

# 2021 KY/TN Tobacco Agent Training

A wide-angle photograph of a tobacco field. The foreground is filled with large, vibrant green tobacco leaves, showing their characteristic vein structure. The field extends into the distance, where a line of trees and a clear blue sky with scattered white clouds are visible. The overall scene is bright and sunny.

April 9, 2021

Dark Tobacco Update

Andy Bailey

Univ. of KY / Univ. of TN

UKREC, Princeton KY

# 2021 Tobacco Agent Training

April 9, 2021

## Agenda

- 8:30-8:45 CST: Welcome, float bed update
- 8:45-9:00 CST: Economic Outlook – Snell
- 9:00-10:00: Bailey
  - Budgets and profitability
  - Angular leaf spot update
  - Potassium research
  - Cigar wrapper research
- 10:00-10:05
  - Break
- 10:05-10:15: Introduction of Mitchell Richmond, new UT Tobacco Specialist
- 10:10-11:30: Pearce
  - Weather effects on tobacco yield
  - Hidden soil compaction
  - Hemp research update



# Float Bed Update

Photos courtesy Eric Walker



Seed shrimp (Ostracod)  
seen in some float beds this spring



- Seen in clusters in float water
- Very fast moving
- Only filter water
- Should not cause any damage to plants

# Float Bed Update

- More transplant growers are finally starting to use **Terramaster** instead of **Ridomil** in float water
  - GAP requirements
- Standard Terramaster rate:
  - **0.7 to 1.0 oz** Terramaster per 100 gallons of float water
  - Curative rate is up to 1.4 oz per 100 gallons
  - 0.5 oz/100 gallons would be minimum rate
- Growers should be aware that Terramaster will cause a short delay in growth for 7-10 days but roots and growth will come back stronger.

# Float Water Calculations

- Calculating float water volume:
  - Method 1: calculate cubic feet water and convert to gallons
    - Bed width (ft.) X Bed length (ft.) X Bed depth (ft.) =  $\text{ft}^3$
    - Example: 20 ft wide X 100 ft. long X 6 inches (0.5 ft.) =  $1000 \text{ ft}^3$
    - $1 \text{ ft}^3 = 7.48$  gallons, so  $1000 \text{ ft}^3 \times 7.48 = 7480$  gallons
  - Method 2: (assuming bed is full of trays)
    - # of trays in bed X depth of water in inches X 1.64
    - (1.64 is gallons of water 1 inch deep under 1 float tray)
    - Example: 750 trays X 6 inches deep X 1.64 = 7380 gallons

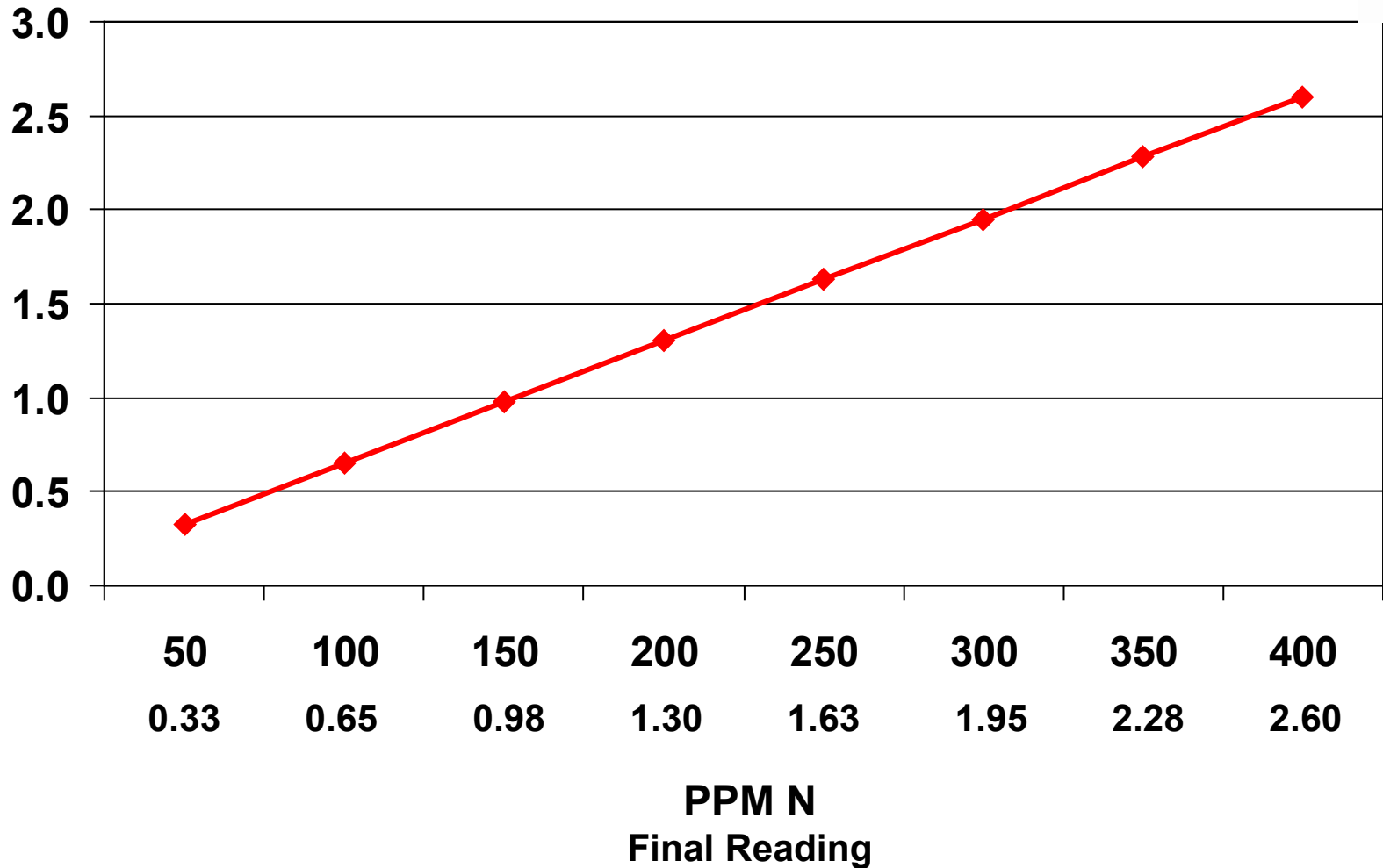
# Fertilizer Calculations

- Terramaster rates based on 100 gallons, fertilizer rates based on 1,000 gallons
- Target N rate: 100 ppm N in float water
  - 1,000 gallons of water weighs 8,340 lbs (8.34 lb/gal)
  - 100 ppm of water is  $8,340/1,000,000 = 0.00834 \times 100 = 0.834$
  - Common soluble fertilizers:
    - 20-10-20:  $0.834/0.20 = 4.2$  lbs per 1,000 gallons
    - 15-5-15:  $0.834/0.15 = 5.6$  lbs per 1,000 gallons

# Standards Chart for 20-10-20 mS (Dist 4 meters)



Fertilized water – plain water source reading



# Tobacco Economic Update

Will Snell



# 2021 KY/TN Tobacco Agent Training

## April 9, 2021

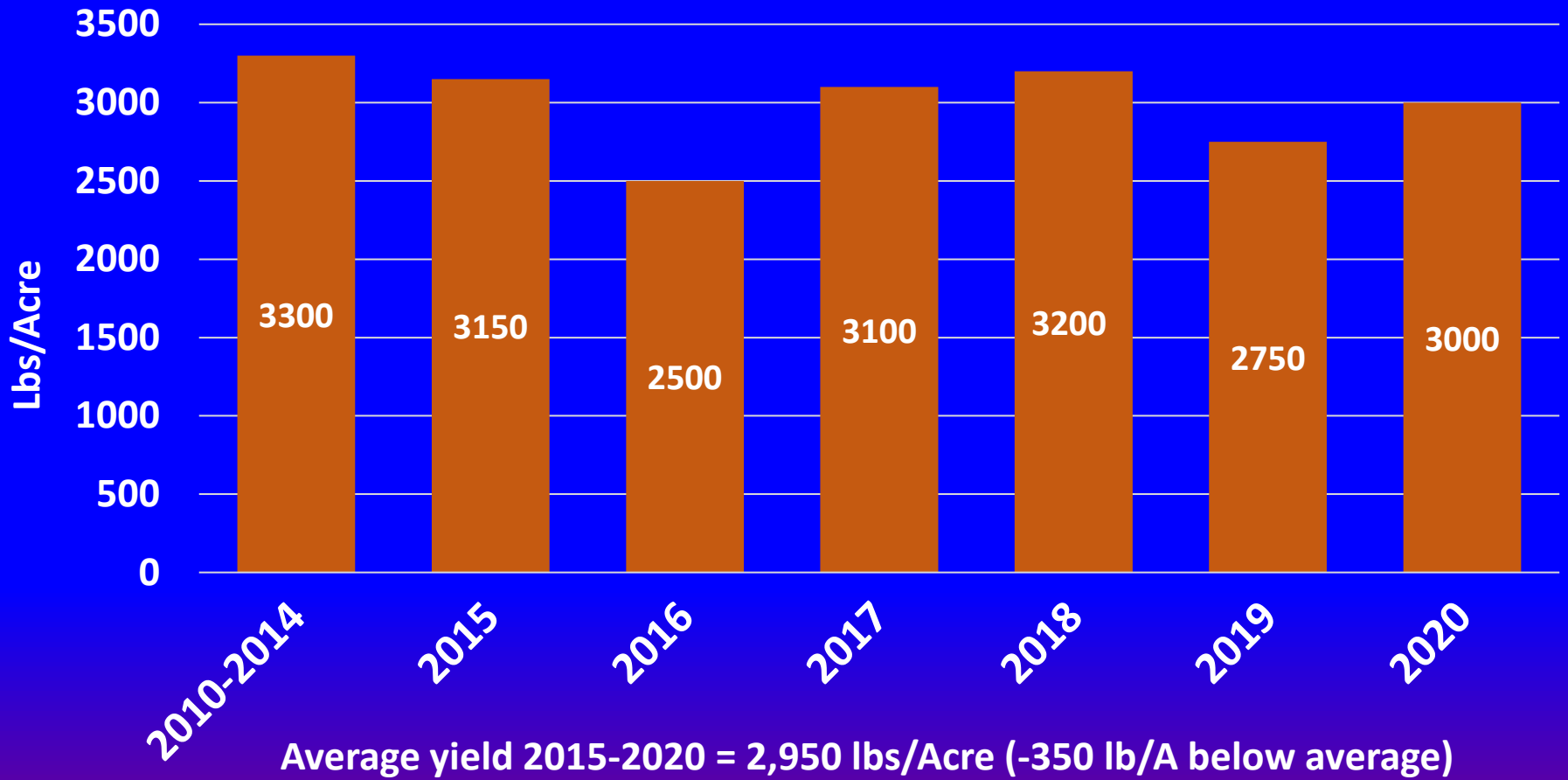
- Tobacco Budgets and Profitability
- Dark tobacco angular leaf spot update
  - Field monitoring project
  - 2020 field trials
- Potassium research
- Connecticut Broadleaf Cigar Wrapper tobacco research

A wide-angle photograph of a tobacco field. The foreground is filled with large, vibrant green tobacco leaves, showing their characteristic vein structure. The plants are arranged in neat rows that stretch towards the horizon. In the background, there are other agricultural fields, including what appears to be a cornfield, under a bright blue sky with scattered white clouds. The overall scene is a lush, productive agricultural landscape.

***Tobacco Budgets and Profitability***

# Dark-Fired Tobacco Yields 2015-2020

Dark-Fired Average Yield/Acre



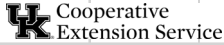

# Time to Look at Budgets

- Three components of profitable tobacco production:
  - Average price received per pound
  - Yield - pounds per acre produced (assuming quality is good)
  - Production costs – how much does it cost per pound to grow?

# Budgets

<https://agecon.ca.uky.edu/budgets#Tobacco>

<https://agecon.ca.uky.edu/files/exttnkydarkfired42.xls>

DARK FIRED TOBACCO BUDGET								
2021 ESTIMATED CONTRACTED TOBACCO COSTS AND RETURNS					4,600 Plants per Acre			
ITEM	DESCRIPTION	UNIT	AMOUNT	PRICE	TOTAL	TOTAL	YOUR	
			(#/AC)	(\$/UNIT)	(\$/AC)	(\$/LB)	FARM	
<b>GROSS REVENUE</b>								
Tobacco Sales	Dark Fired Tobacco	lb	3000	\$2.75	\$8,250.00	\$2.75		
<b>VARIABLE COSTS</b>								
Transplants	Purchased	1000	4.6	\$52.00	\$239.20	\$0.08		
Fertilization	Dolomite Lime - Spread	ton	1	\$24.00	\$24.00	\$0.01		
	Nitrogen - N*	lb	300	\$0.35	\$105.00	\$0.04		
	Phosphorus - P	lb	175	\$0.59	\$103.25	\$0.03		
	Potassium - K**	lb	250	\$0.64	\$160.00	\$0.05		
Herbicides		ac	1	\$45.20	\$45.20	\$0.02		
Insecticides		ac	1	\$106.20	\$106.20	\$0.04		
Fungicides		ac	1	\$50.45	\$50.45	\$0.02		
Sucker Control		ac	1	\$111.25	\$111.25	\$0.04		
Cover crop	Wheat	bag	2	\$10.50	\$21.00	\$0.01		
	<b>Hired Labor***</b>	<b>hr</b>	<b>200</b>	<b>\$15.40</b>	<b>\$3,080.00</b>	<b>\$1.03</b>		
Curing	Sawdust, Slabs	ac	1	\$535.00	\$535.00	\$0.18		
Machinery	Fuel/Oil, Repairs	ac	1	\$165.00	\$165.00	\$0.06		
Crop Insurance		ac	1	\$125.00	\$125.00	\$0.04		
Custom Hire	Spraying (4 times)	ac	1	\$125.00	\$125.00	\$0.04		
GAP****	certification		1	\$100.00	\$100.00	\$0.03		
Trucking		ac	1	\$150.00	\$150.00	\$0.05		
Interest	6 months	\$	\$5,095.55	6.00%	\$152.87	\$0.05		
<b>TOTAL VARIABLE COSTS</b>					<b>\$5,398.42</b>	<b>\$1.80</b>		
<b>RETURN OVER VARIABLE COSTS</b>					<b>\$2,851.58</b>	<b>\$0.95</b>		
<b>FIXED COSTS*****</b>								
Machinery	Depreciation, Insurance, Storage	ac	1	\$110.00	\$110.00	\$0.04		
3-Tier Barn	Depreciation, Insurance	ac	1	\$420.00	\$420.00	\$0.14		
Tobacco Sticks	Depreciation at 8 years	ac	1	\$60.00	\$60.00	\$0.02		
Interest	Barns, Machinery	ac	1	\$200.00	\$200.00	\$0.07		
<b>TOTAL FIXED COSTS</b>					<b>\$790.00</b>	<b>\$0.26</b>		
<b>RETURN TO LAND, OPERATOR LABOR AND MANAGEMENT</b>					<b>\$2,061.58</b>	<b>\$0.69</b>		
Land	Value of Land/Rental Cost	ac	1	\$250.00	\$250.00	\$0.08		
<b>RETURN TO OPERATORS LABOR AND MANAGEMENT</b>					<b>\$1,811.58</b>	<b>\$0.60</b>		
Operator Labor	Unpaid Operator and/or Family	hrs	50	\$15.00	\$750.00	\$0.25		
<b>RETURN TO MANAGEMENT</b>					<b>\$1,061.58</b>	<b>\$0.35</b>		



# Labor Costs

- True H2A labor costs:
  - \$12.40 hourly wage (2020)
  - + **\$3.00/hr** “other” costs
    - Processing fees
    - Housing
    - Transportation – locally and from Mexico and back
- **\$15.40 per hour**
- **2021: \$12.96 + \$3.00 = \$15.96/hr**



# Break-Even Yields based on Current Budgets

- Dark-fired:
  - For 2800 lb/A yield, total production cost is \$2.39/lb
  - at \$2.75/lb, break-even yield over all costs is about **2600 lbs/A**
- Dark air-cured:
  - For 2700 lb/A yield, total production cost is \$2.22/lb
  - At \$2.45/lb, break-even yield over all costs is about **2450 lbs/A**
- Burley: \$2.00/lb sale price
  - Break-even yield over variable and fixed cost is about **2200 lbs/A**
  - Break even yield over all costs (+operator labor) is **2500 lbs/A**

# Connecticut Broadleaf Wrapper Budget?

- +30% more on insecticide costs
- +50% more on fungicide costs
- Assume straight-strip, no added stripping/sorting costs
  
- Need to average at least 40-50% wrapper grades
  - #1, #2/Binder, or 2C
  
- **At 2000 lb/A, need to average at least \$3.00/lb to be profitable.**



*Angular Leaf Spot in Dark Tobacco*





# Angular Leafspot

*Pseudomonas syringae* pv. *tabaci*

- Since 2015, has become the most significant foliar disease in dark tobacco in Kentucky and Tennessee
- Streptomycin has been standard control, but effectiveness is limited
- Increasing levels of resistance to streptomycin
  - At least 1/3 of ALS cases are resistant to streptomycin





**Severe angular leaf spot**



# Angular Leafspot:

## What we (think) we know:



- We don't think angular leaf spot starts in transplants
  - Normally don't see it before about 6 weeks after TP
  - Have never seen angular leaf spot in a float bed
- We don't think tillage type really matters
  - Angular leaf spot bacteria is said to overwinter on plant residue (so no-till should be worse)
  - Angular is also spread by dirt splashing up on leaves
  - No residue in conventional tillage, but more risk for splashing in heavy rains
- We are not sure how much rotation matters



# Angular Leafspot:

## What we (think) we know:



- We think there are differences in dark tobacco varieties
- We do know that anything we can do to prevent leaf damage should reduce angular leaf spot
  - Lower plant populations may help
  - Minimize cultivation after transplanting
  - Incorporate spray rows to minimize driving through the tobacco
  - Top in the bud stage to minimize stalk and leaf damage
  - Drip irrigation may be better than overhead irrigation
  - Earlier harvest to minimize time crop is in the field

# Angular Leafspot:

## What we (think) we know:



- Preventative sprays with good coverage are critical
  - Making a preventative spray before a major storm may be the most important thing we can do
- Frequent preventative sprays
  - At least every 10 days beginning by layby (6 weeks after TP)
- Try to use high volume and high pressure to ensure good coverage
  - 30 to 40 gal/A for small tobacco at layby
  - 50 to 80 gal/A for large tobacco at topping

# Angular Leafspot

*Pseudomonas syringae* pv. *tabaci*



- Bacterial diseases are notoriously difficult to control
- We have done a lot of research on this disease since 2015, but still don't have good management recommendations.
- What have we done?
  - Tested >25 chemicals for control in 10 field trials
  - Monitored resistance to streptomycin
  - Tested dark tobacco varieties for differential sensitivity to angular leafspot infection
  - Field monitoring project to look at factors that may be involved

# Angular Leafspot:

## What we (think) we know:



- What are best chemicals to spray?
  - Streptomycin can still help in fields with susceptible ALS
  - For streptomycin resistant ALS:
    - Copper products have been best alternative:
      - Nordox: copper oxide, 3 to 5 lbs/A
      - Copper sulfate products: Phyton 27AG, KOP-5, Instill, 20 oz/A
      - Cueva: copper octanoate, 1 to 2 gal/A
    - Surface sterilants:
      - Oxidate (hydrogen peroxide + peroxyacetic acid) – 8 to 26 oz/50 gal
      - PAA (peroxyacetic acid + hydrogen peroxide)
- Alternate sprays with streptomycin, copper, and oxidate/PAA may be best spray plan.



# 2020 ALS Chemical Evaluations of Steptomycin Alternatives

## Princeton:

Nordox - copper

Regalia-biological

PAA—peroxyacetic acid (contact)

Botrystop - biological

Vacciplant (laminarin - activator)

PhD (Polyoxin D - antibiotic)

## Murray:

*Copper comparisons:*

Nordox (copper oxide)

KOP-5 (copper sulfite)

Cueva (copper octanoate)

\*Both trials inoculated with strep-sensitive strain of ALS.



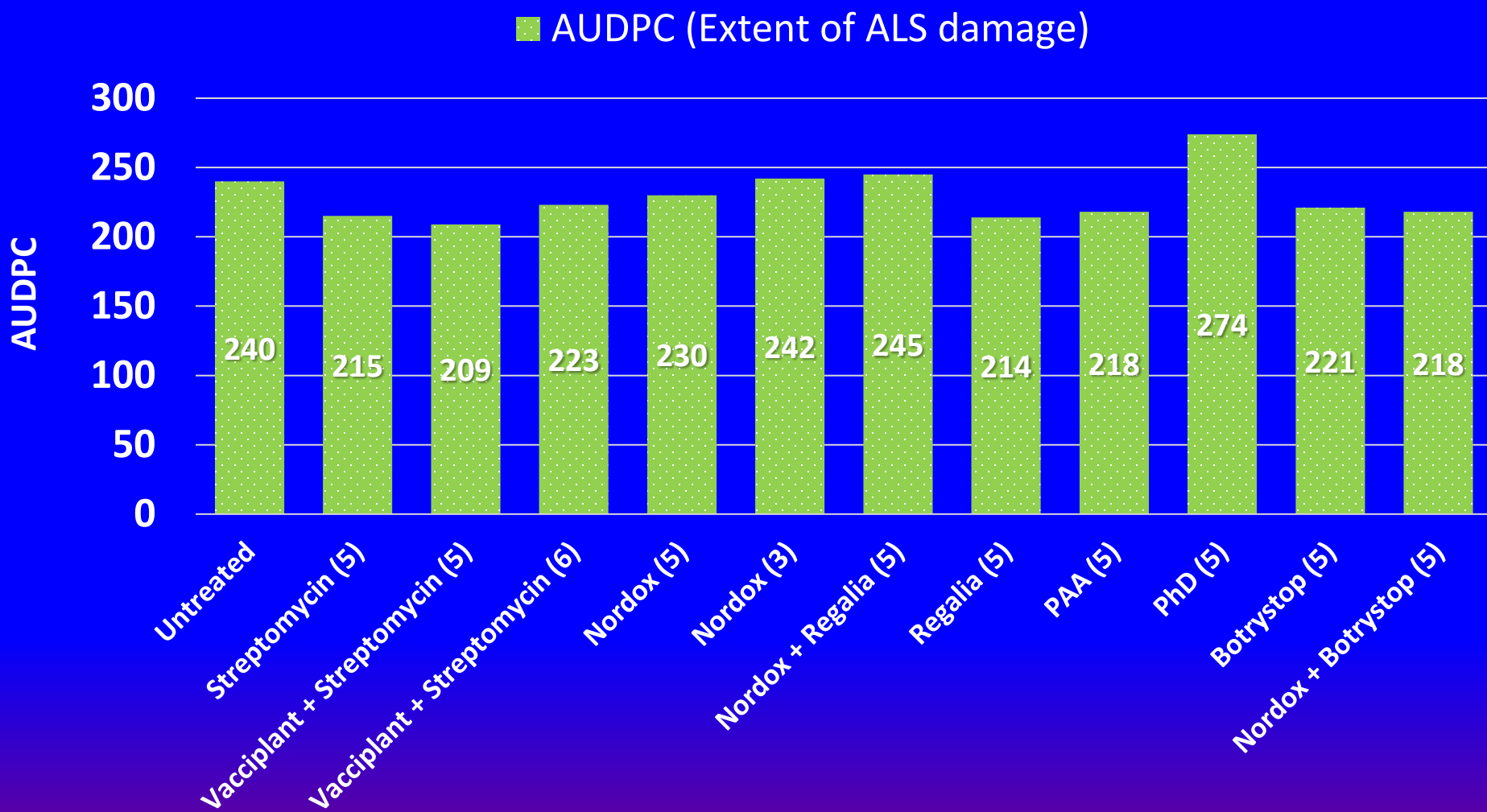
# Chemical Screening for Angular Leafspot Control

- Field trials have been going on every year since 2015
- Chemicals that look promising are retained in the test for the next year, others culled.
- >25 chemicals tested since 2015
- Plots inoculated with a streptomycin-sensitive strain of angular leafspot



# Chemical Screening for Angular Leaf Spot Control

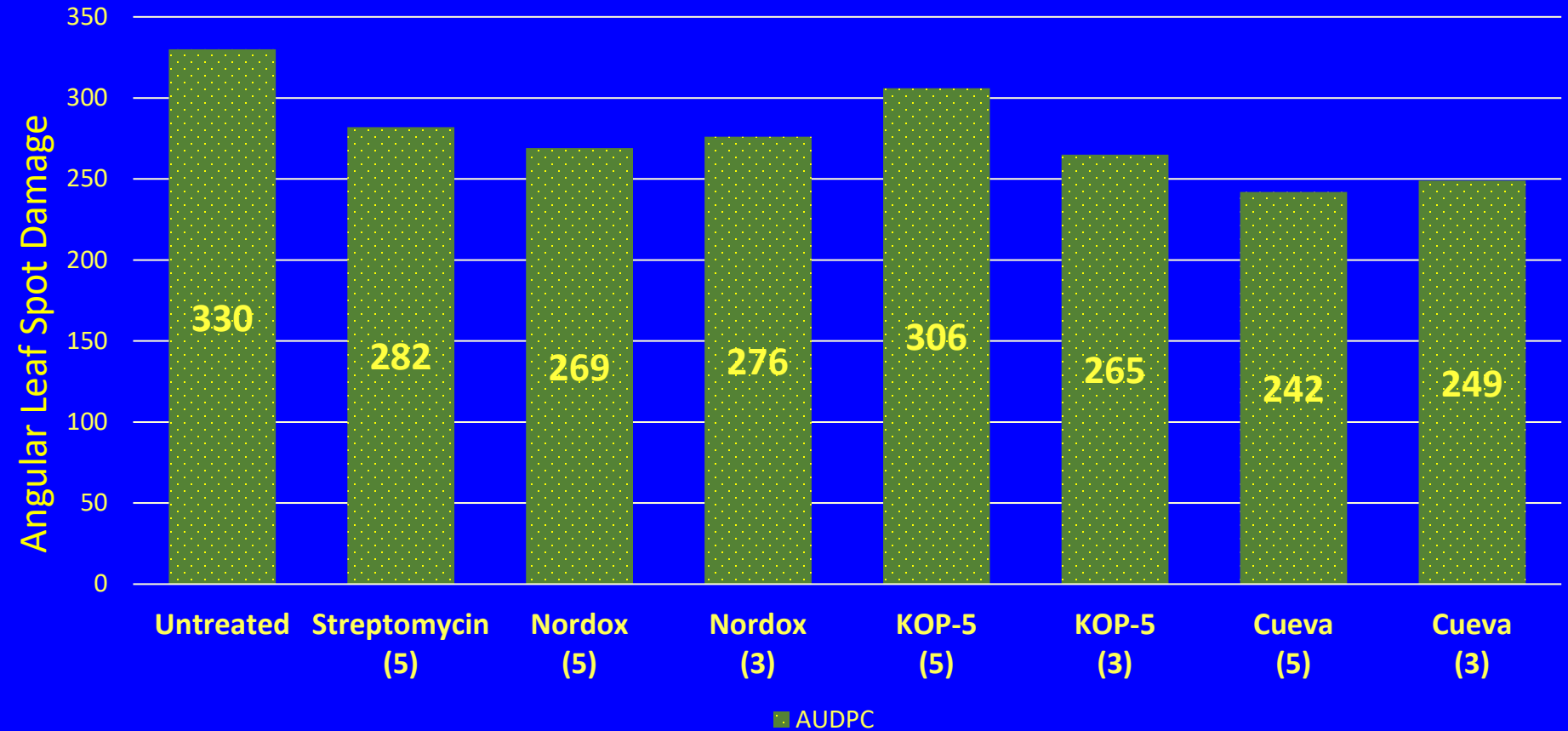
## 2020 – UKREC, Princeton KY



# Comparison of Copper Products

## MSU, Murray KY - 2020

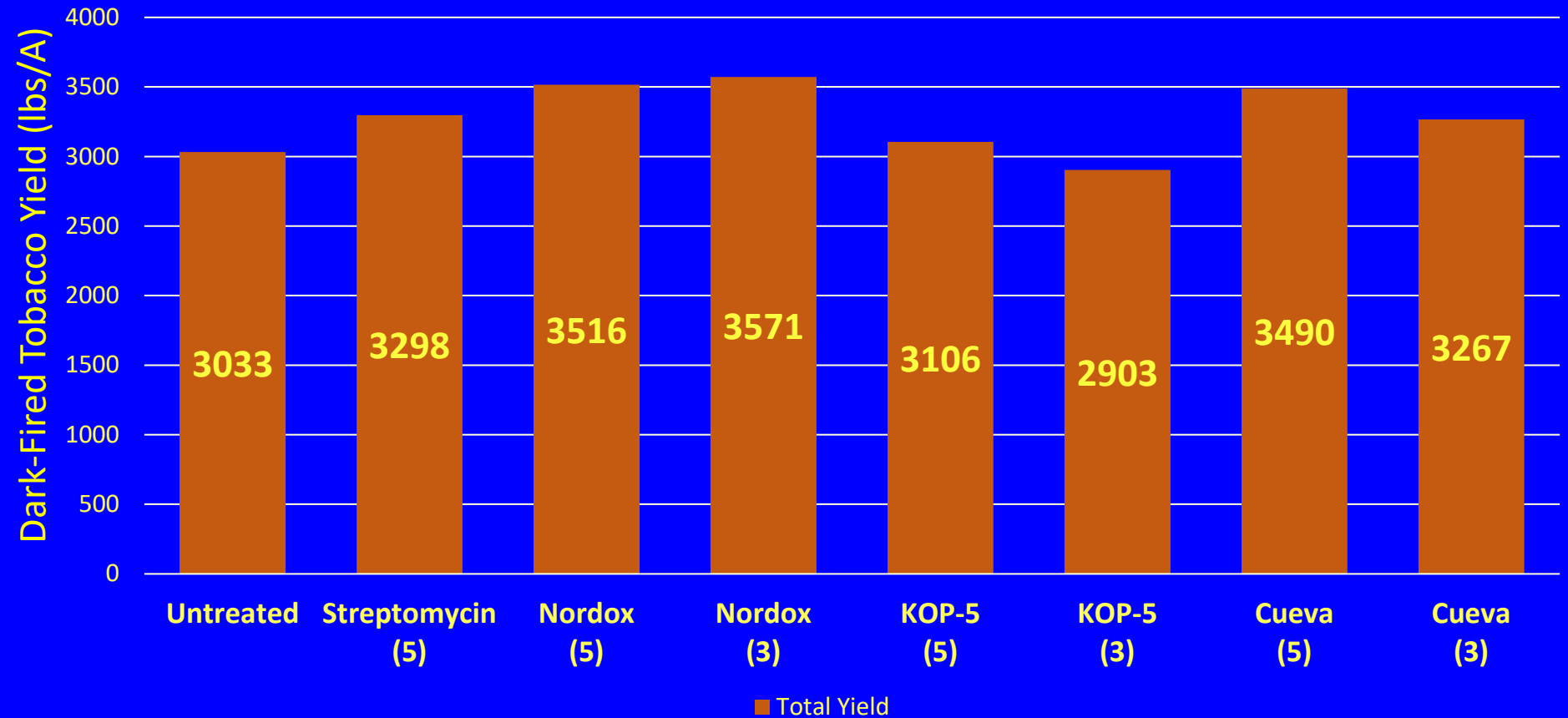
Extent of Angular Leaf Spot Damage (AUDPC)



# Comparison of Copper Products

## MSU, Murray KY - 2020

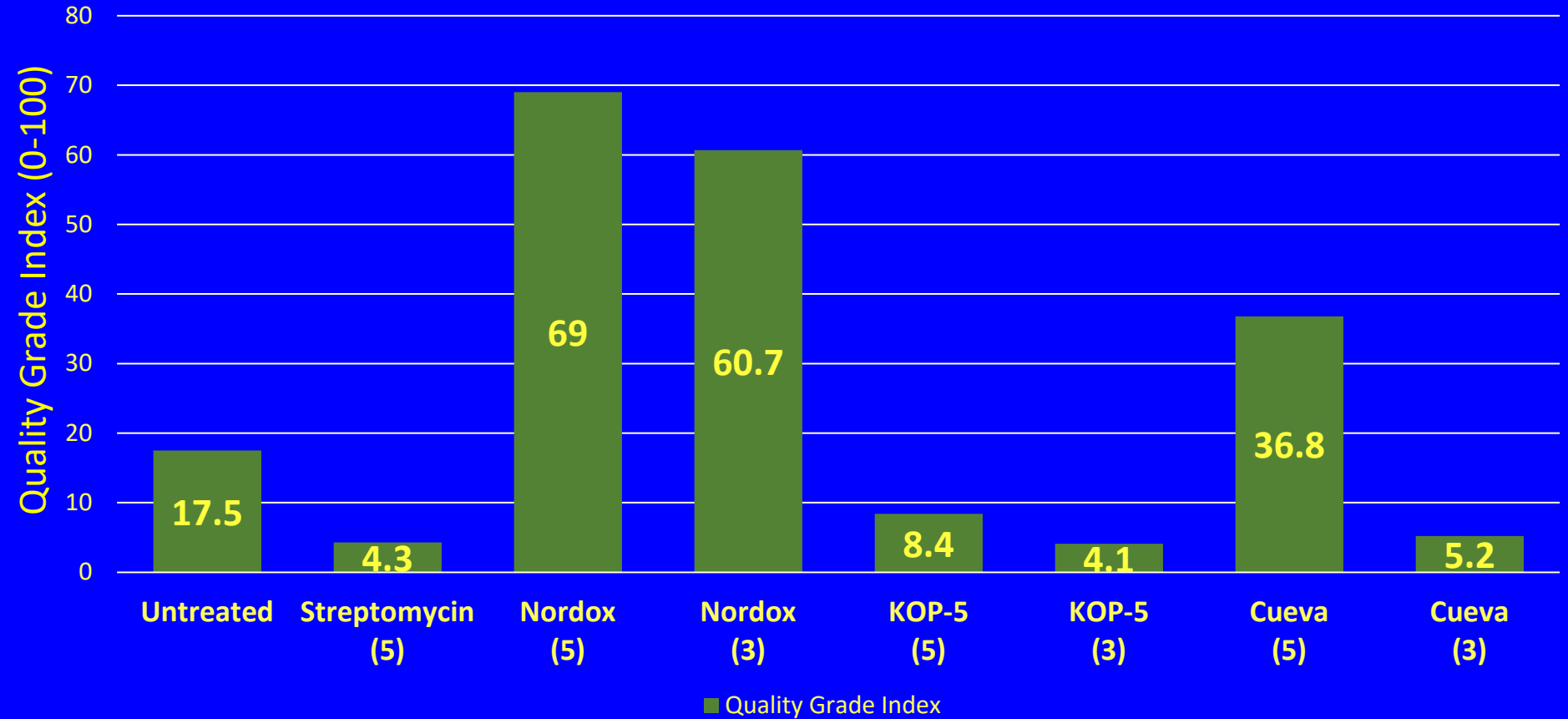
Dark-Fired Tobacco Yield (lbs/A)



# Comparison of Copper Products

## MSU, Murray KY - 2020

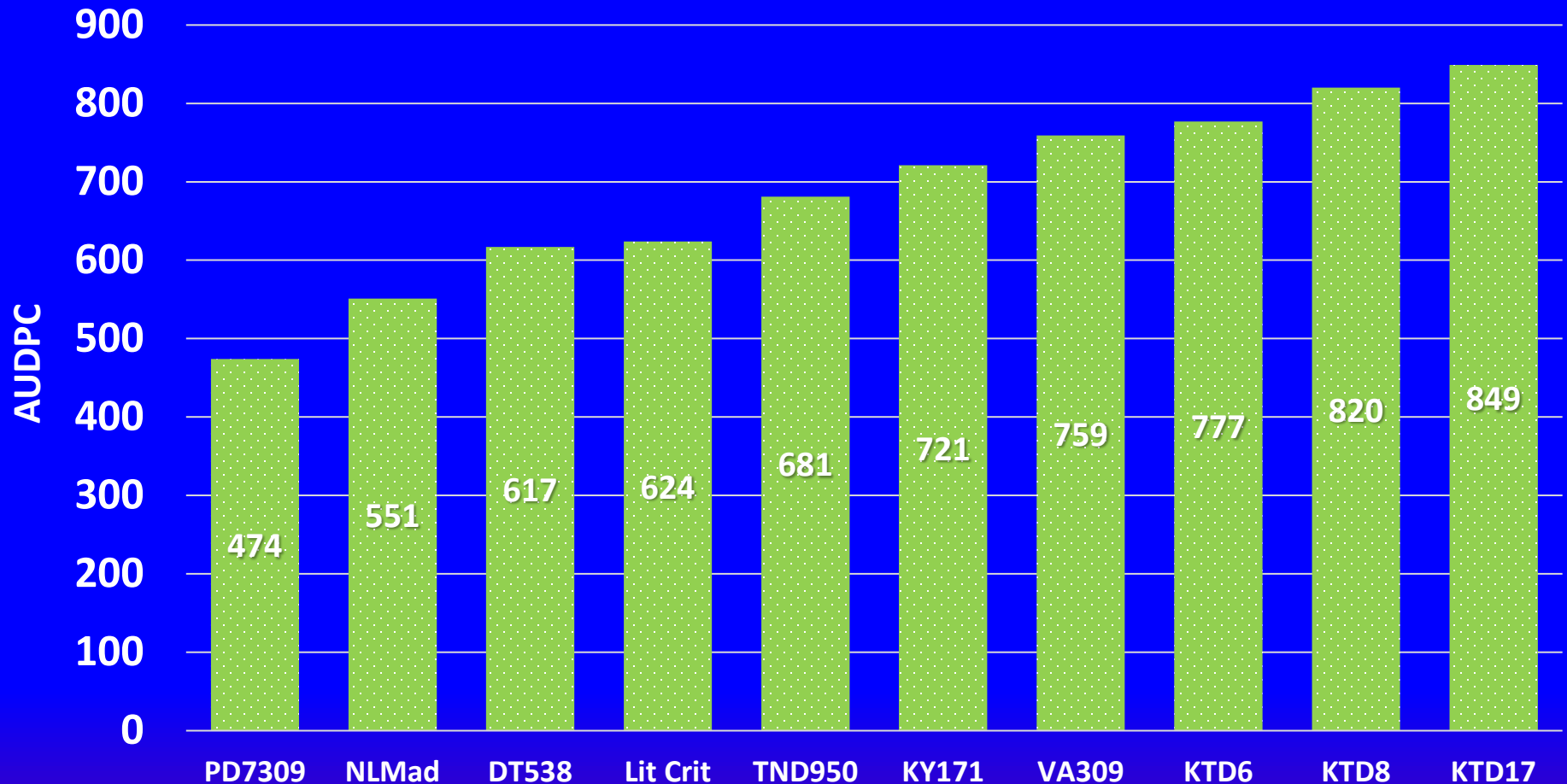
Quality Grade Index (0-100)



# Variety Response to Angular Leaf Spot

## 2020 – UKREC, Princeton KY

■ AUDPC (Extent of ALS damage)



\*Dark varieties with better holdability after topping seem to be less susceptible to ALS.

A wide-angle photograph of a tobacco field. The foreground and middle ground are filled with rows of large, vibrant green tobacco leaves. The leaves have a distinct vein pattern and are slightly curled. In the background, the field extends to a horizon line under a bright blue sky with scattered white clouds. The overall scene is bright and clear, suggesting a sunny day.

***Potassium Research***

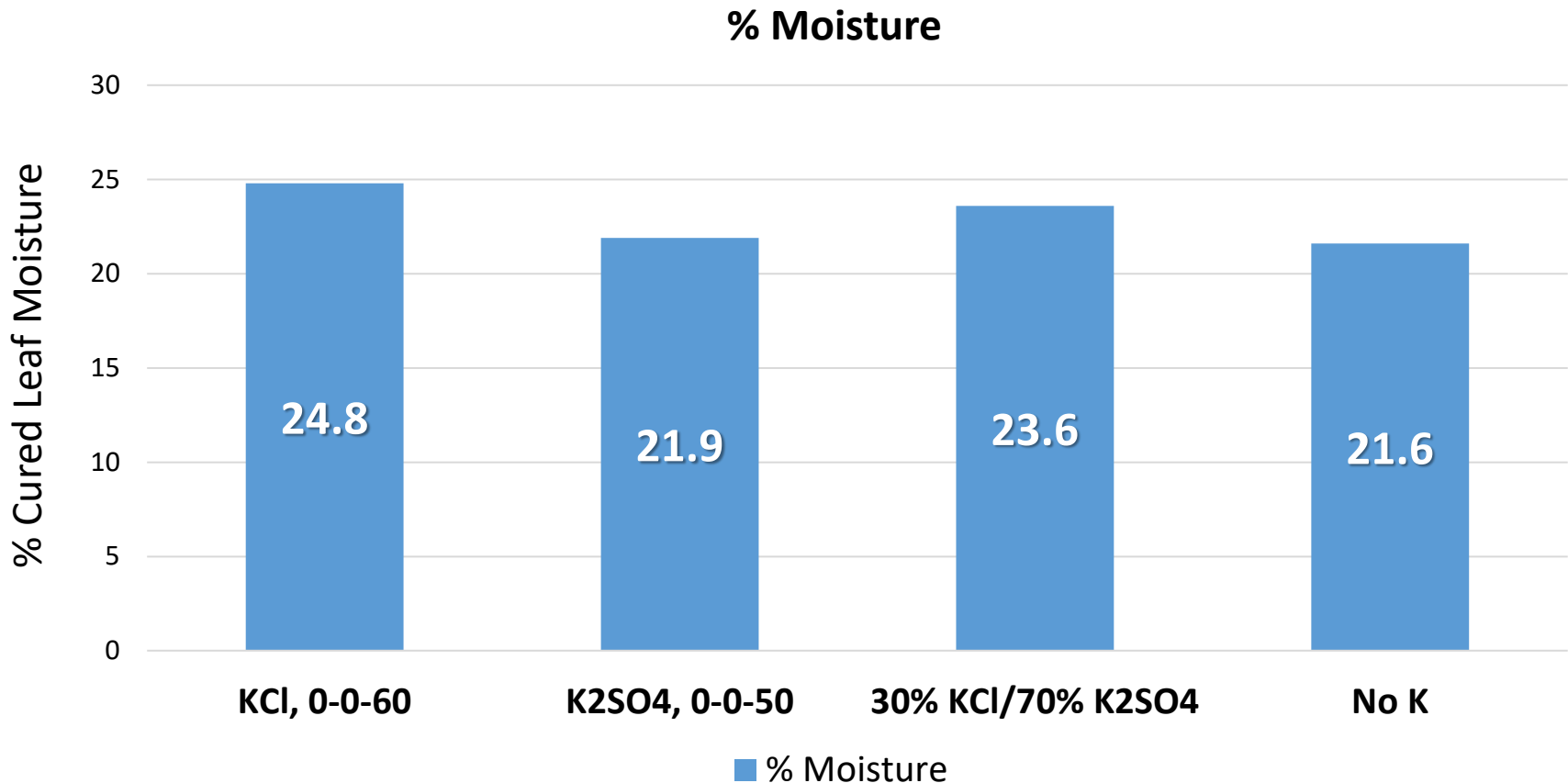


# Effect of Muriate-of-Potash on TSNA

- Average 27% reduction in TSNA from spring applications of Muriate-of-Potash (0-0-60)
- Similar TSNA reductions with blend of Sulfate-of-Potash and Muriate-of-Potash (0-0-50/0-0-60)
  - No more than 100 lbs 0-0-60/acre
  - 30% 0-0-60/70% 0-0-50 at 200 lbs potassium/acre
- ***Now recommend all tobacco growers use potassium blend that contains 100 lbs 0-0-60/acre***

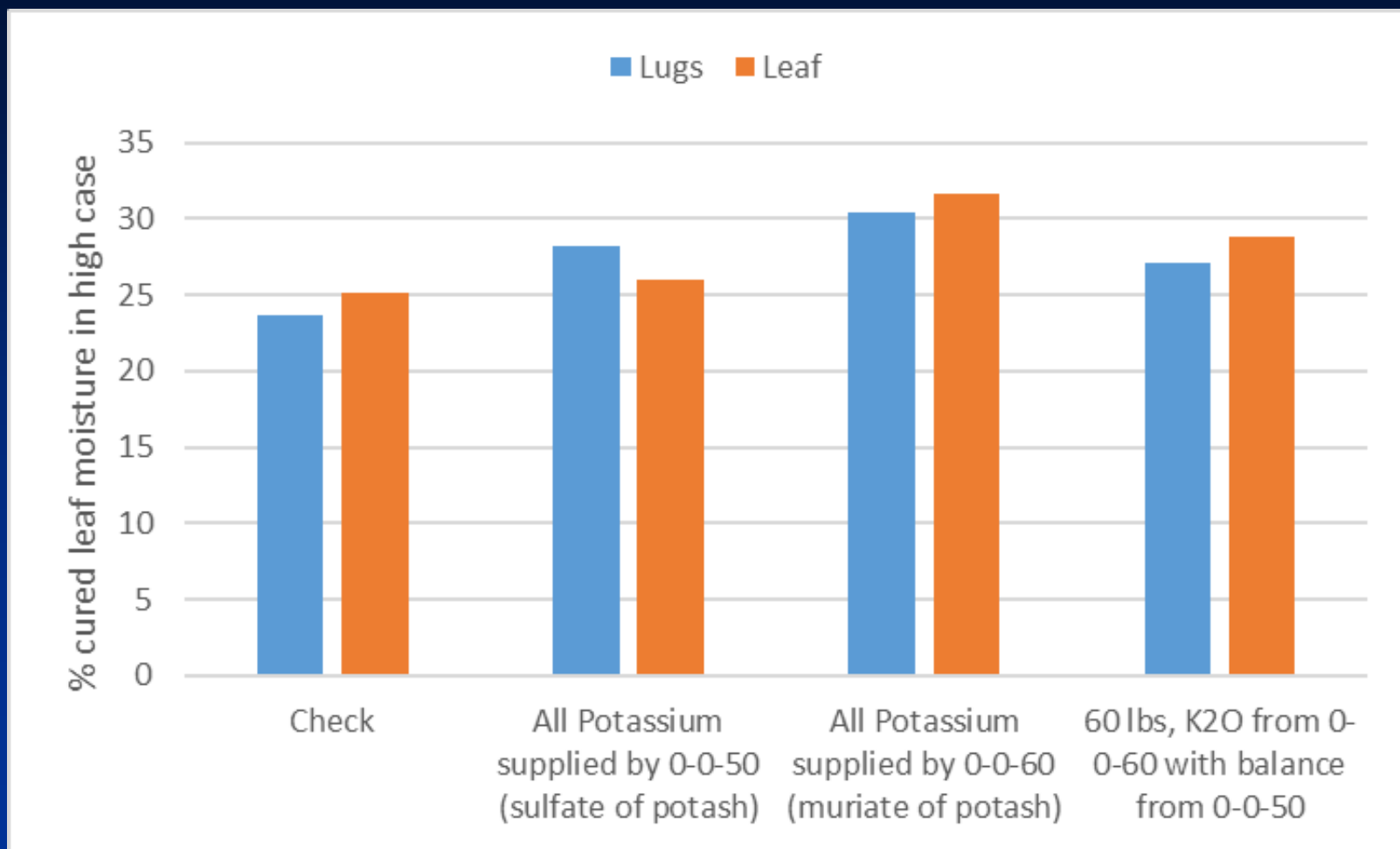
# Effect of Potassium Source of Dark-Fired Cured Leaf Moisture

UKREC, Princeton KY - 2020



\*KT D17LC, 200 lbs potassium per acre. General moisture limit is 25% for dark fired.

# Potassium Source Trial – Cured Leaf Moisture Burley – Lexington 2020



340 lbs potassium per acre. General moisture limit for burley is 23 to 24%.  
Moisture data collected when tobacco was in high case.

# 2021-2022 Burley and Dark Tobacco Production Guide

*A cooperative effort of the University of Kentucky, the University of Tennessee, Virginia Tech, and NC State University*

 University of  
**Kentucky**  
College of Agriculture,  
Food and Environment  
ID-160

THE UNIVERSITY of  
**TENNESSEE**   
INSTITUTE of  
AGRICULTURE  
PB 1782

 VirginiaTech  
*Invent the Future*  
436-050  
**NC STATE UNIVERSITY**





A wide-angle photograph of a tobacco field. The foreground and middle ground are filled with rows of large, green, broadleaf tobacco plants. The leaves are thick and have prominent veins. In the background, there are other agricultural fields, including what appears to be a cornfield, under a bright blue sky with scattered white clouds. The overall scene is a healthy, well-maintained agricultural landscape.

*Connecticut Broadleaf Cigar  
Wrapper Research Update*

# Connecticut Broadleaf Cigar Wrapper

- Air-cured cigar wrapper type
- High demand by leaf dealers
  - 1,500 acres grown in 2019
  - 3,000 acres grown in 2020
  - Probably <1,500 acres in 2021
- Many growers had bad experiences in 2020



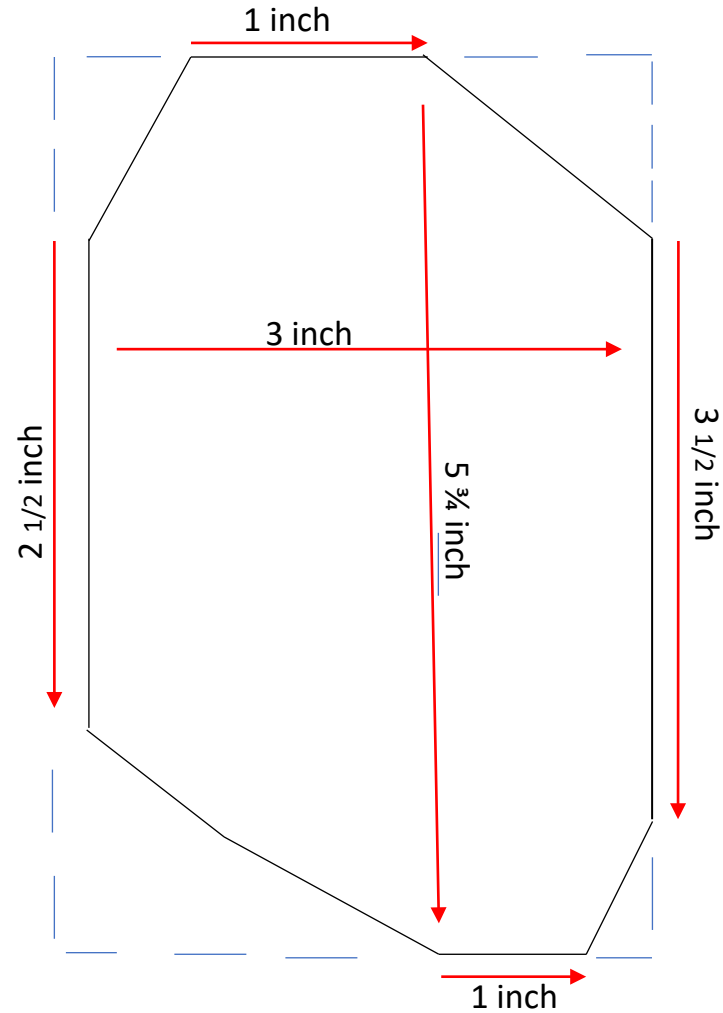


# CT Broadleaf Production Timeline

- Short-season crop
  - Fast growing in greenhouse and field
  - Early harvest before leaf deterioration begins
- Transplants ready in 7 weeks (8 weeks for burley/dark)
- 7 weeks from transplanting to topping (9 wks for burley/dark)
- Harvest at 2 to 3 weeks after topping (4-6 wks for burley/dark)
- 9 to 10 week field season (14-16 weeks for dark-fired)
- Harvest complete before burley or dark harvest begins
- Average yield for CT Broadleaf: 2,000 lbs/A
  - 2,500 lbs/A for burley; 3,000 lbs/A for dark air; 3,500 lbs/A for dark fired

# Wrapper Cuts

Approximately size of 3" x 5" index card

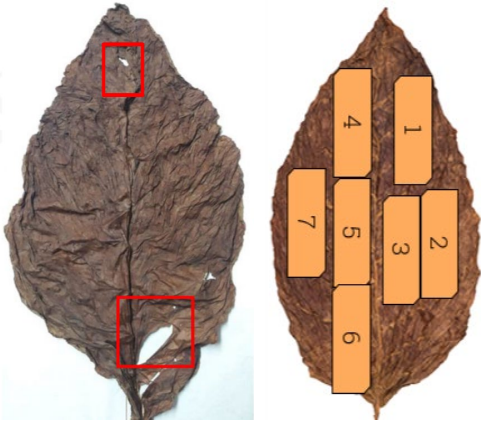


Source: ITG Brands



#1

2LS

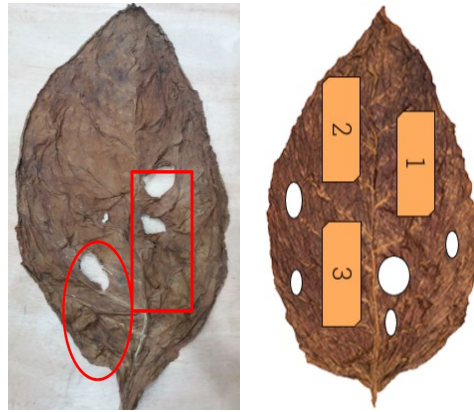


6-8 wrapper Cuts

\$6.50/lb or more

#2

3 LS

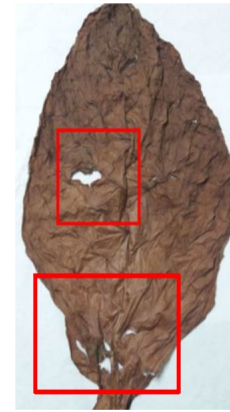


3 to 5 wrapper Cuts

\$4 to \$5/lb

#3 or "2C" (2-cut)

4LS



1-2 wrapper Cuts (Binder)

\$3/lb

BLS/Filler



Less than 1 Cut

\$1.50/lb

- Need large leaves to get more potential wrapper cuts
- Low topping required – 10-12 leaves on plant

Source: ITG Brands

# CT Broadleaf Variety Trials

- Variety trials have been conducted in 2019 and 2020, but currently there is really no variety selection.
- Dealers provide seed for the variety they want grown
- ‘C33’ – ‘heirloom’ type open-pollinated variety from CT.
  - No disease resistance
- Varieties used are just different selections of C33
  - Universal/Gallatin Redrying: PAB (PA Broadleaf)
  - Hail & Cotton: SPX

# 2019 CT Broadleaf Variety Trial – Pre-Harvest



**C33**

No disease resistance



**A1**

Fusarium wilt, TMV



**B1**

Fusarium wilt, TMV



**B2**

Fusarium wilt, TMV, black root rot, blue mold  
Male Sterile Hybrid



**D1**

Fusarium wilt, TMV, black root rot



**D2**

Fusarium wilt, TMV, black root rot, cyst nematode

# 2019 Connecticut Broadleaf Variety Evaluation

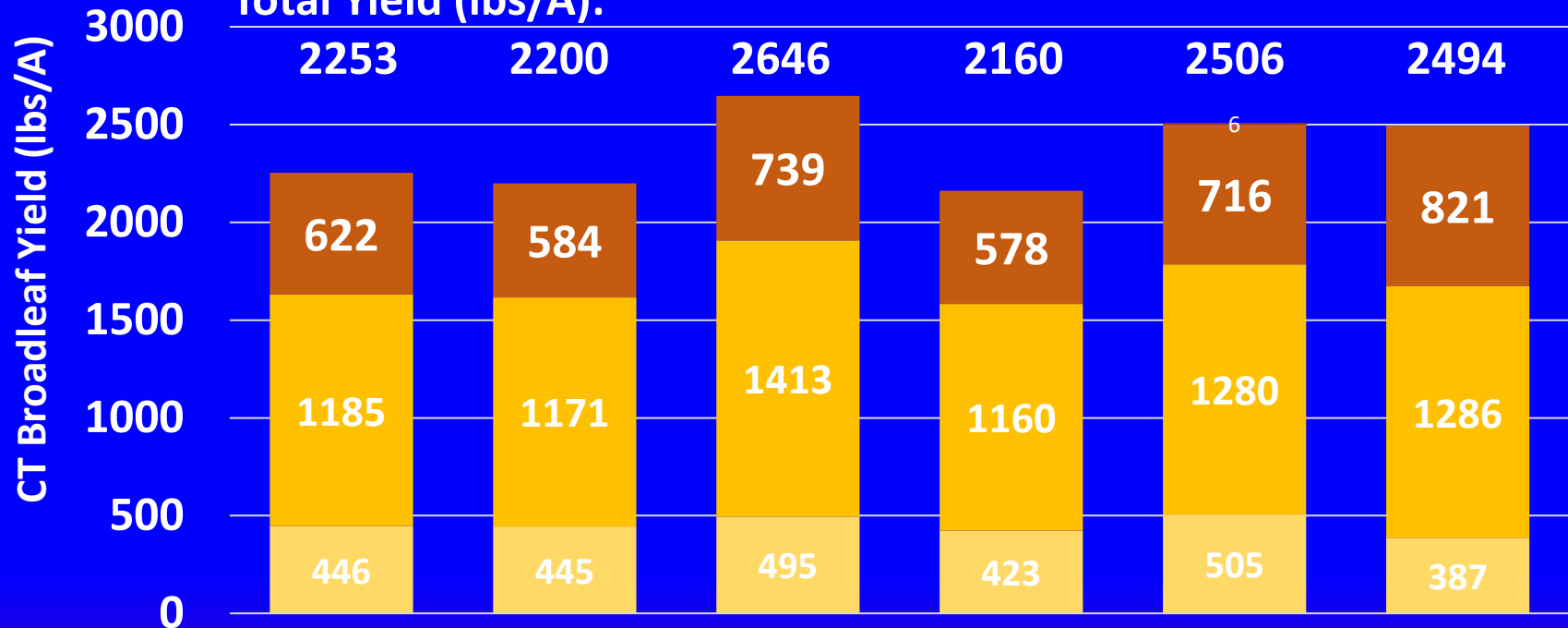
## Variety Evaluation

UKREC, Princeton KY

N: 175 lbs N/A (75 PRE; 100 Sidedress)  
Transplanted May 28  
Harvested 3 wk after topping

LSD(0.10) = 78      244      242      270 (total)  
 ■ Trash   ■ Filler   ■ # 2 Wrapper   ■ # 1 Wrapper

Total Yield (lbs/A):



**A1**

**B1**

**B2**

**D1**

**D2**

**C33**

% Wrapper:

27

26

28

27

29

33

LSD(0.10) for % wrapper = 9.7

Mean total yield for trial = 2376 lbs/A; mean % wrapper = 28%

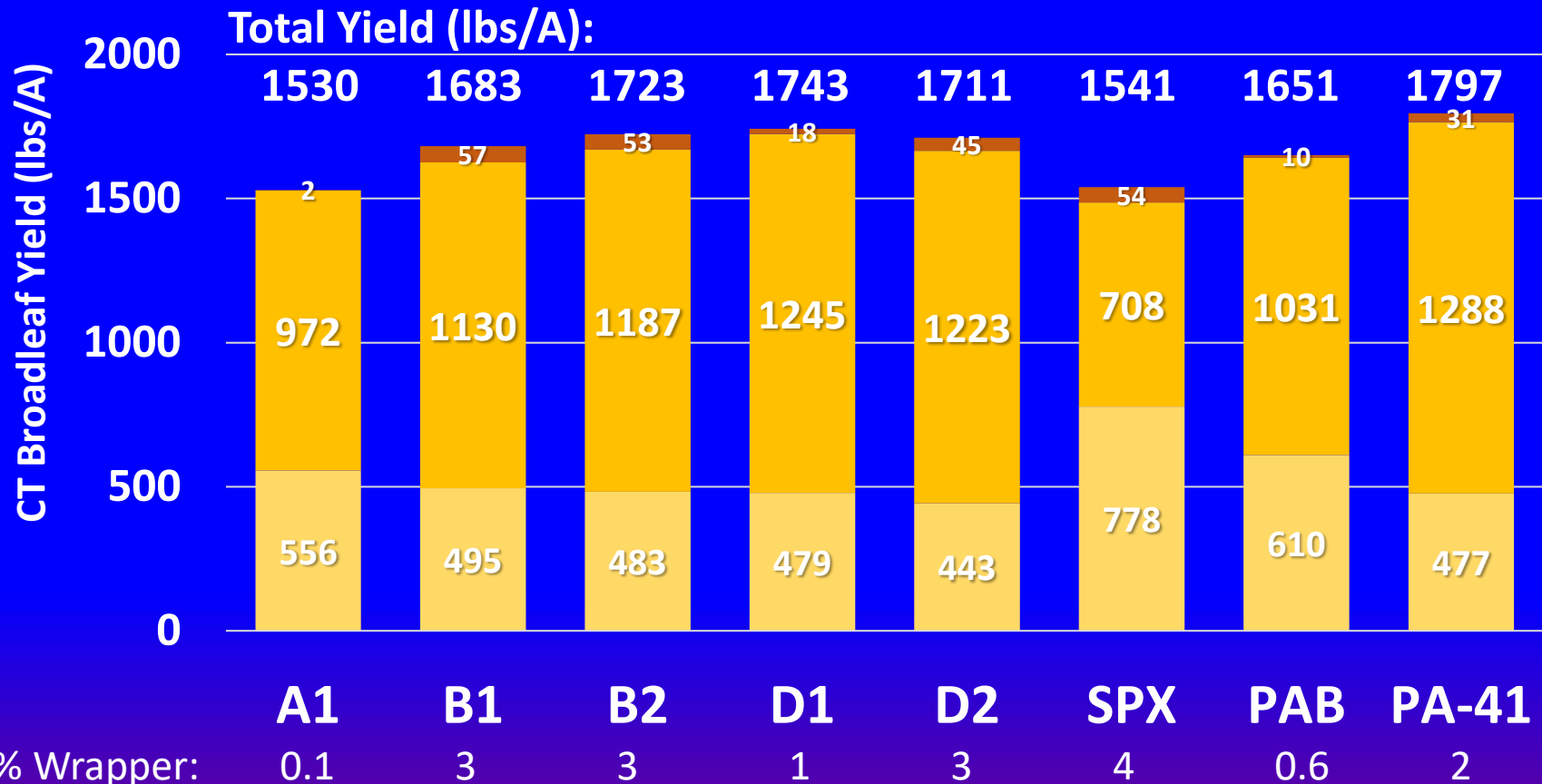
# 2020 Connecticut Broadleaf Variety Evaluation

## Variety Evaluation

UKREC, Princeton KY

N: 175 lbs N/A (75 PRE; 100 Sidedress)  
 Transplanted June 8  
 Harvested 2 wk after topping

LSD(0.10) = 139      260      46      219 (total)  
 ■ Trash   ■ Filler   ■ Wrapper



LSD(0.10) for % wrapper = 3

Mean total yield for trial = 1672 lbs/A; mean % wrapper = 2.1%



# CT Broadleaf Nitrogen Rate Trials

- Short season, early harvest, and preference for thin leaf favored lower nitrogen rates compared to burley and dark.
- Nitrogen rate trials suggest that 150-175 lb N/A is optimal.
- Now, leaf dealers are saying that slightly higher N rates (and thicker leaf) is okay
  - Up to 200 to 250 lbs N/A
- Sidedressing is not critical, all N can be applied prior to transplanting.

# 'Greenspeck' in Cured CT Broadleaf

- Associated with late frogeye leafspot infections occurring within 7 days of harvest



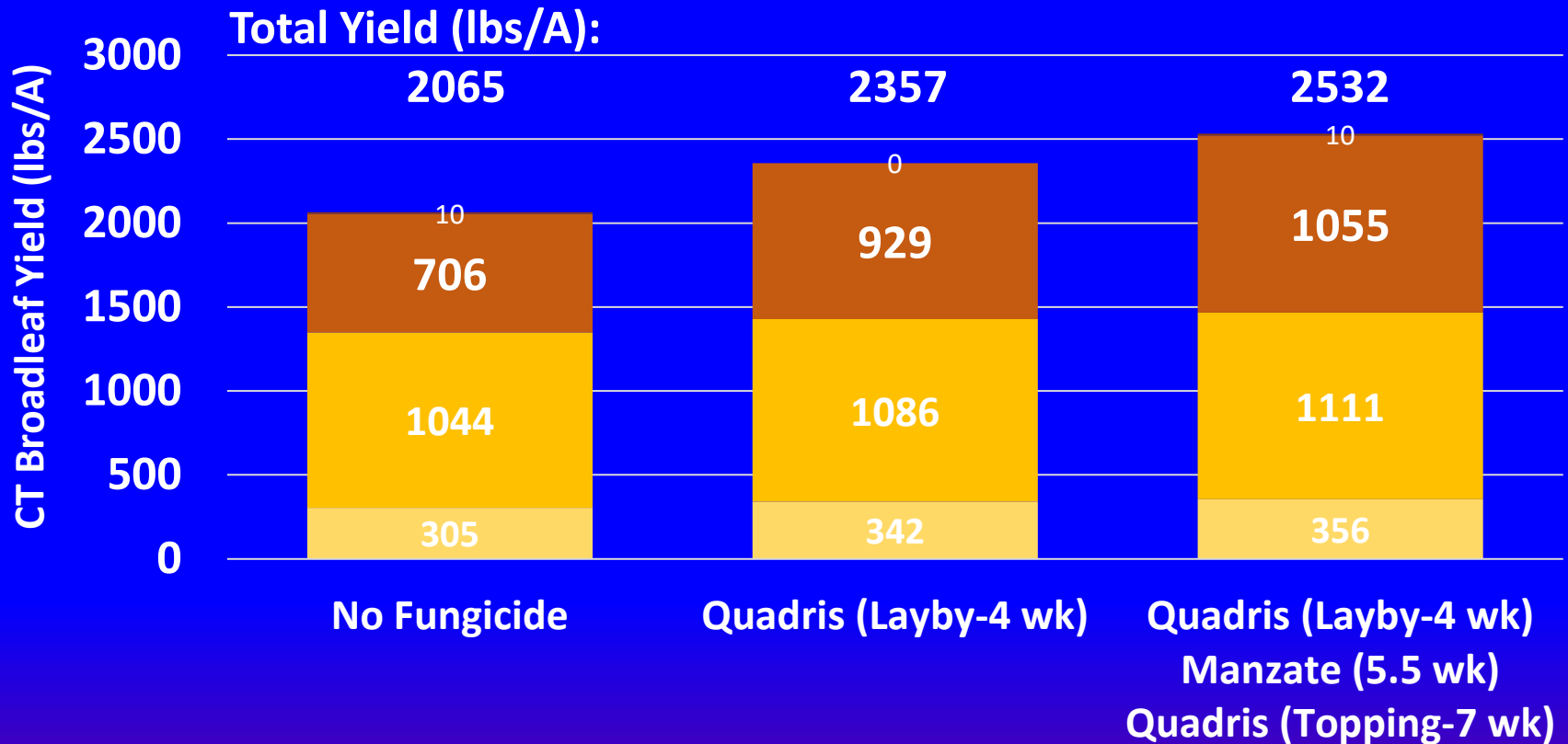
# 2019 Connecticut Broadleaf Fungicide Trial

## UKREC, Princeton KY

Variety: C33  
 N: 175 lbs N/A (75 PRE; 100 Sidedress)  
 Transplanted May 28  
 Harvested 3 wk after topping

LSD(0.10) = 55      167      349      13      423 (total)

■ Trash   ■ Filler   ■ # 2 Wrapper   ■ # 1 Wrapper



% Wrapper: 33      39      42

LSD(0.10) for % wrapper = 10.2

Mean total yield for trial = 2318 lbs/A; mean % wrapper = 38%

# 2020 Connecticut Broadleaf

## Fungicide Trial

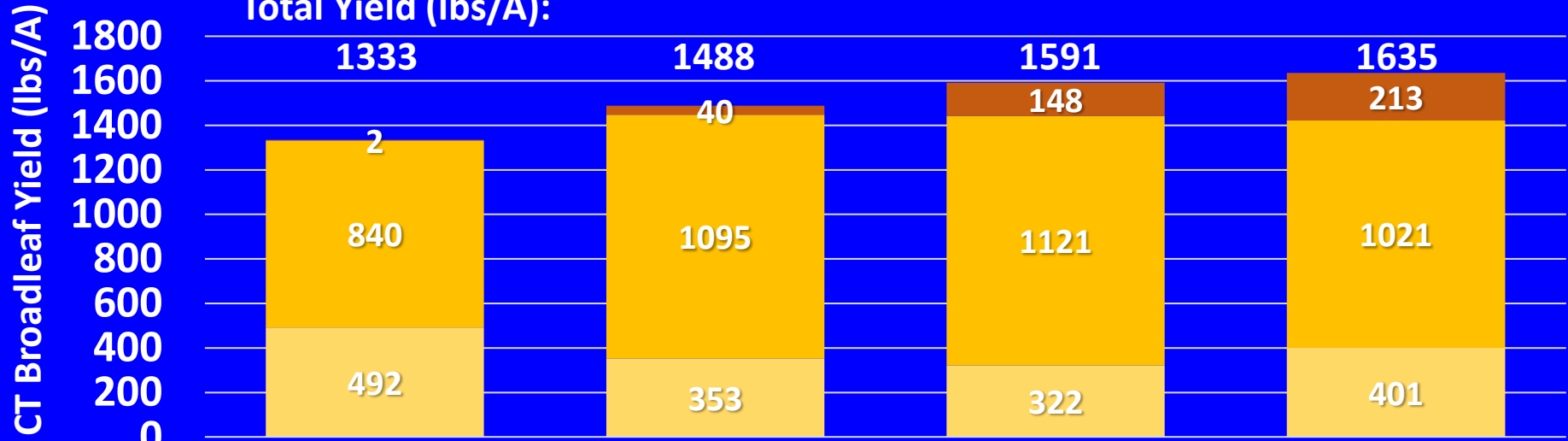
UKREC, Princeton KY

Variety: SPX  
 N: 175 lbs N/A (75 PRE; 100 Sidedress)  
 Transplanted June 8  
 Harvested 2 wk after topping

LSD(0.10) = 163      159      86  
 ■ Trash   ■ Filler   ■ Wrapper

254 (total)

Total Yield (lbs/A):



% Wrapper: 0.2      3      9      13

LSD(0.10) for % wrapper = 4

Mean total yield for trial = 1512 lbs/A; mean % wrapper = 6.3%



# Use of Heat During Curing CT Broadleaf

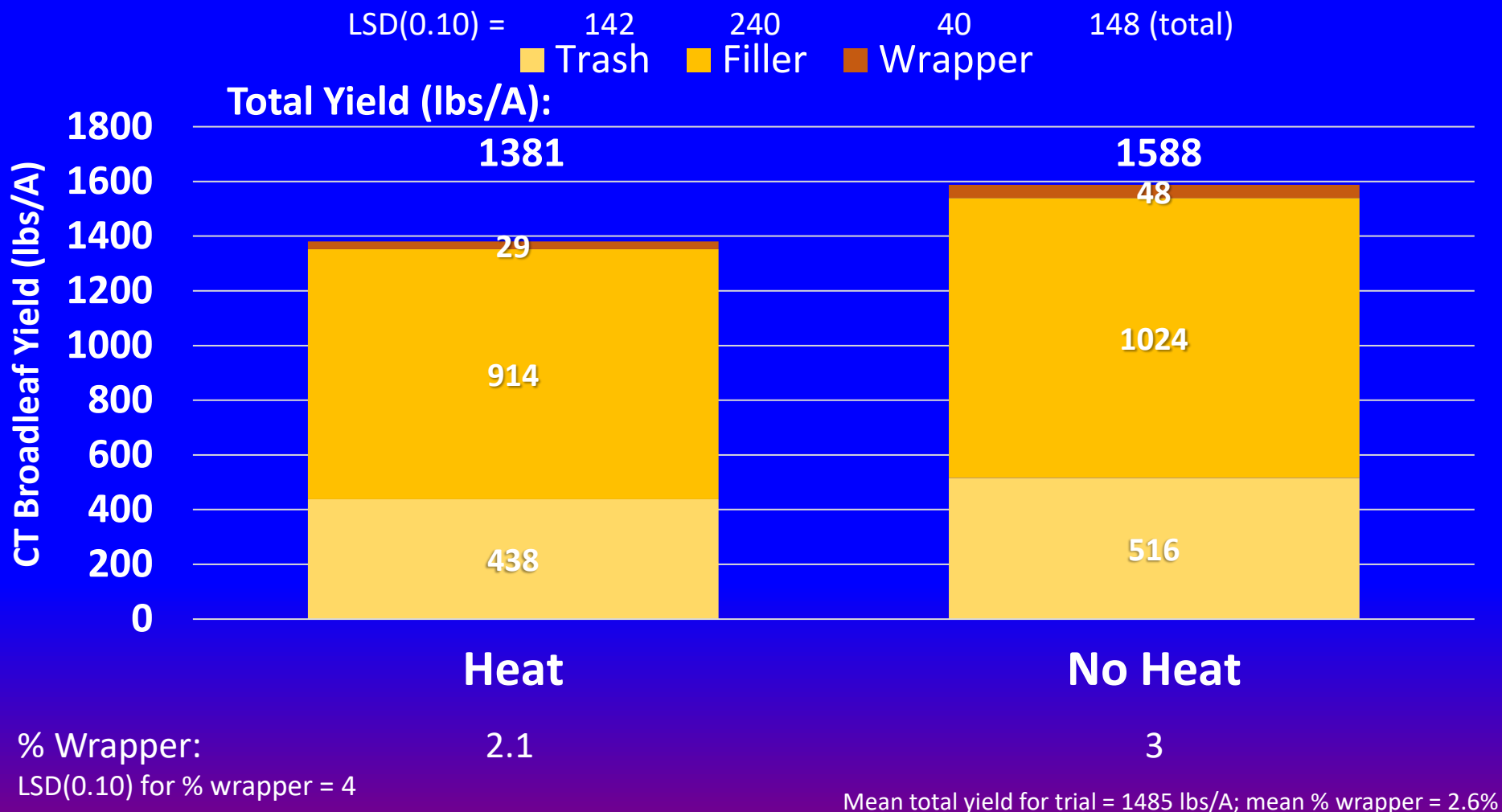
- Buyers allow use of heat during curing of CT Broadleaf if needed
- Low heat, <110 F
- Minimal smoke: Charcoal, wood chunks, propane
- Timing of heat? Duration?
- CT Broadleaf housed in dark-fired barns will almost certainly need heat to prevent sweating/houseburn.
- Experiment in 2020 where charcoal heat applied in small fire-cured barn for 10 days (4-6 hours per day) during extended period of high humidity at 3 weeks after harvest.

# 2020 Connecticut Broadleaf

## Curing Trial – Effect of Added Heat During Curing

UKREC, Princeton KY

Variety: SPX  
N: 175 lbs N/A (75 PRE; 100 Sidedress)  
Transplanted June 8  
Harvested 2 wk after topping



# Contact Information

**Dr. Mitchell Richmond**

Assistant Professor

Tobacco, Hemp & Specialty Crops Extension Specialist

Department of Plant Sciences

University of Tennessee Institute of Agriculture

215 Third Creek Building, 2415 Fletcher Luck Lane

Knoxville, Tennessee 37996

865-974-8826 Office / 606-316-4536 Mobile

[mitchell.richmond@utk.edu](mailto:mitchell.richmond@utk.edu) | [ag.tennessee.edu](http://ag.tennessee.edu)