yield

Burley		Dark	
Soil Test K	K ₂ O Needed (lbs/A)	Soil Test K	K ₂ O Needed (lbs/A)
Very High (>450)	0	Very High (>450)	0
High (450-304)	30-190	High (450-296)	30-100
Medium (303-206)	200-290	Medium (295-206)	110-190
Low (205-96)	300-390	Low (205-96)	200-290
Very Low (<96)	400	Very Low (<96)	300

UK Potassium Recommendations for Tobacco

- No potassium recommended in approximately 30% of Kentucky tobacco fields sampled
- When soil test potassium is below 225, broadcast is more effective than banding.
- If banding is used to apply potassium after transplanting, the recommended rate can be reduced by 30%.
- Most previous potassium research was done with burley and needs to be evaluated more in dark tobacco

Objective

- Determine dark tobacco response to applied potassium in medium and low K soils
 - Take soil test recommendation for site and evaluate response to K_2O rates above and below recommendation
 - Compare broadcast applications made before transplanting to banded applications made after transplanting

Potassium Rates and Application Methods in Dark Tobacco

2010 – Stamps Farm – Franklin, KY

- Pembroke silt loam soil (well-drained)
- TN D950 set May 28
 - 4900 plants/A
 - 40" rows, 32" plant spacing
- Soil test K: 236 (medium)
- 160 lbs K₂O recommended
- All K treatments applied May 28
 - Sulfate of potash (0-0-50)
- N and P applied to entire trial according to soil test.
- All other practices standard
- Randomized complete block with 4 replications
- Tobacco harvested August 30
- Air-cured
- Stripped December 9

Trt	% of UK Recom.	Lbs K ₂ O applied	Applic Method
1	0%	0	
2	200%	320	Broadcast
3	150%	240	Broadcast
4	100%	160	Broadcast
5	75%	120	Broadcast
6	50%	80	Broadcast
7	100%	160	2 Bands
8	75%	120	2 Bands
9	50%	80	2 Bands
10	100%	160	1 Band
11	75%	120	1 Band
12	50%	80	1 Band

Potassium Rates and Application Methods in Dark Tobacco

2010 – Stamps Farm – Franklin, KY



0 K₂O per acre



320 lbs K₂O per acre

Potassium Rates and Application Methods in Dark Tobacco

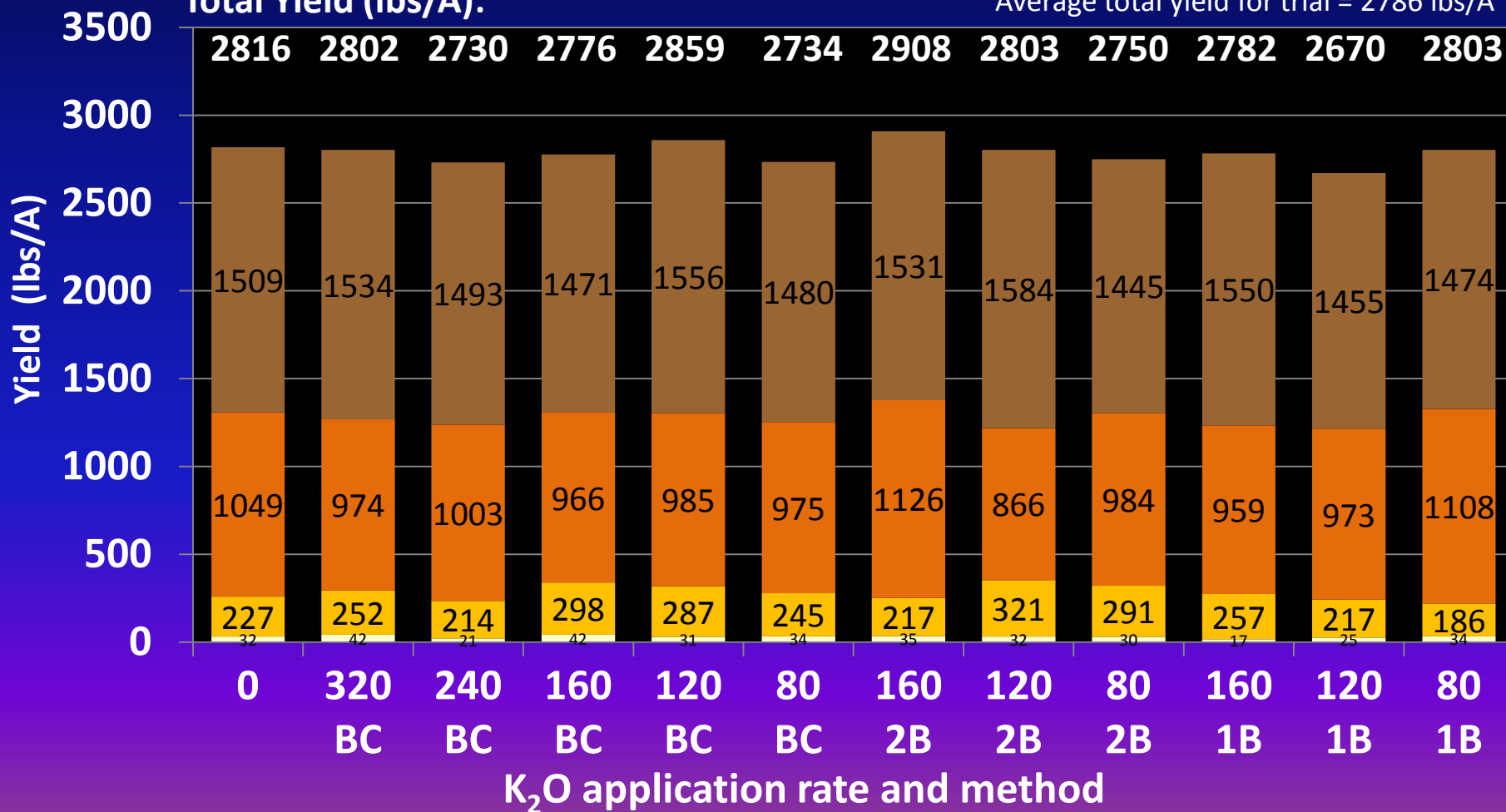
2010 – Stamps Farm – Franklin, KY – Dark Air-Cured Yield

LSD(.10) = 23 112 171 168 223 (total)

 ■ Trash ■ Lug ■ Second ■ Leaf

Total Yield (lbs/A):

Average total yield for trial = 2786 lbs/A



Potassium Rates and Application Methods in Dark Tobacco 2010 – Stamps Farm – Franklin, KY

- No effects of potassium rate or application method
 - Reduced or excessive rates yielded similarly
 - No obvious effects of application method
- Potassium index was medium (236)
- Low probability of response to applied potassium even though 160 lbs K_2O/A was recommended

Dark Tobacco Response to Potassium

MSU West Farm - 2012

- Determine dark tobacco response to potassium where soil K index is low.
- Grenada silt loam soil (mod. well drained)
- Soil Test K index = 102 (low)
- 290 lbs K₂O/A recommended
- Trial was randomized complete block with 4 replications.
 - Plots 4 rows, 40 ft. long.
- Extreme drought, plots drip irrigated
- Tobacco harvested October 9
- Fire-cured

Treatment	Lbs K ₂ O/A (% of UK Rec.)	Application Method
1	0	-
2	145 (50%)	Broadcast
3	290 (100%)	Broadcast
4	435 (150%)	Broadcast
5	145 (50%)	Band
6	290 (100%)	Band
7	435 (150%)	Band

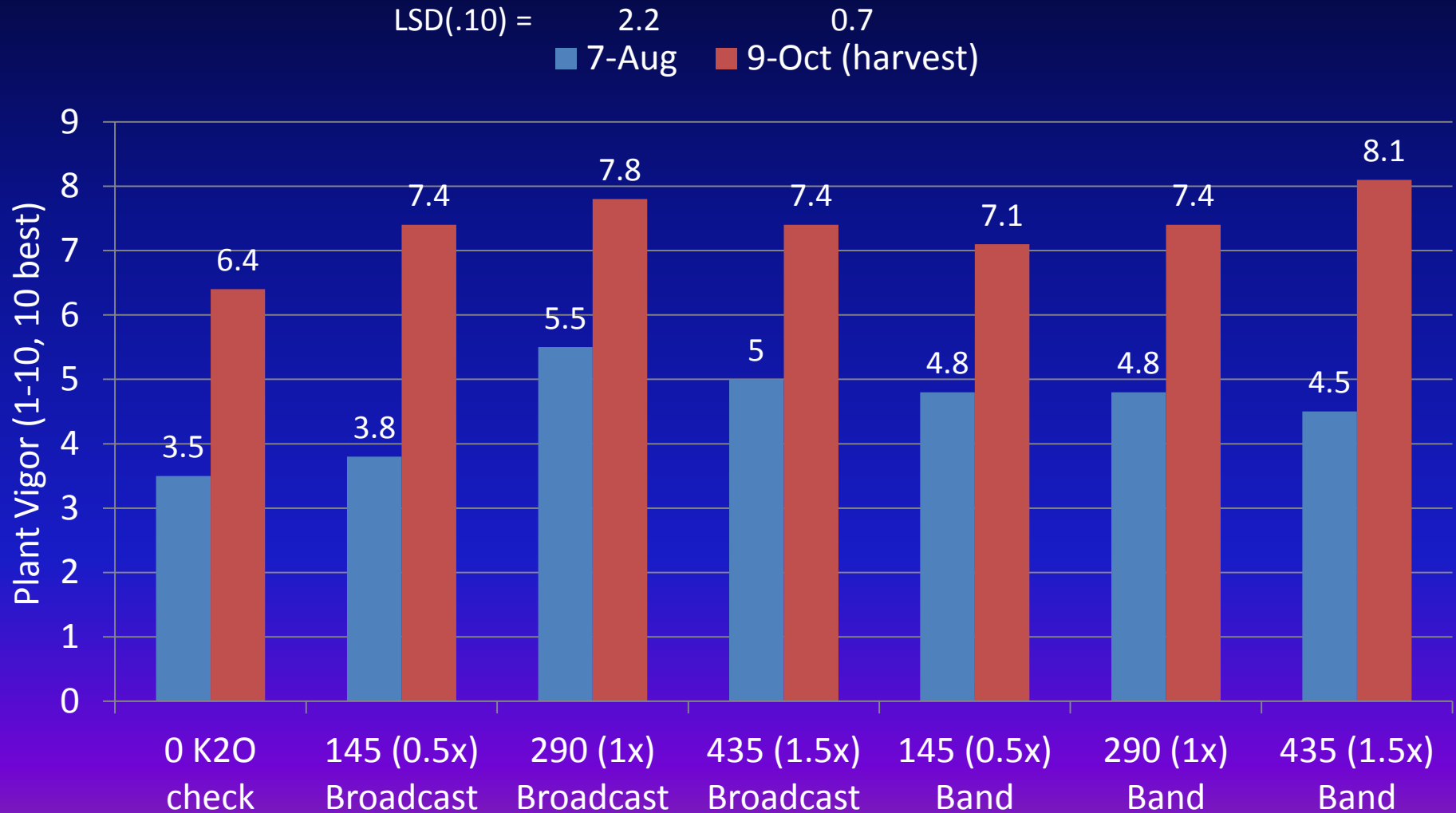
*Broadcast applications made June 8 and incorporated with Roterra.

*PD7309 set June 12-13 on 41" rows and 32" plant spacing (4781 plants/A)

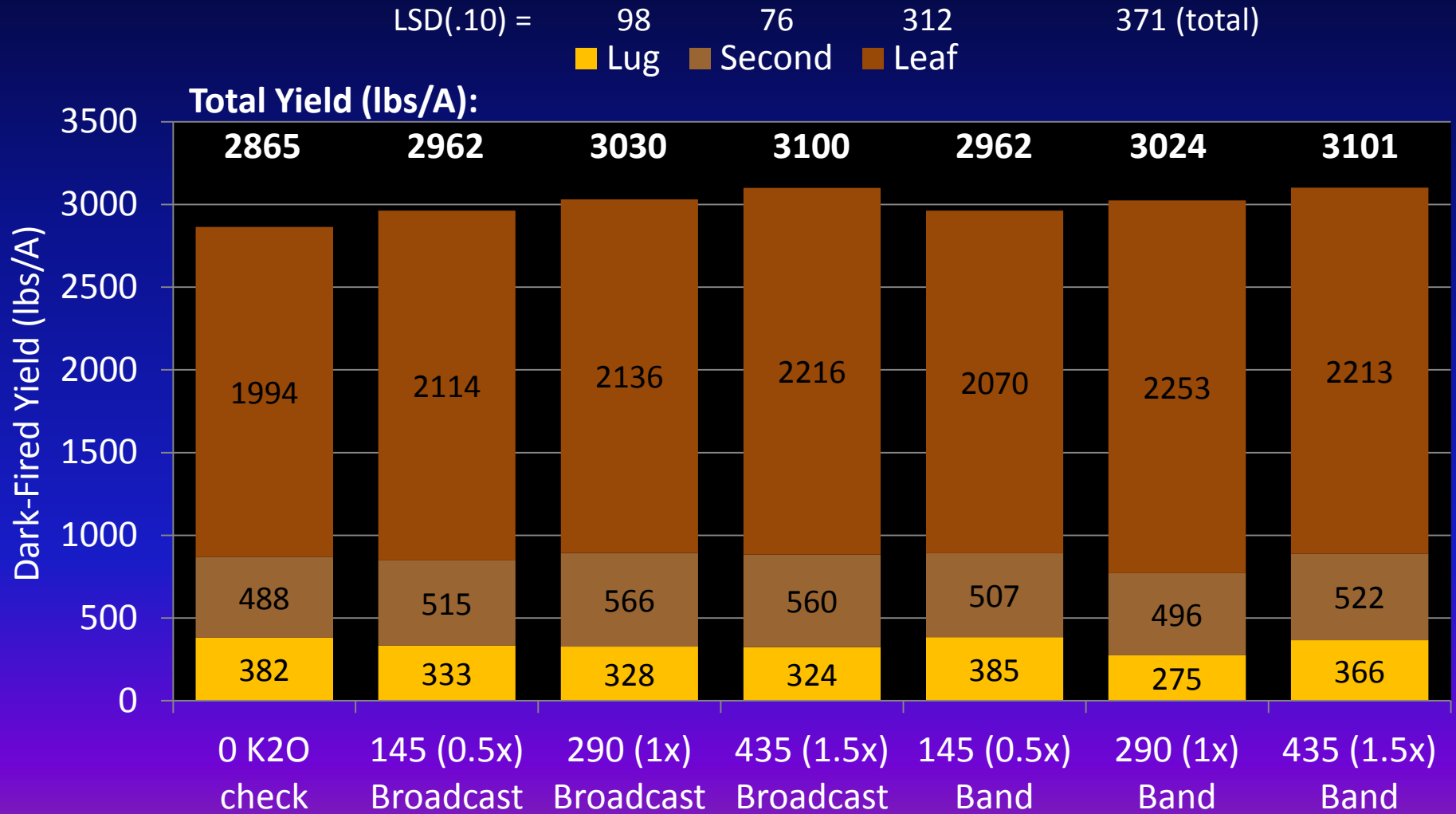
*Banded applications applied to both sides of each row on June 18 and cultivated in.

Dark Tobacco Response to Potassium

MSU West Farm – 2012 – Late Season Plant Vigor



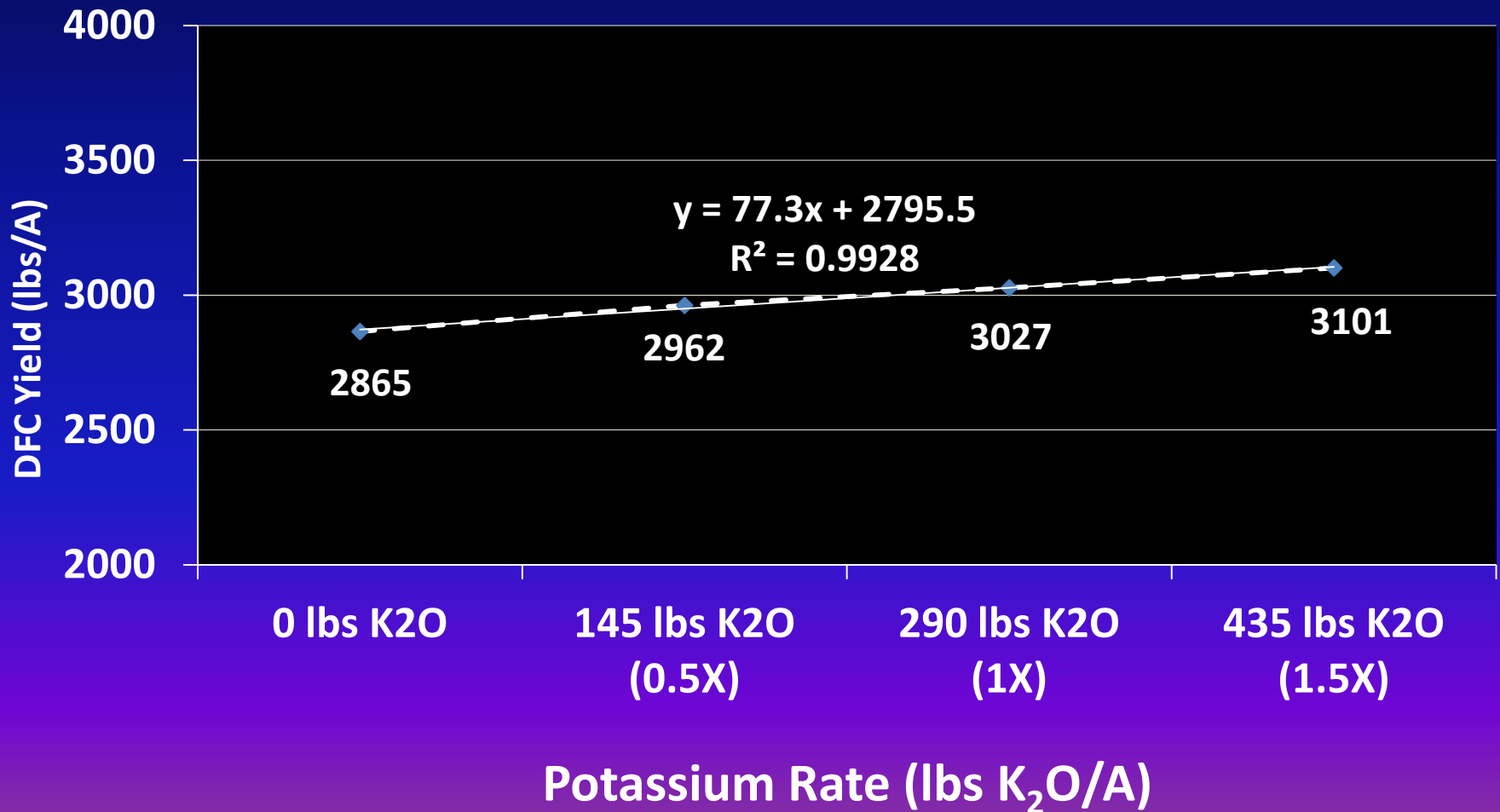
Dark Tobacco Response to Potassium MSU West Farm – 2012 – Dark Fired Yield



Dark-Fired Tobacco Response to Potassium Rate

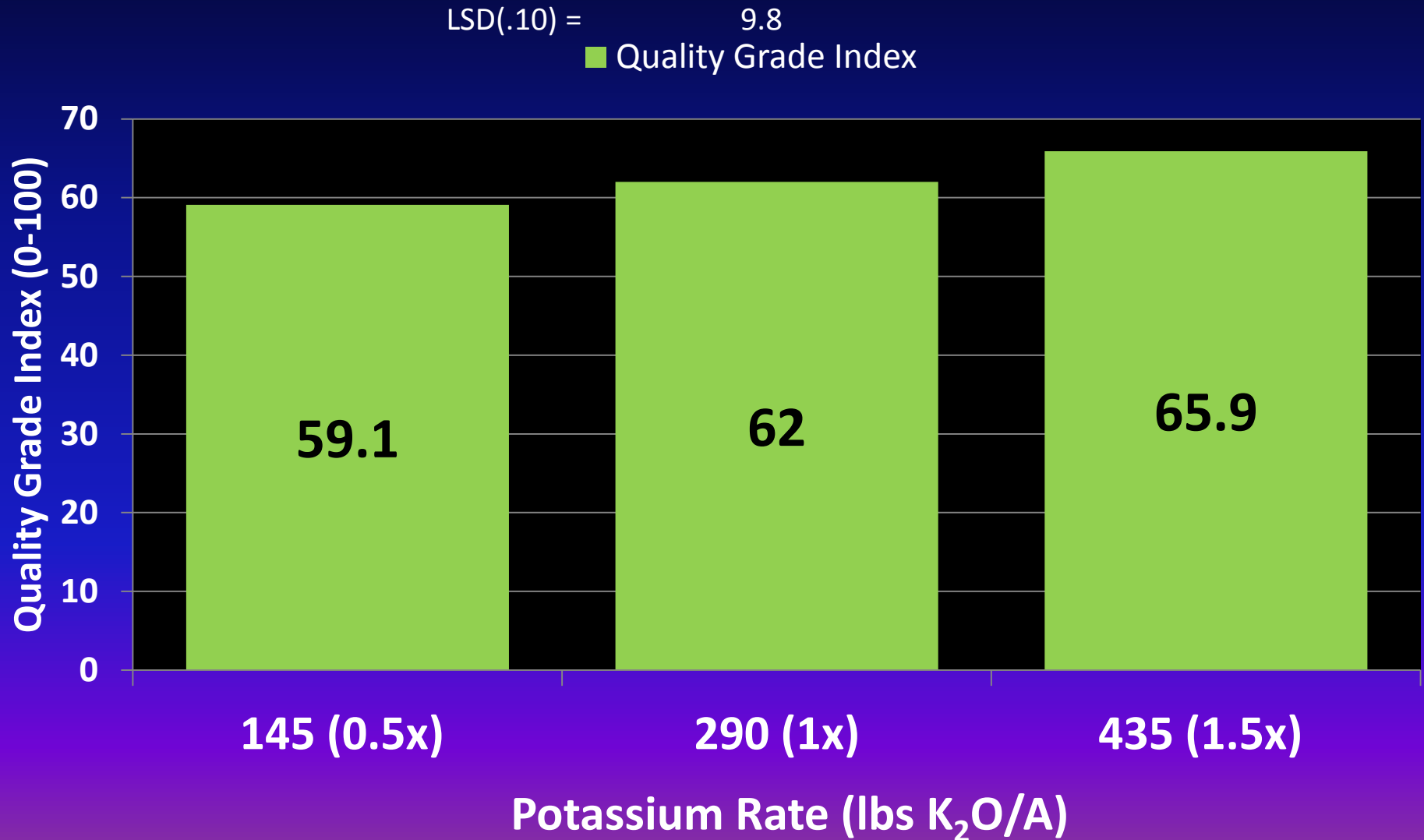
2012 - MSU West Farm – Murray KY

—◆ DFC yield (lbs/A) — Linear (DFC yield (lbs/A))



Dark Tobacco Response to Potassium Rate

MSU West Farm – 2012 – Dark Fired Quality Grade Index



Dark Tobacco Response to Potassium

MSU West Farm – 2012 – Dark Fired Yield

- If potassium prices are \$0.75/lb K_2O and dark-fired prices are \$2.65/lb:
 - 145 lbs K_2O/A costs \$109
 - 290 lbs K_2O/A costs \$218
 - 435 lbs K_2O/A costs \$326

- 145 lbs K_2O/A made an extra \$265/A (\$156 ROI)
- 290 lbs K_2O/A made an extra \$451/A (\$233 ROI)
- 435 lbs K_2O/A made an extra \$636/A (\$310 ROI)

Dark Tobacco Response to Potassium

MSU West Farm - 2013

- Grenada silt loam soil
- Soil Test K index = 136 (low)
- 260 lbs K₂O/A recommended
- Wet season, no irrigation needed
- Tobacco harvested October 4
- Fire-cured

Treatment	Lbs K ₂ O/A	Application Method
1	0	-
2	130 (50%)	Broadcast
3	260 (100%)	Broadcast
4	390 (150%)	Broadcast
5	130 (50%)	Band
6	260 (100%)	Band
7	390 (150%)	Band

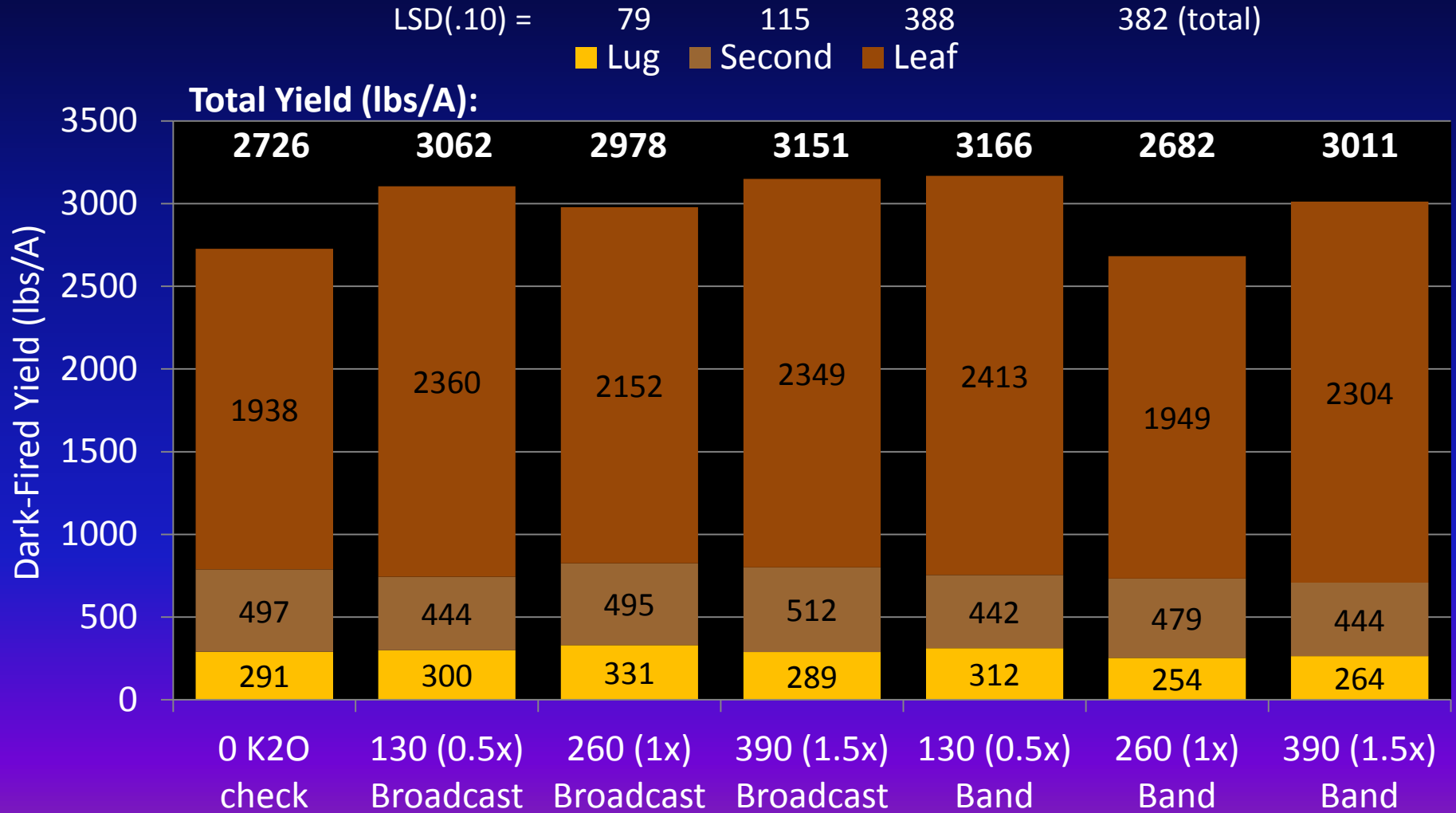
*Broadcast applications made June 19 and incorporated with Roterra.

*PD7309 set June 20 on 40" rows and 32" plant spacing (4900 plants/A)

*Banded applications applied to both sides of each row on June 28 and cultivated in.

Dark Tobacco Response to Potassium

MSU West Farm – 2013 – Dark Fired Yield



Summary

Year	Soil Type	Soil Test K	lbs K ₂ O/A recommend	Rainfall* (April-Sept)	Crop Response
2010	Well drained Pembroke	236 (Medium)	160	Normal (23.58")	None
2012	Moderately well drained Grenada	102 (Low)	290	Dry (17.98")	Small trends but not significant
2013	Moderately well drained Grenada	136 (Low)	260	Wet (38.58")	None

*Historical average rainfall from April to September is approximately 23.75 inches.

Summary

- Grenada soil at Murray classified as moderately well-drained
 - More prone to water damage to tobacco root systems in wet years
 - Likely increased variability in 2013
- Grenada soil series and other soils found in the Purchase area of west Kentucky contain more montmorillonite clay than in other areas of Kentucky
 - Can hold large amounts of exchangeable potassium that may be below 6-inch depth where soil samples are taken
- These data suggest there is no difference in dark tobacco response to broadcast or banded applications under these conditions and there are opportunities to reduce K_2O rates without reducing yield or quality of dark-fired tobacco.

Questions?



Appreciation to Altria Client Services/U.S. Smokeless Tobacco Co. for support of this research