



# Micronaire and Ultra-Short Season Cotton Production

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Annual Meeting – Lubbock  
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Lubbock Classing Office Quality Report for the Week Ending 1/19/2023  
Lubbock - Office Summary  
Agricultural Marketing Service  
Cotton Market News

January 20, 2023

Volume 6, No. 14

Email us with accessibility issues regarding this report

COLOR GRADE			STAPLE			STRENGTH		
	Week	Season		Week	Season		Week	Season
11	1.6	8.2	31 & Shorter	0.4	0.1	22 & Below	*	*
21	22.4	33.5	32	1.7	0.5	23	0.1	*
31	43.1	44.0	33	3.4	1.5	24	0.2	0.1
41	19.5	8.2	34	7.3	4.4	25	0.8	0.5
51	*	0.1	35	12.6	10.3	26	1.7	1.6
61	-	*	36	19.5	20.2	27	4.2	4.3
71	-	*	37	30.3	33.3	28	7.9	8.9
12	0.6	1.2	38	14.1	18.3	29	13.9	14.3
22	1.8	2.0	39	6.5	8.3	30	23.4	18.3
32	4.1	1.6	40	3.6	2.5	31	19.7	19.0
42	2.6	0.5	41 & Longer	0.6	0.6	32	14.0	15.7
52	-	*	Avg Staple	36.49	36.82	33	8.3	9.7
62	-	*	Avg Length	1.14	1.15	34	4.0	4.9
13	*	0.1	MICRONAIRE			35	1.3	1.9
23	0.1	0.1	2.4 & Below	Week	Season	36	0.4	0.6
33	1.3	0.2	2.5-2.6	0.1	0.1	37	0.1	0.1
43	1.8	0.2	2.7-2.9	0.3	0.8	38	*	*
53	*	*	3.0-3.2	4.6	3.0	39	-	-
63	-	-	3.3-3.4	12.9	9.9	Avg Strength	30.88	31.03
24-54	1.2	0.1	3.5-3.6	13.8	9.8	UNIFORMITY		
25-35	-	-	3.7-4.2	16.0	11.6	74 & Below	Week	Season
81-85	-	*	4.3-4.9	35.2	35.0	75	-	*
LEAF GRADE			5.0-5.2	16.9	24.8	76	0.1	0.1
	Week	Season	5.3 & Above	*	1.1	77	0.4	0.6
1	0.9	2.1	Avg Micronaire	3.72	3.90	78	2.0	2.6
2	19.5	26.4	EXTRANEOUS MATTER			79	8.2	8.4
3	45.5	43.9	Bark (11)	44.4	26.4	80	22.0	19.4
4	23.5	18.6	Grass (21)	0.1	*	81	30.9	28.8
5	8.0	6.1	Seed Coat (31)	*	*	82	20.6	25.2
6	2.3	2.0	Prep (01)	-	*	83	12.3	11.7
7	0.3	0.7	Other (61)	-	*	84	2.8	2.7
8	*	0.2	Plastic (71)	*	*	85 & Above	0.6	0.4
Avg Leaf	3.26	3.10	Gins	25	58	Avg Uniformity	80.55	80.57
Avg Trash	0.41	0.36						
Bales Classed	28,118	1,443,073						

# USDA-AMS Classing Office Lubbock Seasonal Fiber Property Summaries (Jan 20, 2023)

# USDA-AMS Classing Office

## Seasonal Summaries (Jan 20, 2023)

Office	Bales classed	Low mic % $\leq 3.4$ , (avg)	Avg. Staple 32nds	Bark %
Lubbock	1,443,073	24.5 (3.90)	36.82	26.4
Lamesa	201,663	11.0 (4.14)	36.49	7.7
Abilene (All)	464,333	14.0 (4.01)	36.73	19.8
Abilene (TX only)	190,847	11.5 (4.09)	37.13	24.0
Abilene (OK only)	158,352	15.2 (3.93)	37.42	16.2
Abilene (KS only)	115,134	16.8 (3.99)	35.15	17.6

# What is micronaire?

- USDA–AMS Agricultural Handbook 566 states:
- “Micronaire is a measure of fiber fineness and maturity. An airflow instrument is used to measure the air permeability **of a constant mass of cotton fibers compressed to a fixed volume.**”

# How to interpret?

- A **HIGH** air flow indicates **HIGH** micronaire and means a small surface area per unit weight of fiber (**think forced air blowing through gravel**).
- A **LOW** air flow indicates **LOW** micronaire and means a high surface area per unit weight of fiber (**think forced air blowing through sand**).

# Micronaire as Measured

- The micronaire value that is measured is a result of several factors which interact to impact the flow of air through the fixed sample mass compressed to a known volume.
- Those include fineness of the fiber (linear density) and its maturity (degree of secondary wall development).
- “Micronaire is proportional to the inverse of the surface area<sup>2</sup> of a fixed mass of lint.”

# Varietal Impact

- Standard Fineness (or fiber perimeter) is a varietal characteristic.
- Some varieties with small fiber perimeter have lower micronaire, even when mature.
- As fiber gets smaller, the ratio of surface to weight INCREASES, placing more surface area in the 10-gram sample.
- For research purposes, Fineness and Maturity Ratio can be measured using Advanced Fiber Information System (AFIS) machines.

# Influence of Genetics and Environment on Cotton Fiber Quality Variability

Fiber Property	Genetics %	Environment %
Staple	~80	~20
Micronaire	~40	~60
Color	~20	~80
Strength	~90	~10

Source: <http://www.cotton.org/tech/ace/growth-and-development.cfm>

# Fiber Development

- The fiber is an extension of the cell wall of a cell on the seedcoat
  - Water dependent, stress results in short fibers
- If you don't make seed, you can't make fiber
- It takes about 21-22 days for the fiber to elongate (length set) in a given boll (maximum boll VOLUME)
- After that, it takes another ~25-50 days (regionally dependent) depending upon temperatures, functional leaves, and healthy plants for the fiber to reach maturity (maximum boll WEIGHT)
  - Cellulose deposition occurs (secondary wall thickening)
  - Cool temperatures and/or reduced solar radiation result in immature fiber (low micronaire)

# Boll Size vs. Days after Pollination



# Micronaire Development

- If seed is not set, fiber can't be produced. Each cotton fiber arises from a single epidermal cell on the seed coat, and is composed mostly of cellulose.
- After the ovule (seed) is fertilized the primordial fiber tubular structures elongate much like a balloon expands as it is inflated. This first phase is called the elongation phase and it continues for about 22 days or so.
- After that occurs, the second phase of fiber development begins, and it is called the fiber secondary cell wall thickening phase. This phase lasts an additional ~25 days or more, and is temperature/photosynthesis dependent.

# Micronaire Development

- Genetics determine about 40% of micronaire potential, with environment contributing the remaining 60%.
- The tubular structure (primary wall) fills from the inside, with daily deposition of cellulose in what's called the lumen. This thickens the secondary wall of the fiber.
- Unlike tree rings, which are deposited outside of last year's ring, the secondary wall of a cotton fiber fills from the inside.

# Micronaire Development

- A good analogy is that the tube (fiber) can be thought of as a pipe. The length (i.e. fiber length) and diameter (i.e. fiber perimeter) of the pipe are controlled by genetics and environment.
- Fiber diameter is set before elongation begins and is more heritable than either length or strength.
- Thickness of the wall of the pipe is also controlled by genetics, but to a greater degree by environment.
- Under good conditions, after about 25 days of thickening of the wall, the cellulose nearly fills the void. This sets the thickness of the wall of the pipe.

# Schedule 40 vs. Schedule 80 PVC Pipe Analogy

- Wall thickness is the main difference between schedule 40 and schedule 80 PVC pipes
- Schedule 80 pipes have a thicker wall than schedule 40 pipes



Photo courtesy of <https://www.pvcfittingsonline.com/resource-center/schedule-40-vs-schedule-80-pvc/>

# Schedule 40 vs. Schedule 80 PVC Pipe Analogy

PVC Pipe	Size (inch)	Wall thickness (inch)	Inner diameter (inch)	Outer diameter (inch)	Weight (lbs/ft)	Weight difference 80 vs 40 (% of lb/ft)
Schedule 40	2	0.154	2.067	2.375	0.68	--
Schedule 80	2	0.218	1.939	2.375	0.95	+28
Schedule 40	4	0.237	4.026	4.5	2.01	--
Schedule 80	4	0.337	3.826	4.5	2.75	+27

<https://pvcpipesupplies.com/pvc-cpvc-pipe-sizes-and-weights>

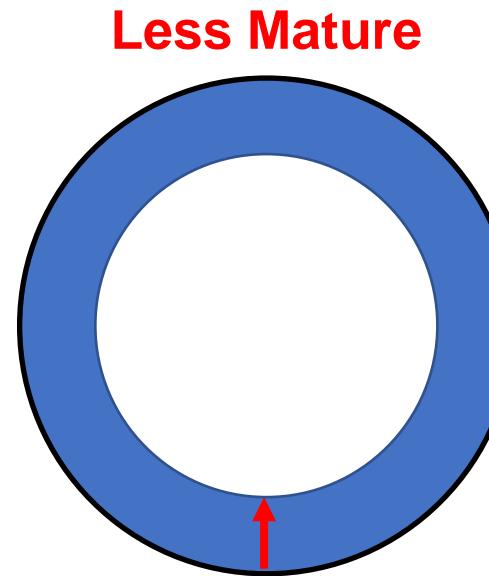
Size, Thickness and Weight for Schedule 40 and Schedule 80 Plumbing. Finding the pipe with the right specifications for the job is often difficult when having to compare measurements between many pipe products. To streamline this process and make it easy to find the right pipe, PVC Pipe Supplies has compiled PVC and CPVC pipe specifications for size, wall thickness, inner diameter, outer diameter and average pipe weight for both schedule 40 and schedule 80 plumbing. Sizes listed below are in NPS (Nominal Pipe Size) sizing standard.

# Micronaire Development

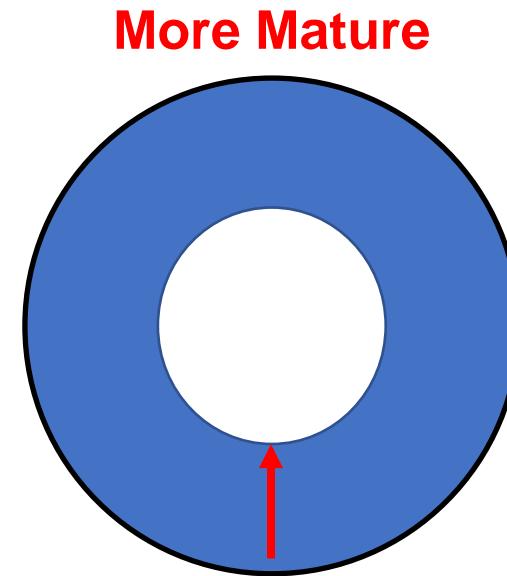
- If an excessive amount of the void is filled by cellulose, or if the diameter of the pipe is too large, this typically results in **HIGH** micronaire.
- If the fiber development (or perhaps a good descriptive term such as void fill) is cut short by excessive water stress, loss of leaves, Verticillium wilt, lack of heat units (for late-set bulls) necessary to optimize photosynthesis and thus carbohydrate production (cellulose deposition), then **LOW** micronaire is a typical result.

# Micronaire Development

- Hypothetical cross sections of two cotton fibers with the same diameter are shown.
- The one on the right represents a nearly mature fiber and shows the thickening of the fiber secondary wall (blue area).
- The one on the left is less mature and shows a thinner fiber wall.
- These two examples could represent fibers that are the same age in days, but the one on the left might have fewer heat units and less cellulose deposition due to reduced photosynthesis.



Fiber fill starts inside black ring and works toward the center as daily deposition of cellulose occurs



Fiber fill starts inside black ring and works toward the center as daily deposition of cellulose occurs

# **First Day Bloom**

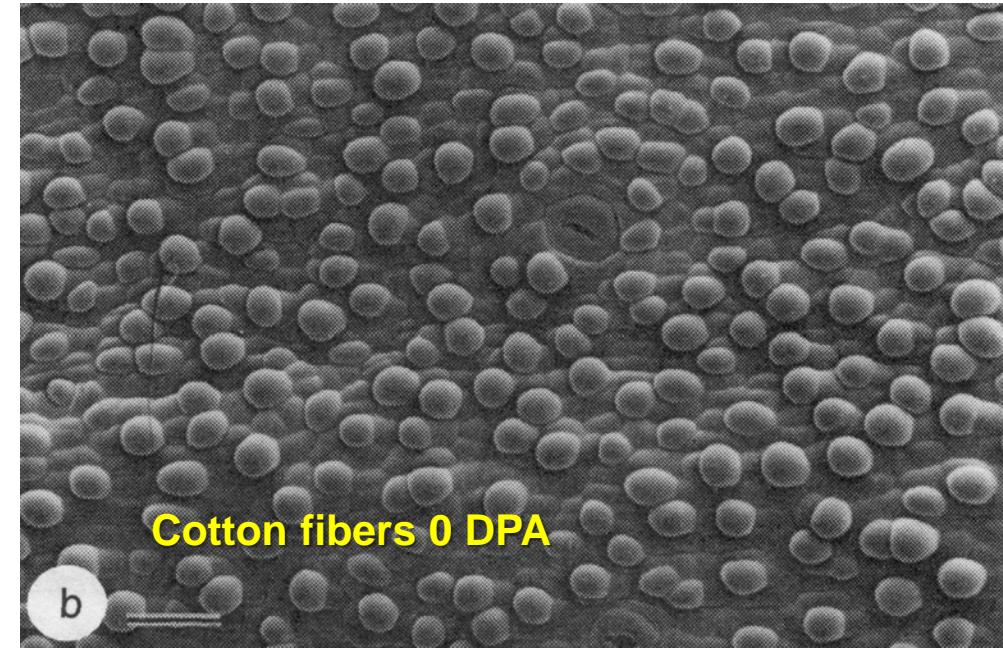
## **“White Bloom”**



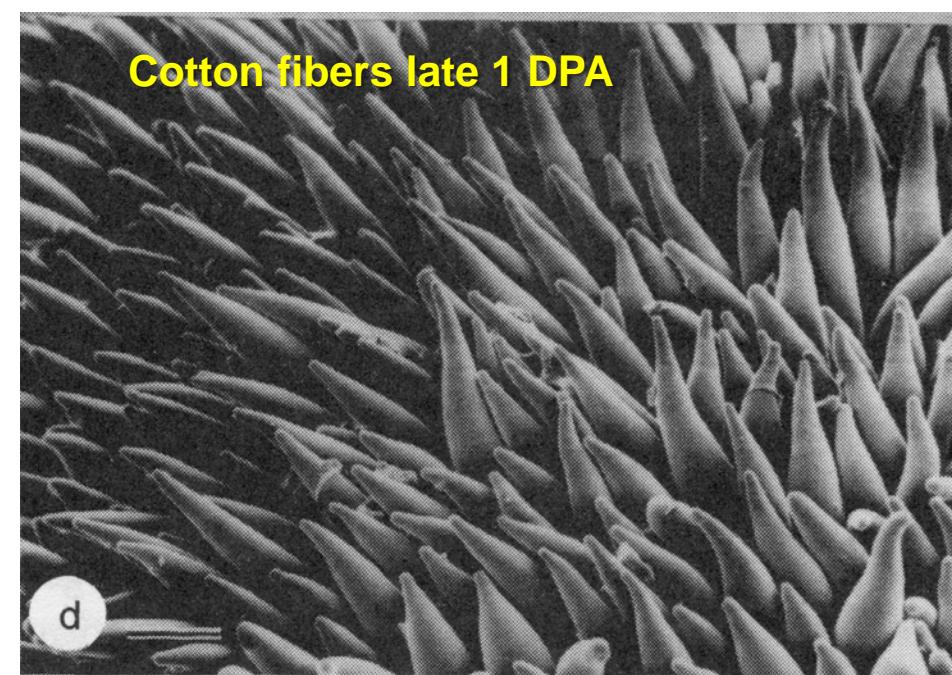
# **Day Old Bloom**

## **“Pink Bloom”**

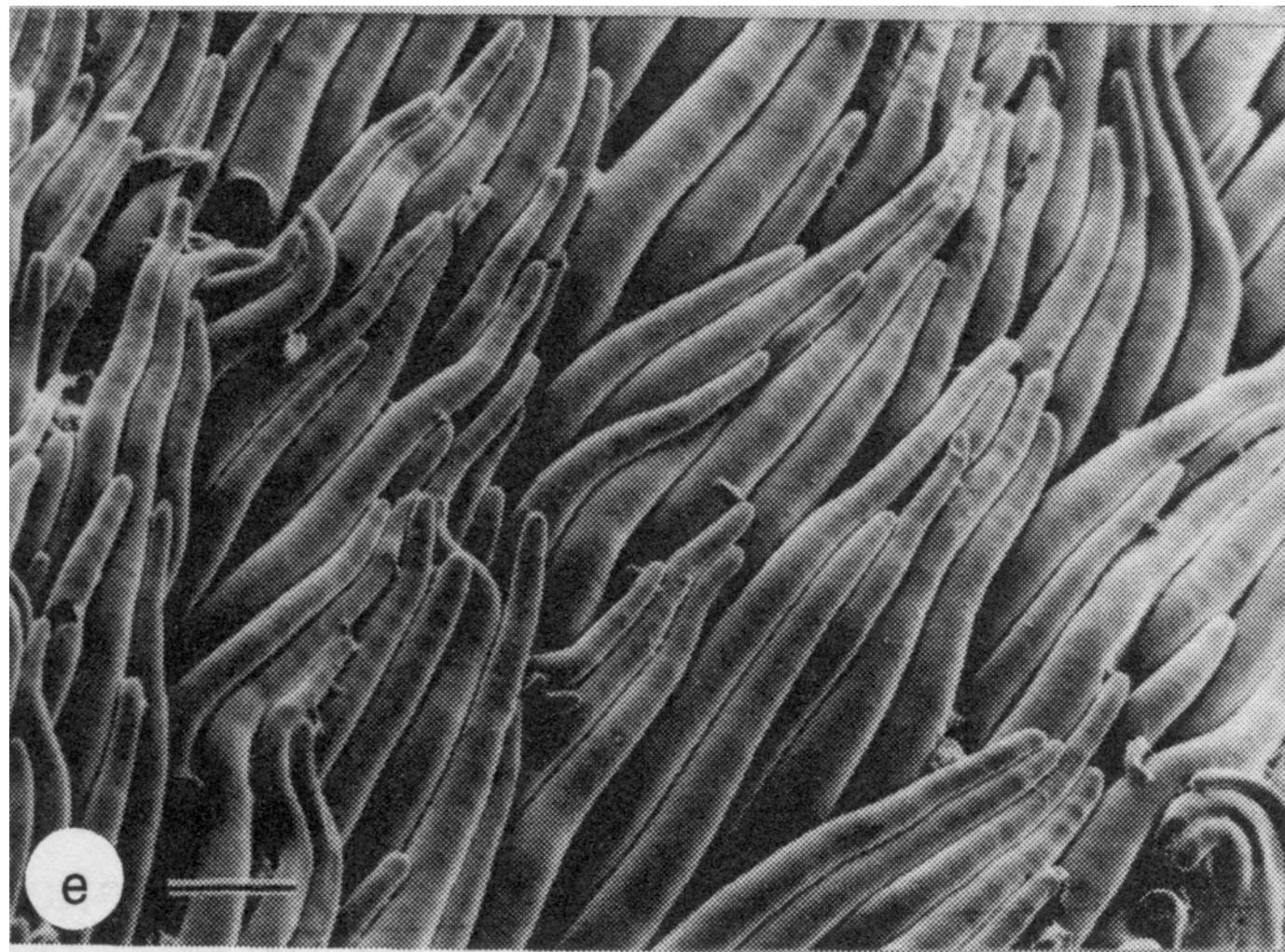




USDA-ARS

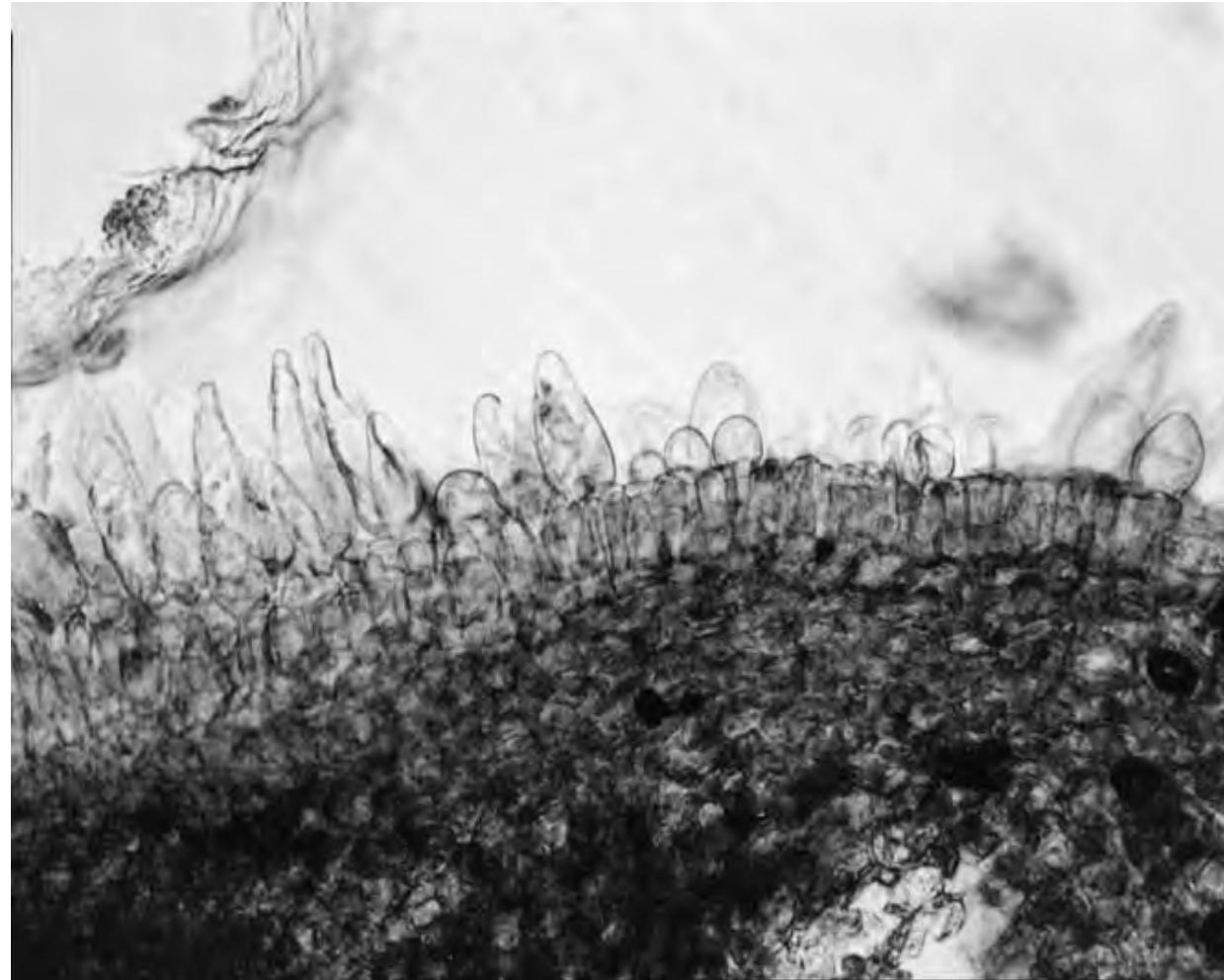


# Cotton Fibers 3 Days Post-Anthesis



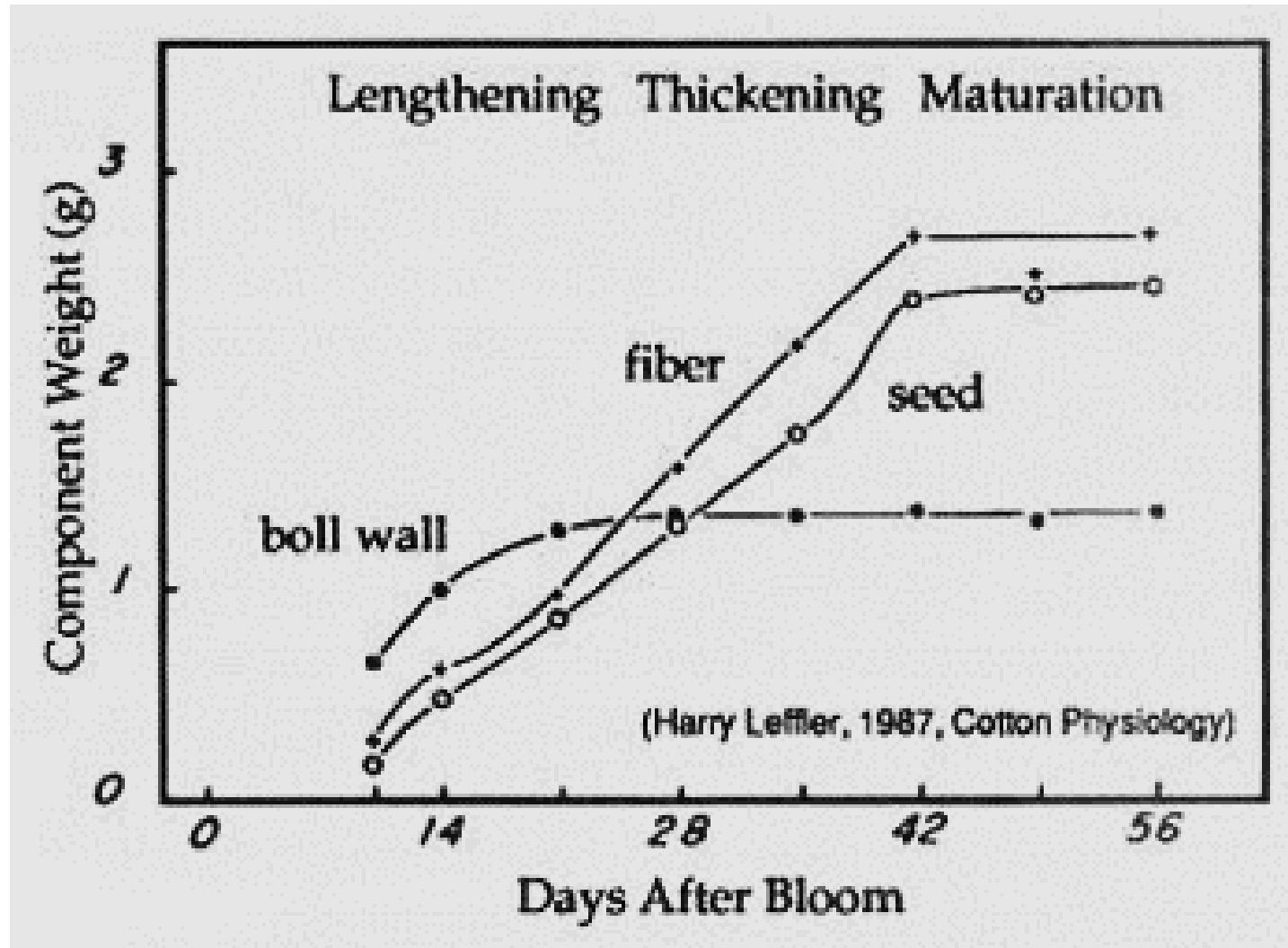
USDA-ARS

# Seedcoat Section Showing Fibers Initiating at the Seed Surface 4 Days Post-Anthesis



USDA-ARS

# Cotton Boll Maturation

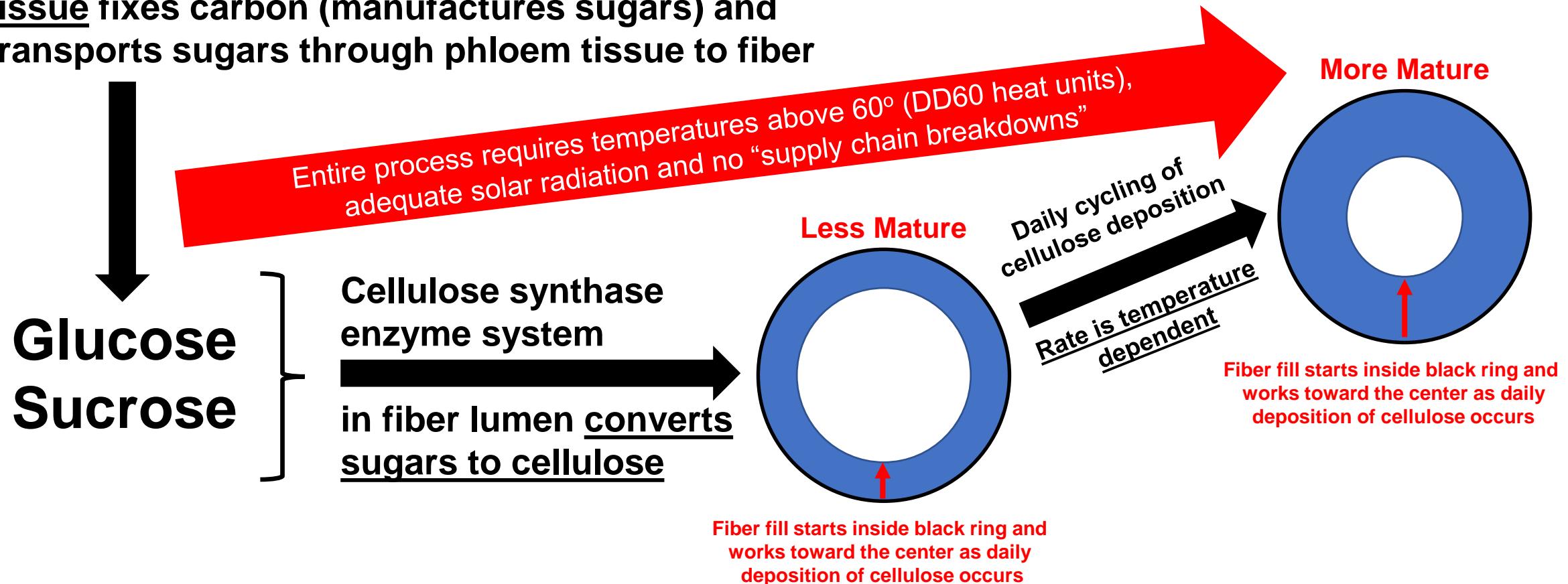


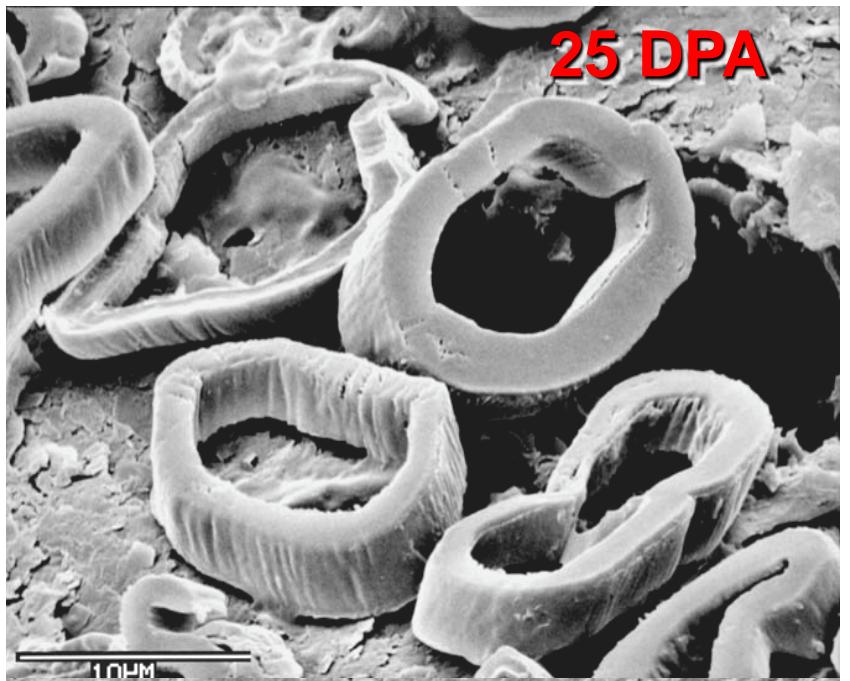
Source: <http://www.cotton.org/tech/ace/growth-and-development.cfm>

# Sugar Manufacturing Occurs In Leaves

## Sugars Are Then Transported To Bolls Where Converted to Cellulose and “Daily Fiber Laydown” Occurs

Living leaf tissue performs photosynthesis - living leaf tissue fixes carbon (manufactures sugars) and transports sugars through phloem tissue to fiber



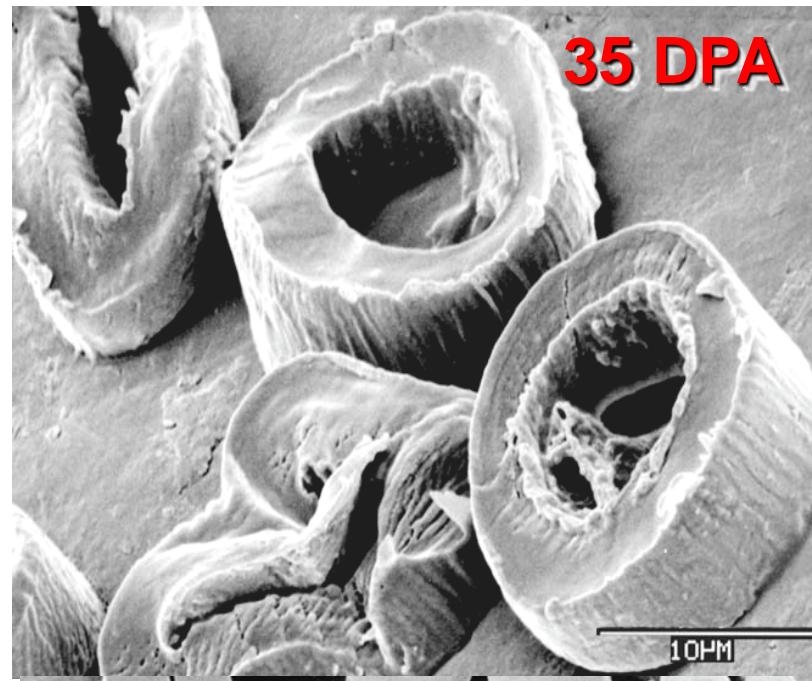


25 DPA

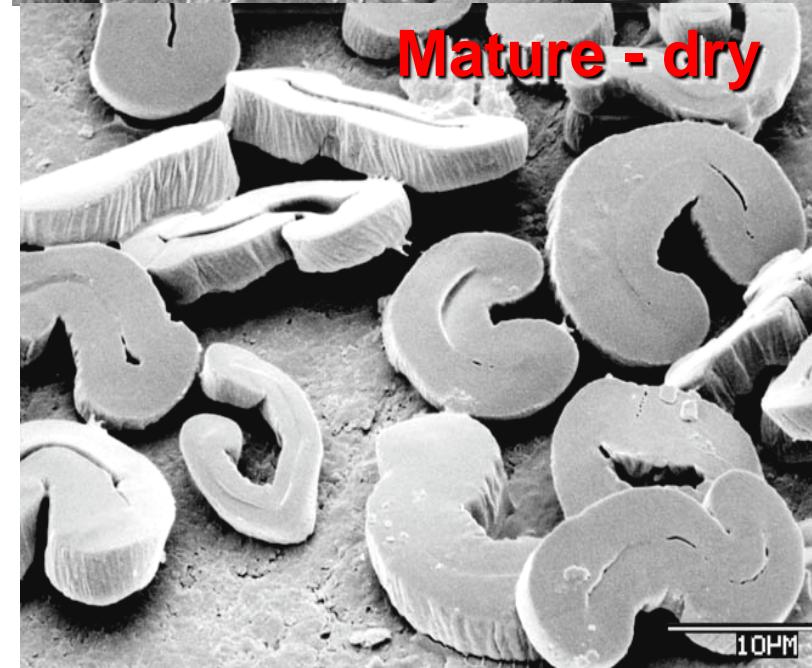


50 DPA – Mature

USDA-ARS

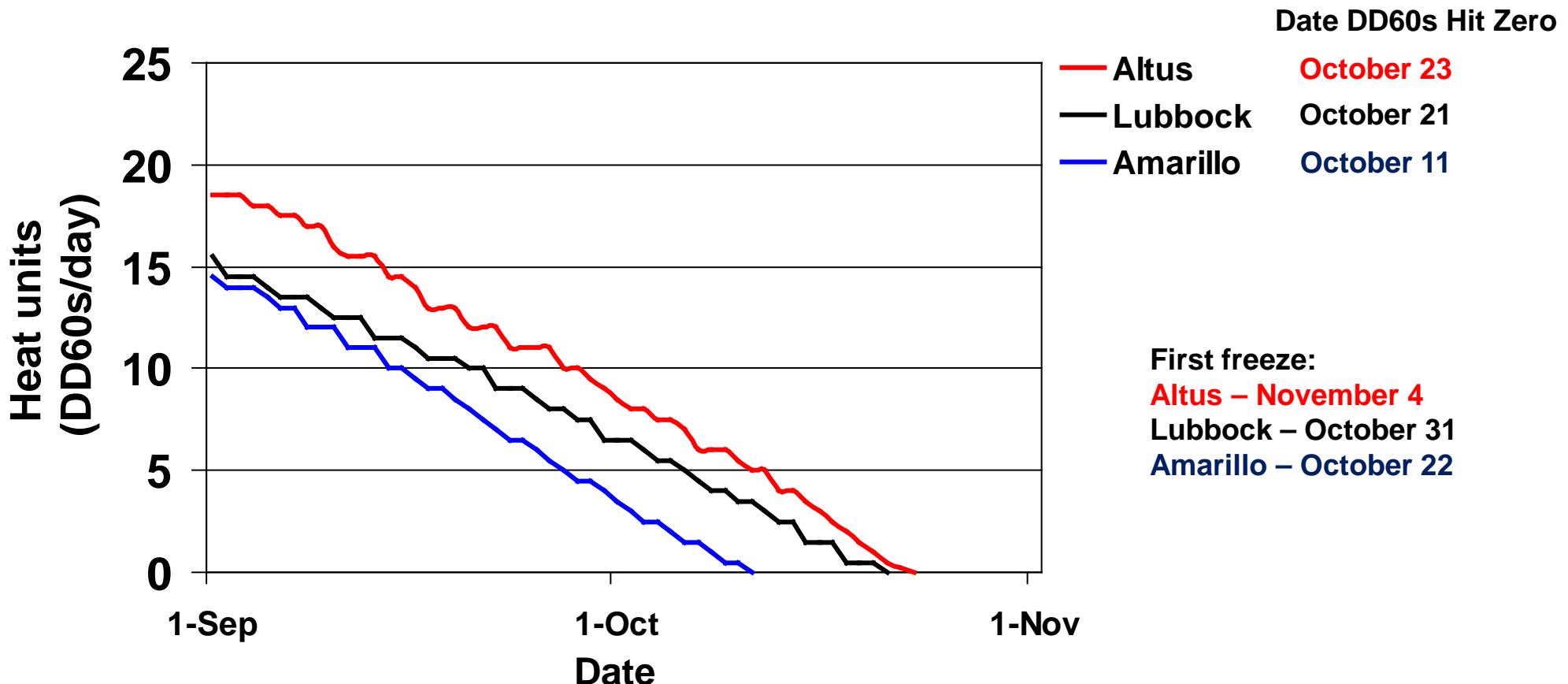


35 DPA



Mature - dry

# Altus, Lubbock and Amarillo 30-Yr Normal Cotton Heat Unit Accumulation



Altus: [http://climate.ok.gov/county\\_climate/Products/QuickFacts/jackson.pdf](http://climate.ok.gov/county_climate/Products/QuickFacts/jackson.pdf)

Lubbock: <http://www.srh.noaa.gov/lub/?n=climate-firstfreeze>

Amarillo: <https://w2.weather.gov/climate/index.php?wfo=ama>

# **Causes of High Micronaire**

- Some varieties inherently produce higher micronaire than others; identify and avoid if negatively impacting lint value.
  - Higher micronaire varieties are welcomed north of Plainview...
- In our area, high micronaire can be attributed to drought stress reducing the boll load on the plants and then later rainfall and fiber maturing temperatures occur.
- The high amount of leaf area generates a large amount of photosynthates that can fill the remaining few bolls per plant.
- Etc.

# **Causes of Low Micronaire**

## **(There are many paths to this, but....)**

**Anything that affects early fruit retention,  
delays first bloom date, or results in  
significantly increased retention of late fruit**

**AND**

**Anything that negatively impacts  
photosynthate production required to meet boll  
development demand within a specific growing  
season for a given variety planted**

# **Micronaire Building**

**Only open skies, heat units, healthy plants, adequate soil moisture, functional leaves and cellulose synthase enzyme system can mature fiber.**

# Reasons for Micronaire Discounts

- Excessively mature (**high micronaire**) cotton has limited use in textiles due to the fact that fewer fibers can be included in a cross section of yarn. This limits the yarns that can be made with high micronaire fibers to coarse types.
- **Low micronaire** fibers can impact several yarn and fabric characteristics. Low micronaire fibers can be spun into fine yarns, but immature fibers don't readily absorb or retain dyes. Fiber entanglements called neps can be problematic by negatively impacting yarn spinning rates, and can cause white specks in finished fabrics. Neps are typically more pronounced in low micronaire cotton.

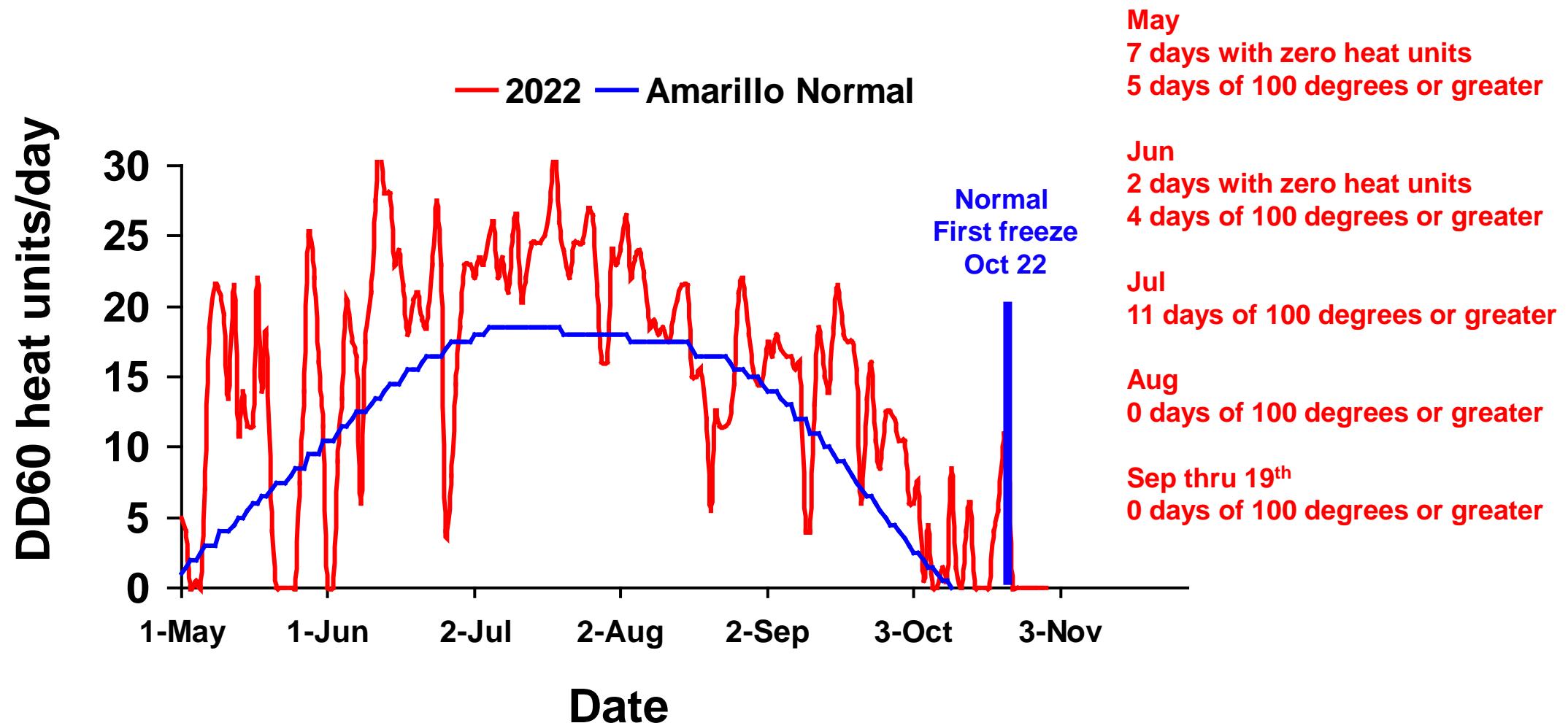
# USDA-AMS Classing Office

## Seasonal Summaries (Jan 20, 2023)

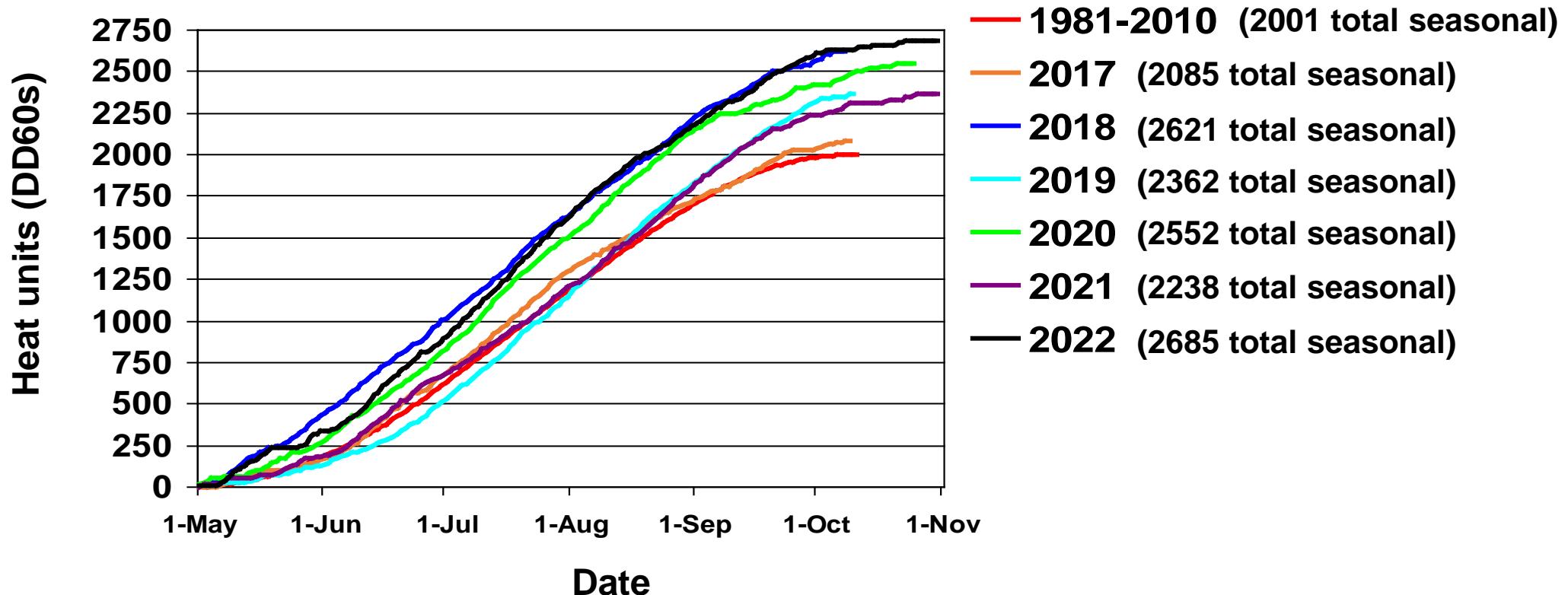
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# Amarillo

## 30-Year Normal (1981-2010) and 2022 Daily Heat Units

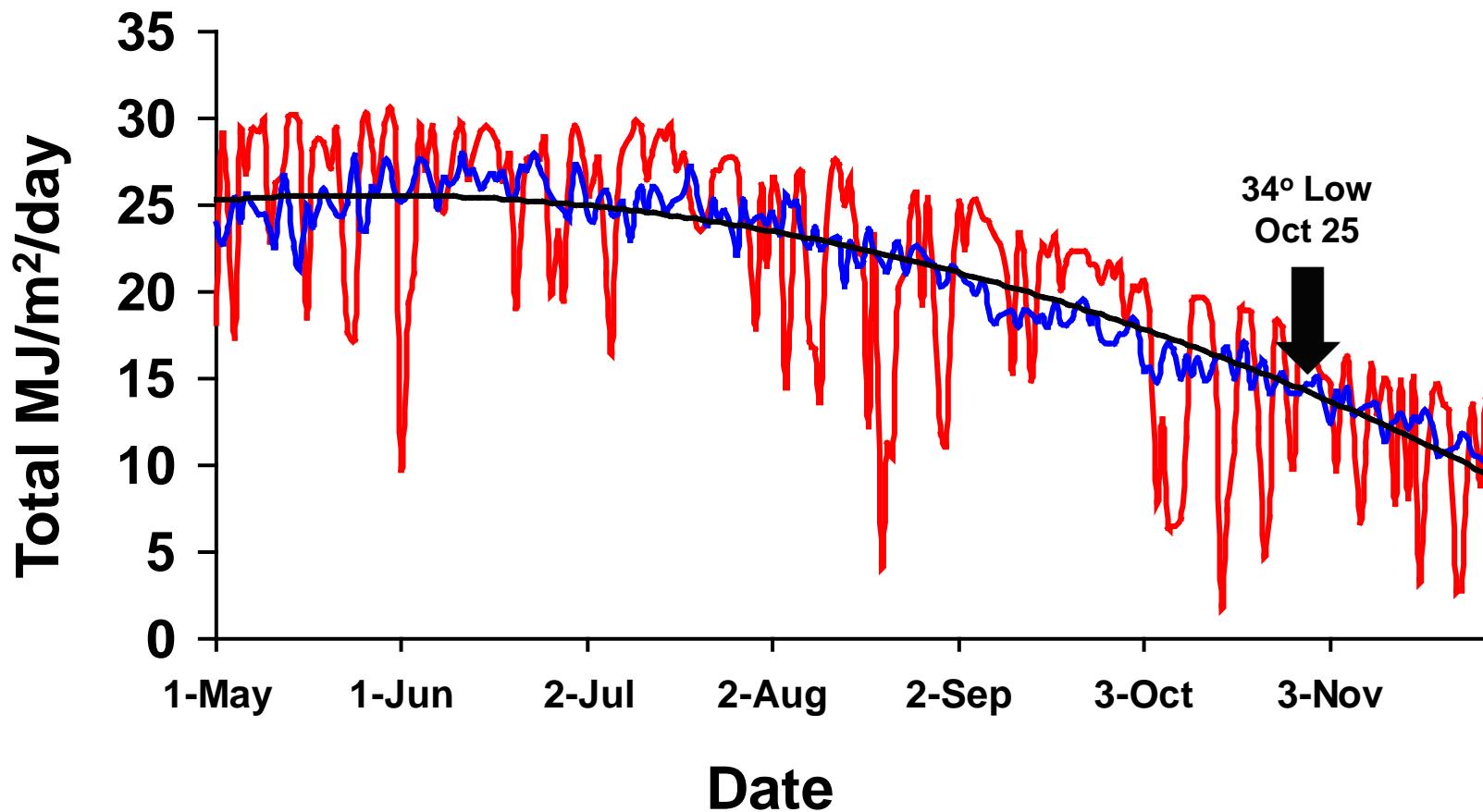


**Amarillo 30-Yr Normal (1981-2010)  
vs. 2017, 2018, 2019, 2020, 2021, and 2022  
Cotton Heat Unit Accumulation  
From May 1 Through First Hard Freeze**



# Muleshoe, TX

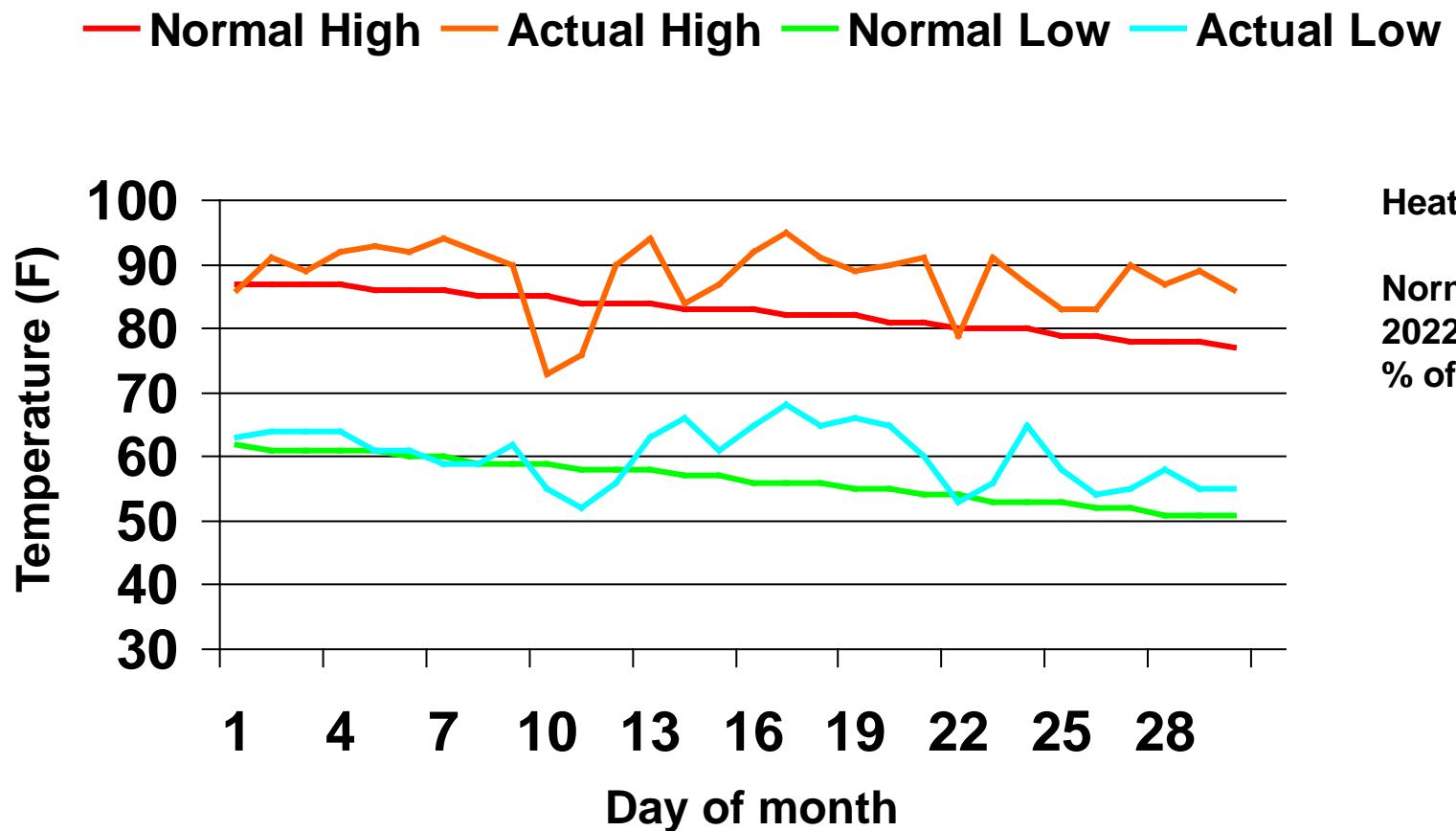
## 18-Year Mean (2004-2021) and 2022 Daily Total Solar Radiation (MJ/meter<sup>2</sup>)



Total solar energy, in MJ/meter<sup>2</sup>, calculated from the hourly average global solar radiation rates and converted to energy by integrating over time.

# Amarillo

## 30-Yr Normal (1981-2010) and September 2022 Air Temperatures



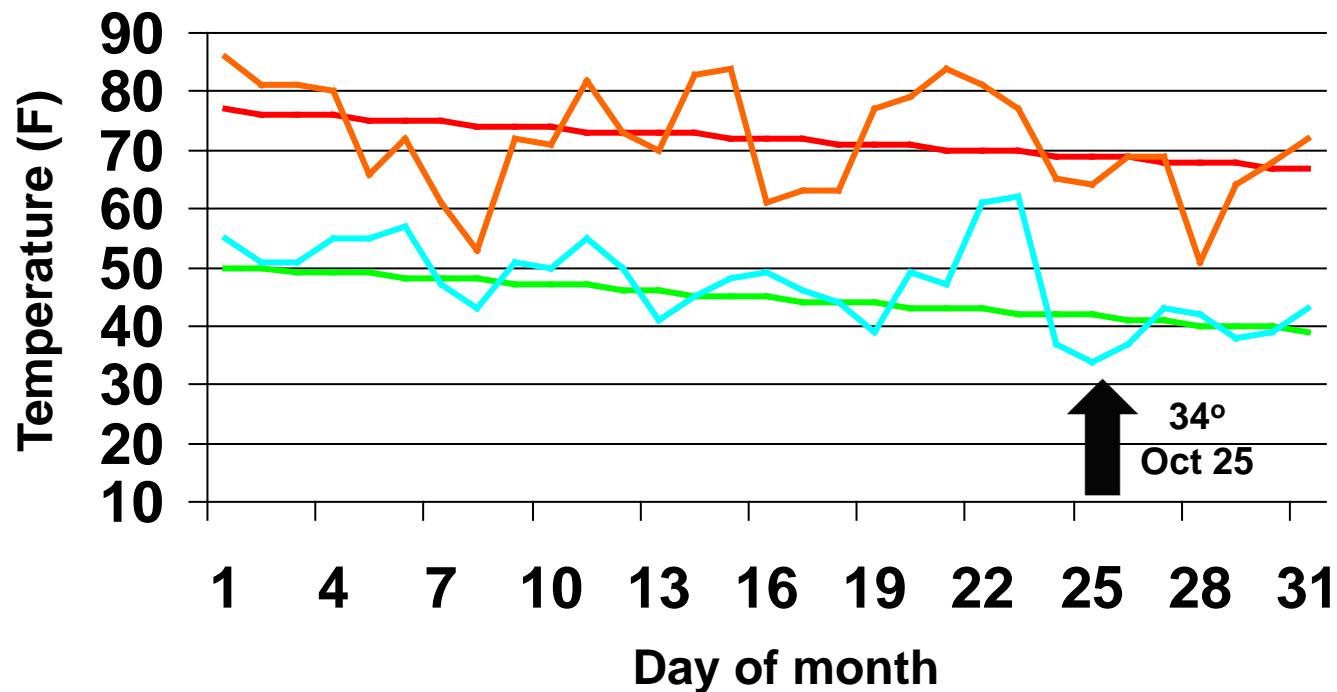
### Heat Units

Normal total: 286  
2022: 427  
% of normal: +49

# Amarillo

## 30-Yr Normal (1981-2010) and October 2022 Air Temperatures

— Normal High — Actual High — Normal Low — Actual Low



### Heat Units

Normal total: 19

2022: 87

% of normal: +358

First freeze on Nov 4 (29 degrees)  
Hard freeze on Nov 11 (22 degrees)

# Cotton Is Not a Grain Crop

- I have personally seen more cotton negatively impacted by **TOO MUCH** N rather than **TOO LITTLE** N in my career.

# **Excessive Nitrogen Can...**

- Increase Verticillium wilt disease (?)
- Increase cotton aphid populations
- Increase plant growth and thus plant growth regulator need
- Delay maturity
- Challenge harvest aid performance
- Decrease gin turnout
- Ultimately negatively impact fiber quality (e.g. micronaire; possibly bark and color and leaf grade)
- This could result in cotton production losses, or unnecessarily high expenses or both

# Current Texas A&M AgriLife N Recommendations

- **College Station Soil Testing Laboratory**

- Dr. Tony Provin still has the same recommendations as in past years
- 50 lbs N/bale of yield goal **minus residual NO<sub>3</sub>-N in the top 24 inches of soil profile (and any manure, compost, or irrigation water contributions)**
- So, a 3 bale/acre yield goal would have a 150 lb N/acre fertilizer requirement if the residual NO<sub>3</sub>-N in the top 24 inches is zero (and no other N contributions).

- **Lubbock Research and Extension Center**

- Dr. Katie Lewis and others are conducting N research on newer varieties and cropping systems
- Based on her presentation at the recent Red River Crops Conference in Childress, she has lowered the N recommendations for the High Plains and Panhandle regions
- 1<sup>st</sup> bale – 40 lbs N/acre, 2+ bales 35-40 lbs N/bale **minus residual NO<sub>3</sub>-N in the top 24 inches of soil profile (and any manure, compost, or irrigation water contributions)**
- So, a 3 bale/acre yield goal would have a minimum 110 lb N/acre fertilizer requirement if the residual NO<sub>3</sub>-N in the top 24 inches is zero (and no other N contributions).

**Note:**

**Decrease N rate based**  
**on residual NO<sub>3</sub>-N in**  
**0-24" depth and any N**  
**contributions from**  
**manure, compost or**  
**irrigation water.**

# Total Soil Nitrogen Contains Both Organic and Inorganic Forms

**Total Soil N = Organic N + Inorganic N**

Organic = native OM,  
crop residues, manures,  
compost, etc. in various  
stages of decomposition

Inorganic =  $\text{NH}_4^{+1}$ ,  $\text{NO}_2^{-2}$ ,  $\text{NO}_3^{-1}$

**NOTE: Current Soil Testing Measures ONLY  $\text{NO}_3\text{-N}$**

**$\text{NO}_3\text{-N IS MOBILE AND SUSCEPTIBLE}$   
 $\text{TO LEACHING LOSSES}$**

**HOW MUCH N WILL BE  
MINERALIZED FROM THE  
ORGANIC N POOL AND  
BECOME PLANT AVAILABLE  
AS  $\text{NO}_3\text{-N}$  DURING THE  
GROWING SEASON?**



Without data, you're  
just another person  
with an opinion

*- W. Edwards Deming*

**Let's think about this.....**

# **Seven N Rate Trials in Corn/Cotton Rotation Conducted in Northern Texas Panhandle and Southwestern Kansas 2018-2022**

- In cooperation with Ben Benton, formerly PhytoGen Cottonseed Cotton Development Specialist (currently with Corteva (crop protection))
- Large plot on-farm trials conducted with grower equipment
- 5 of 7 sites commercially ginned/classed, others grab sampled and ginned/HVI data from TTU-FBRI
- 2018 – Hugoton, KS
- 2020 – Hugoton, KS, Panhandle, TX, Groom, TX
- 2021 – Sunray, TX
- 2022 – Pampa, TX (**stand issues**), Gruver, TX

# Site Methods

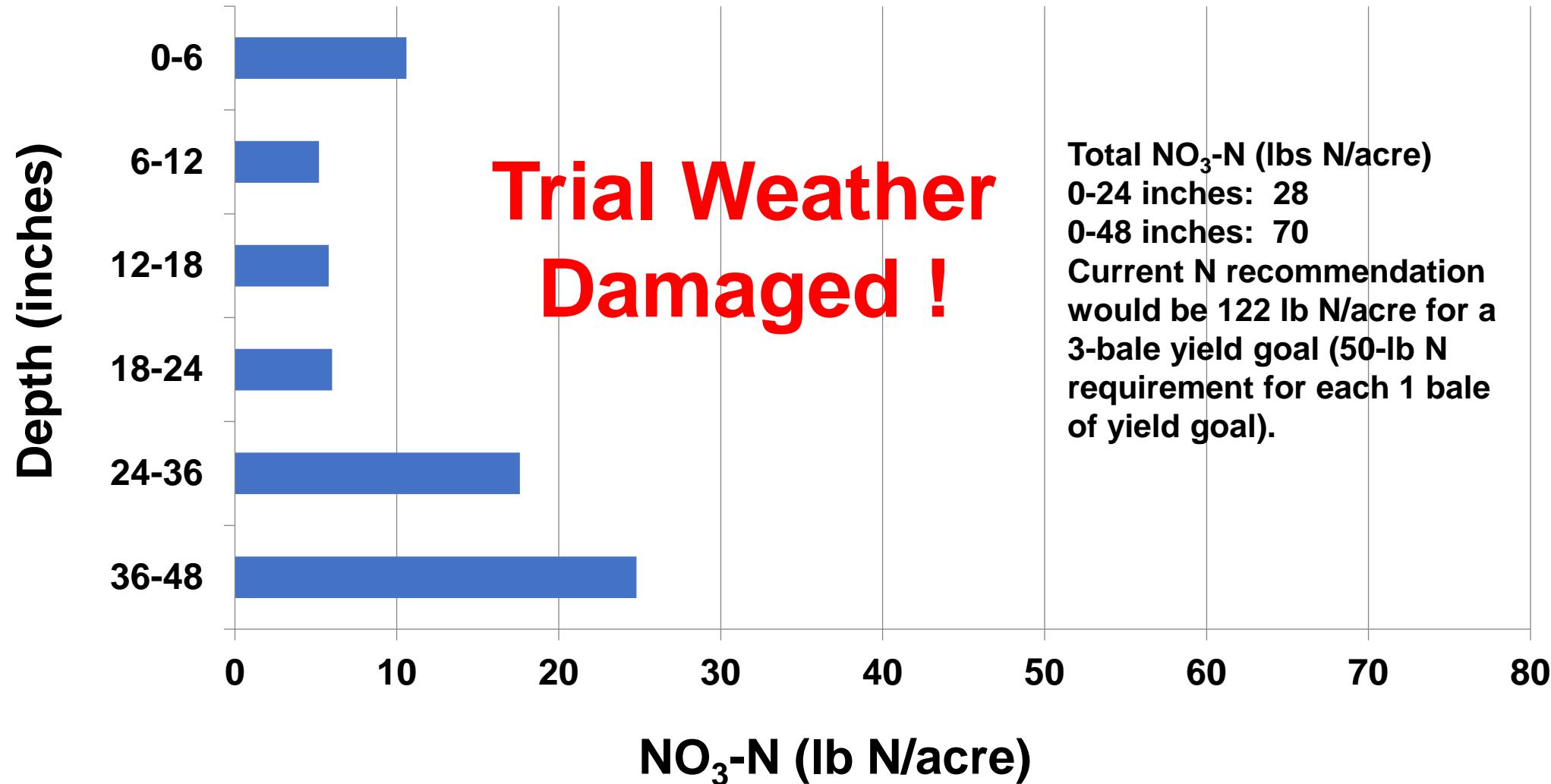
Year	2018	2020	2020	2020	2021	2022	2022
Site	Hugoton, KS	Hugoton, KS	Panhandle, TX	Groom, TX	Sunray, TX	Pampa	Gruver
Elevation	3115	3100	3490	3295	3470	3225	3215
Variety	PHY 340 W3FE	PHY 250 W3FE	PHY 250 W3FE	NG 2982 B3XF	PHY 210 W3FE	NG 3195 B3XF	NG 3406 B2XF
Experimental design	2 factor factorial RCB	CRD	RCB	RCB	RCB	RCB	RCB
Replicates	3	4	3	4	4	4	4
N Rates	topped off residual	topped off residual	on top of residual				
Residual N - 0-24"	26	34	44	66	45	28	104
Residual N - 0-48"	--	54	75	141	110	70	196

# Site Methods

Year	2018	2020	2020	2020	2021	2022	2022
Site	Hugoton, KS	Hugoton, KS	Panhandle, TX	Groom, TX	Sunray, TX	Pampa	Gruver
Row spacing	30 inches	30 inches	30 inches	30 inches	30 inches	30 inches	30-inches
Plant date	8-May	29-Apr	27-Apr	22-May	13-May	18-May	19-May
Seeding rate	35, 45, 55, 65K	48K	50K	50K	65K	60K	65K
Final stand	30, 37, 47, 52K	36K	31K	42K	38K	~18K (large skips)	48K
N Source	28-0-0 (UAN)	32-0-0 (UAN)	82-0-0 (AA)	82-0-0 (AA)	32-0-0 (UAN)	82-0-0 (AA)	32-0-0 (UAN)
Grower cost \$/ton	\$150	\$260	\$335	\$335	\$375	\$1,250	\$515
Grower cost \$/lb N	\$0.28	\$0.41	\$0.20	\$0.20	\$0.58	\$0.76	0.80
Application date	15-Mar	1-Apr	8-Feb	20-Apr	22-Apr	11-Apr	29-Apr
Application method	strip till	coulter/knife	strip till	strip till	surface band/irrigation	coulter rig/knife	strip till
Fertilized plot width	8 rows	8 rows	16 rows	16 rows	12 rows	16 rows	12 rows
Leaf N date	--	--	20-Aug	24-Aug	1-Sep	--	8-Sep
Plant height date	--	--	20-Aug	24-Aug	13-Oct	--	6-Oct
NACB date	--	--	23-Sep	28-Sep	13-Oct	--	6-Oct
Harvest date	12-Dec	12-Jan	23-Oct	17-Nov	8-Nov	5-Dec	31-Oct
Harvested plot size	8 rows x 1900 ft	8 rows x 2500 ft	12 rows x 2500 ft	12 rows x 2150 ft	8 rows x 2100 ft	8 rows x ~2600 ft	12 rows x ~1200 ft
Plot weight	handler	handler	handler	handler	handler	handler	handler
Ginning	FBRI (each plot)	FBRI (each plot)	Commercial (reps bulked)				
Classing	FBRI (each plot)	FBRI (each plot)	USDA-AMS	USDA-AMS	USDA-AMS	USDA-AMS	USDA-AMS
Minimum bales/N rate	--	--	14	18	9	11	13

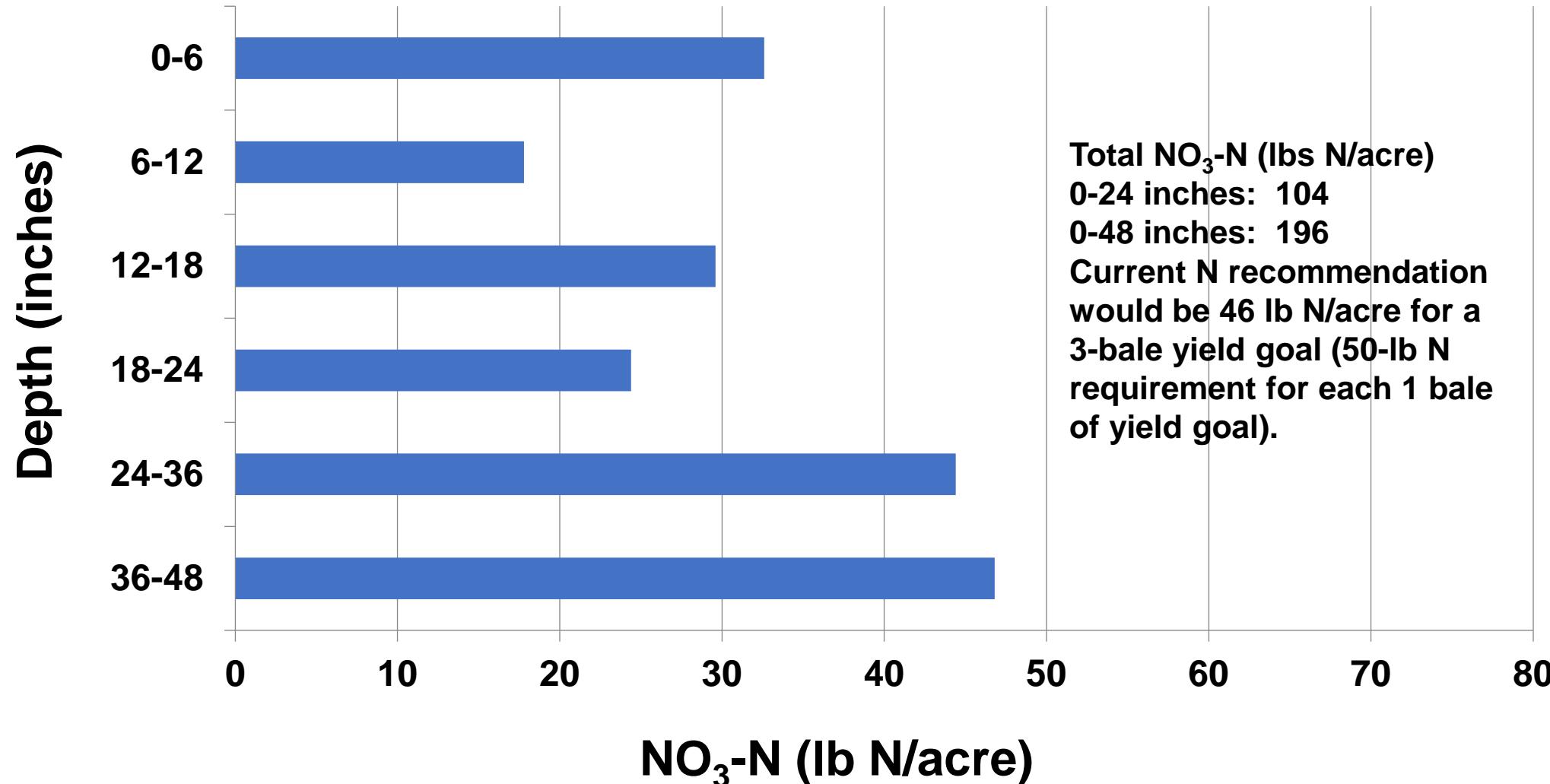
# $\text{NO}_3\text{-N}$ (Pounds N/Acre) vs. Depth (inches)

## Pampa, TX - 2022



# $\text{NO}_3\text{-N}$ (Pounds N/Acre) vs. Depth (inches)

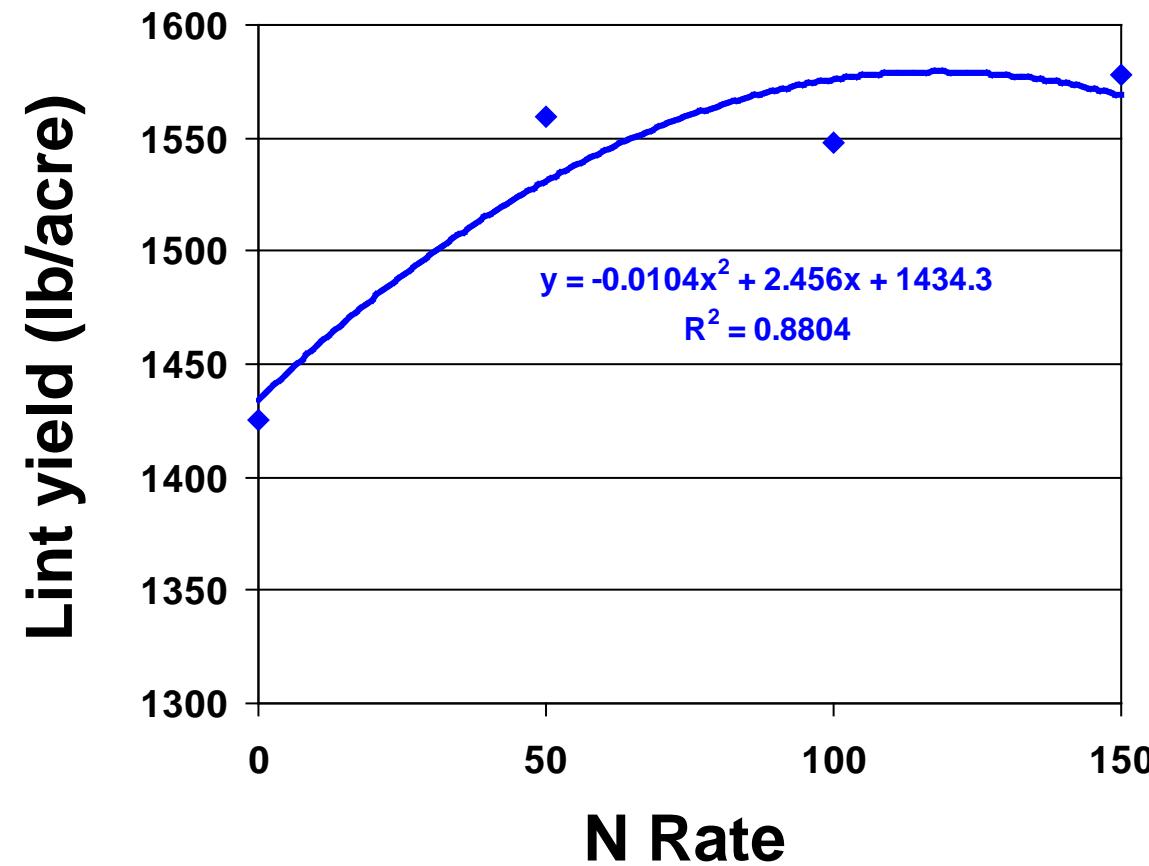
## Gruver, TX - 2022



# Lint Yield

# Lint Yield Mean Across Sites vs. N Rate

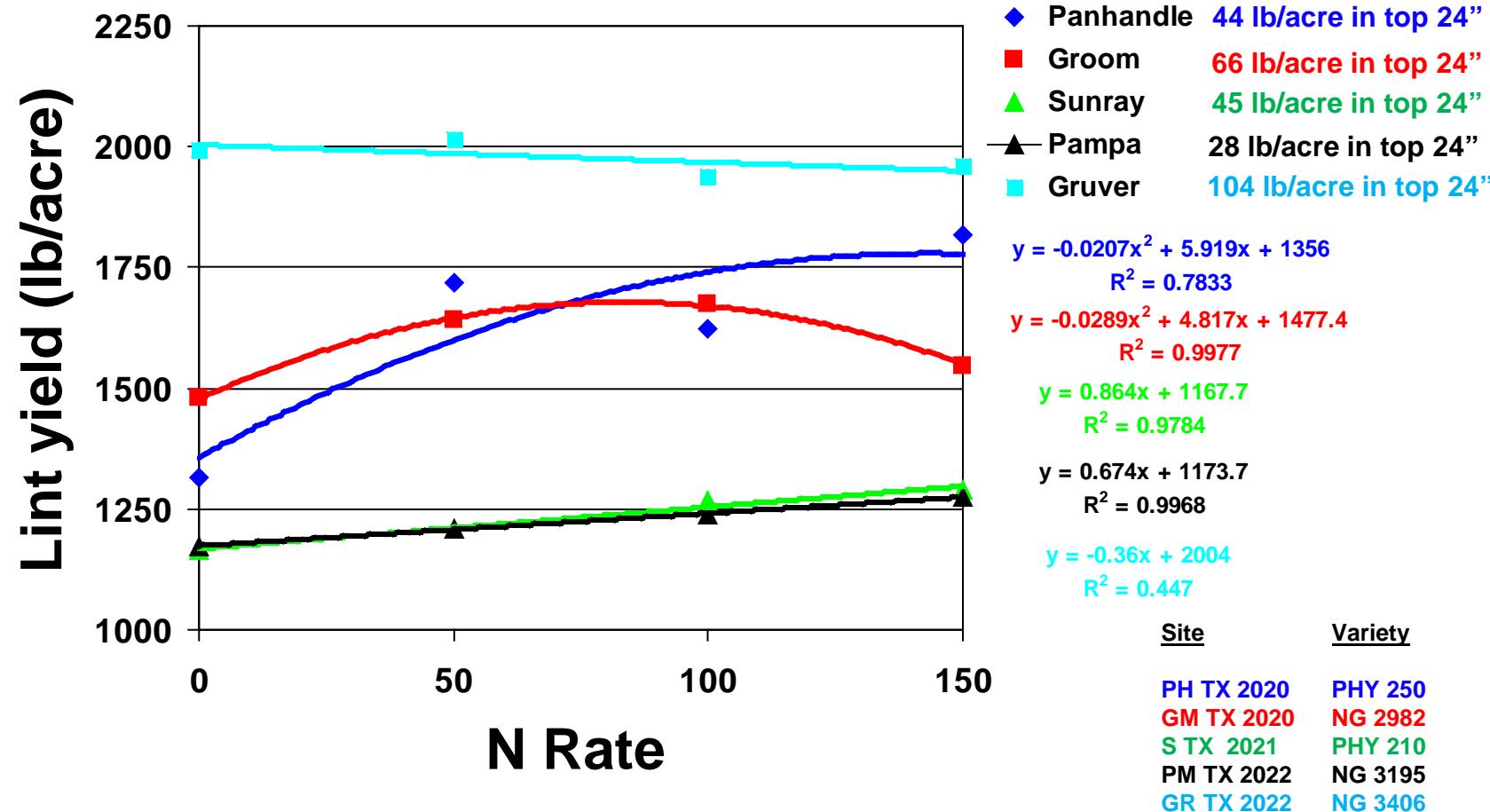
(5 Commercially Ginned Large-Plot Replicated Cotton/Corn Rotation N Rate Trial  
Sites in the Texas Panhandle 2020-2022)



<u>Site</u>	<u>Variety</u>	<u>Plant date</u>
PH TX 2020	PHY 250	27-Apr
GM TX 2020	NG 2982	22-May (replant)
S TX 2021	PHY 210	13-May
PM TX 2022	NG 3195	18-May
GR TX 2022	NG 3406	19-May

# Lint Yield vs. N Rate

(5 Commercially Ginned Large-Plot Replicated Cotton/Corn Rotation N Rate Trial Sites in the Texas Panhandle 2020-2022)



**So what about  
micronaire and  
subsequent lint  
loan value?**

# Commodity Credit Corporation 2022 Loan Chart

- USDA-AMS Classing Office High Volume Instrument (HVI) quality parameters and classer's calls used to determine Commodity Credit Corporation (CCC) Loan Value

### **MICRONAIRE DIFFERENCES**

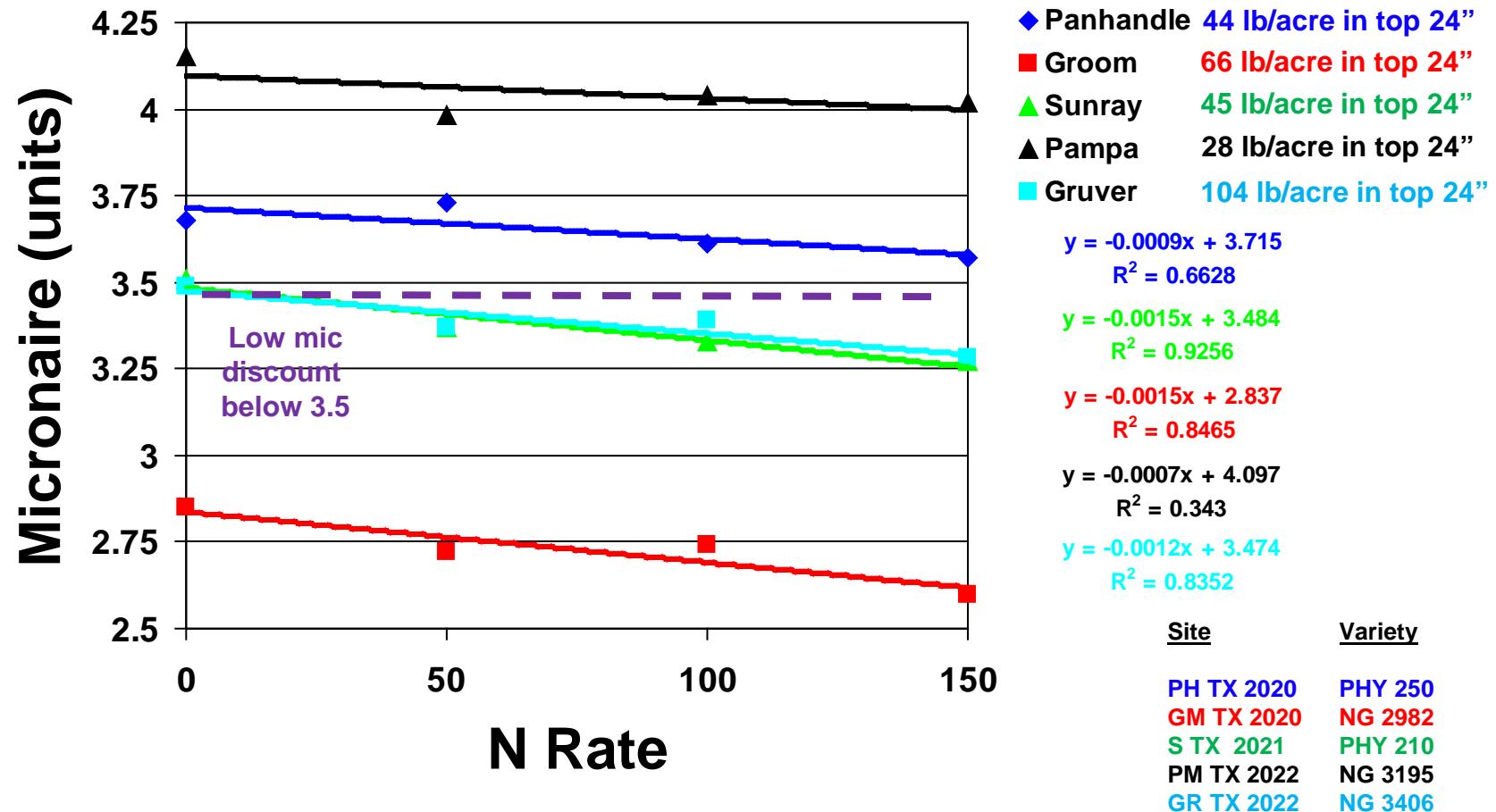
<b>MIC</b>	<b>MIC</b>	
<b>GRP</b>	<b>READING</b>	<b>PTS.</b>
7	5.3 & above	-390
6	5.0 - 5.2	-235
5	4.3 - 4.9	0
*	3.7 - 4.2	+5
5	3.5 - 3.6	0
4	3.3 - 3.4	-475
3	3.0 - 3.2	-650
2	2.7 - 2.9	-950
1	2.5 - 2.6	-1415
0	2.4 & below	-1840

**\*MIC PREMIUMS APPLY ONLY  
TO THESE GRADES**

# **2022 CCC Loan Chart Micronaire Discounts**

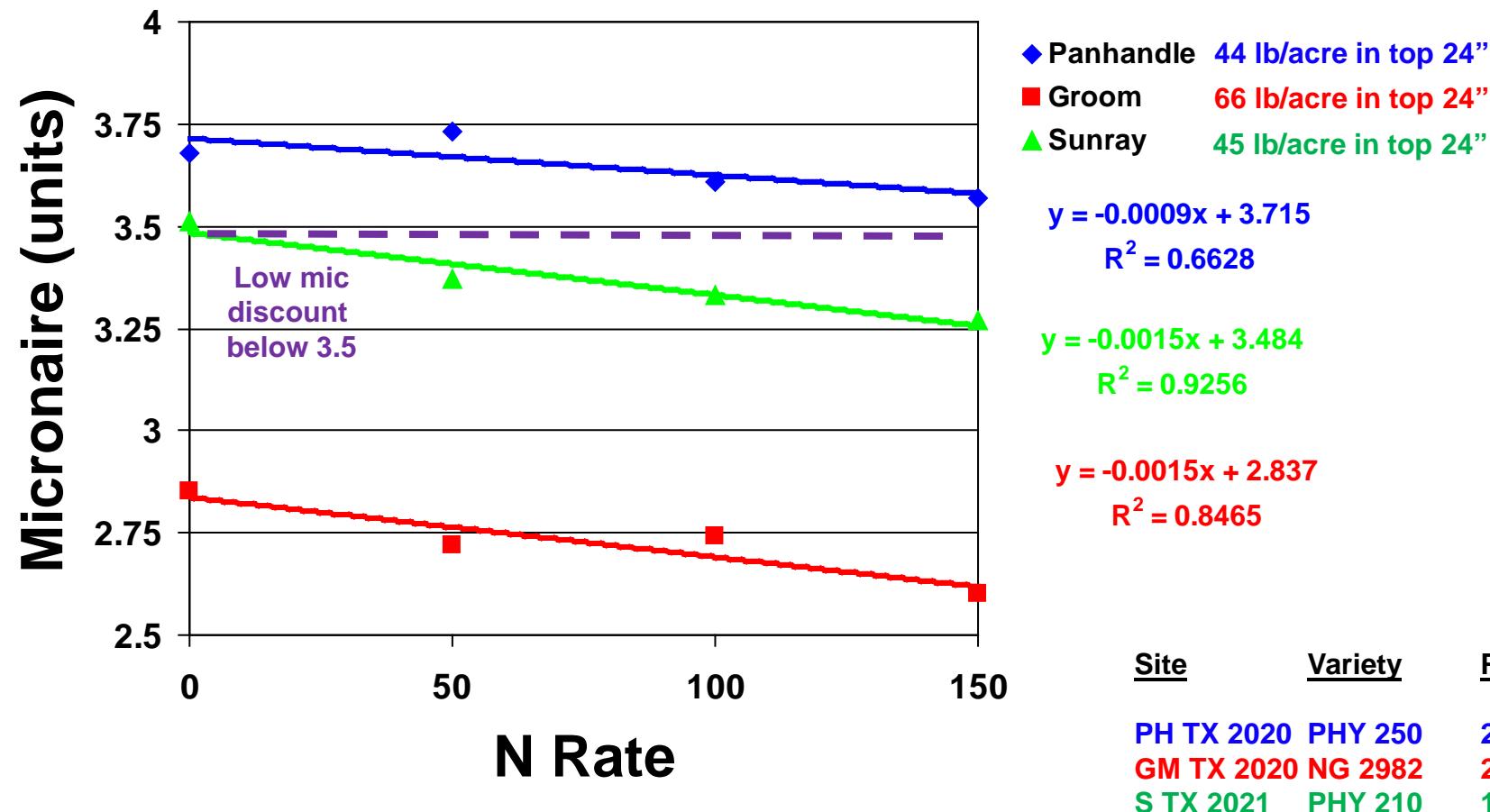
# Micronaire vs. N Rate

(5 Commercially Ginned Large-Plot Replicated Cotton/Corn Rotation N Rate Trial Sites in the Texas Panhandle 2020-2022)



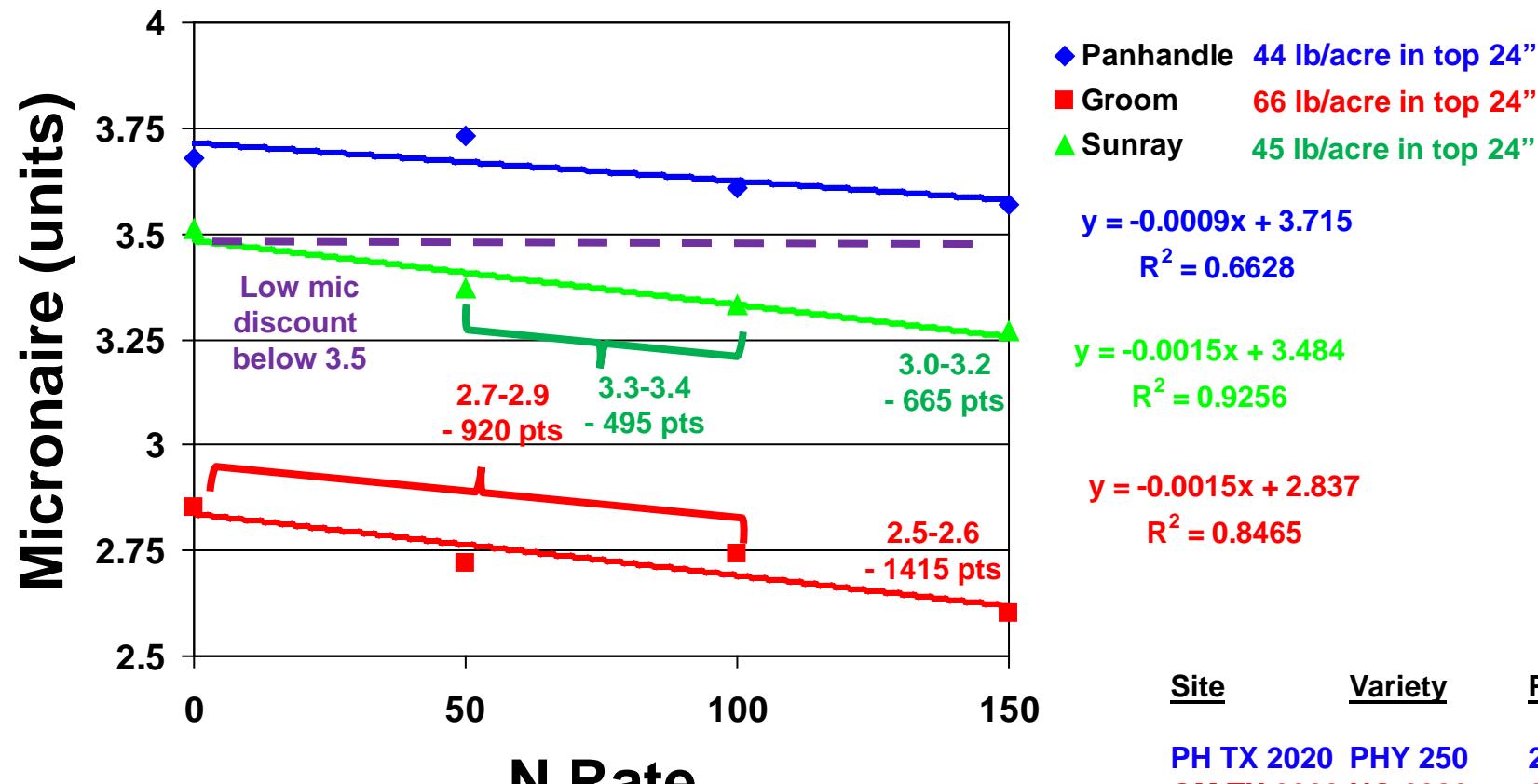
# Micronaire vs. N Rate

(3 Commercially Ginned Large-Plot Replicated Cotton/Corn Rotation N Rate Trial Sites in the Texas Panhandle 2020-2021)



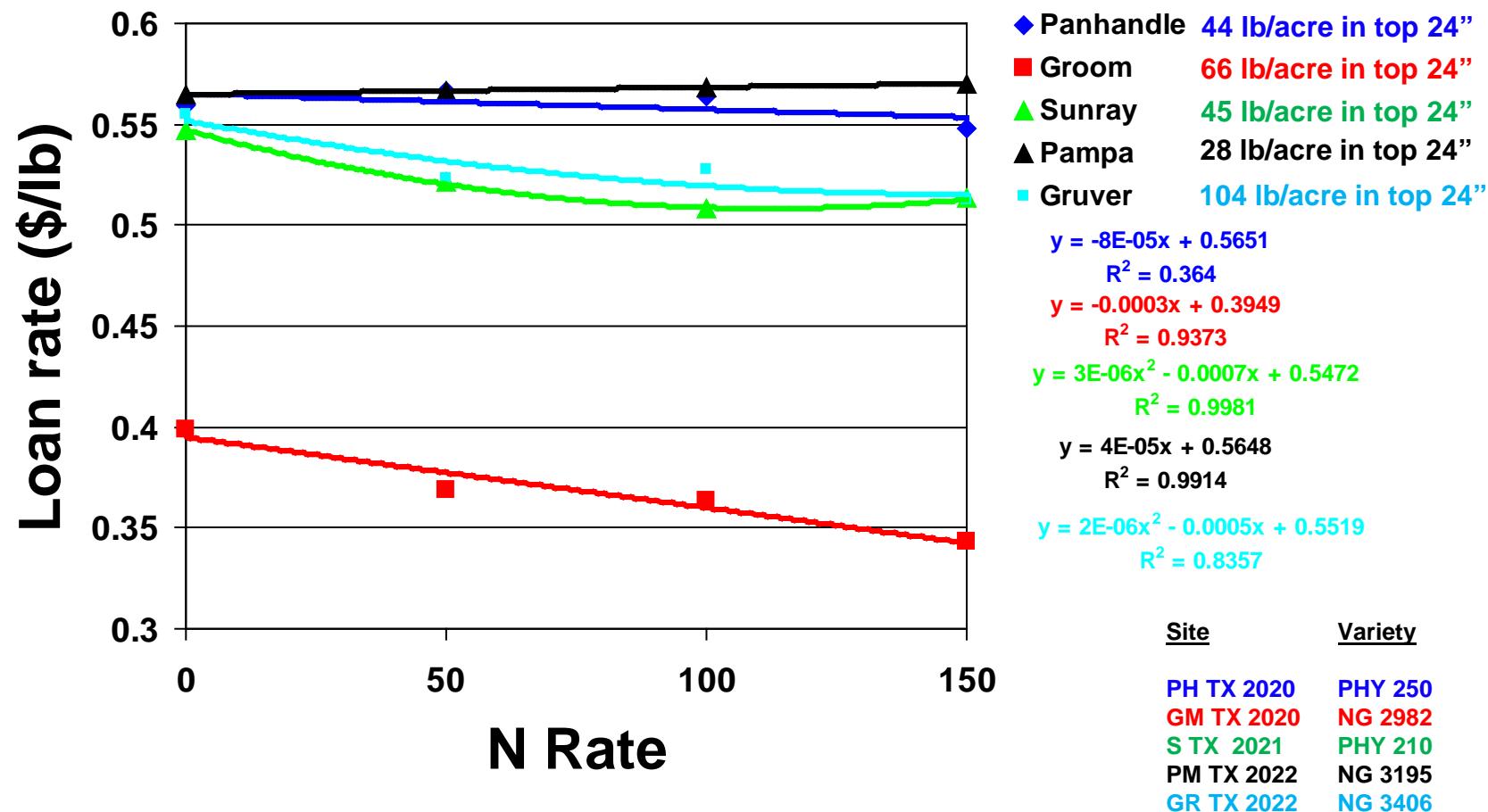
# Micronaire vs. N Rate

(3 Large-Plot Replicated Cotton/Corn Rotation N Rate Trial Sites  
in the Texas Panhandle 2020-2021)



# Lint Loan Rate vs. N Rate

(5 Commercially Ginned Large-Plot Replicated Cotton/Corn Rotation N Rate Trial Sites in the Texas Panhandle 2020-2022)

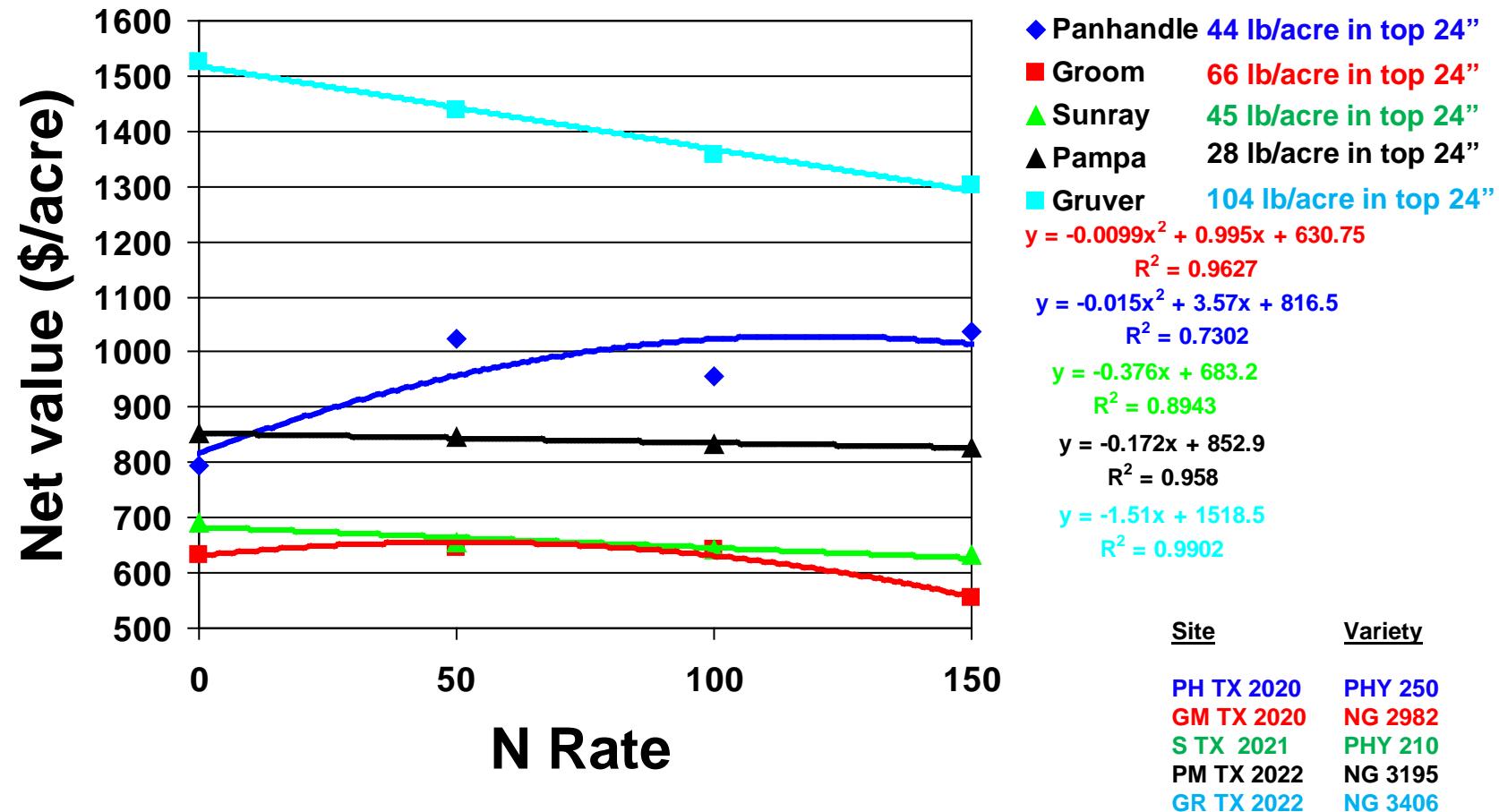


# **So what about “economics”? (Commercially Ginned Trials)**

- Commercially ginned trials included cost of ginning at the respective gin for the year trial was conducted
- Lint loan rate for each treatment was multiplied times yield to obtain gross loan value (income)
- Seed value – ginning cost = net gin credit (income) and is included in total revenue
- Nitrogen fertilizer rate cost for each grower in each year was subtracted from total income to calculate net value/acre

# Net Value/Acre vs. N Rate

(5 Commercially Ginned Large-Plot Replicated Cotton/Corn Rotation N Rate Trial Sites  
in the Texas Panhandle 2020-2022)  
(Actual Fertilizer Price for Trial)

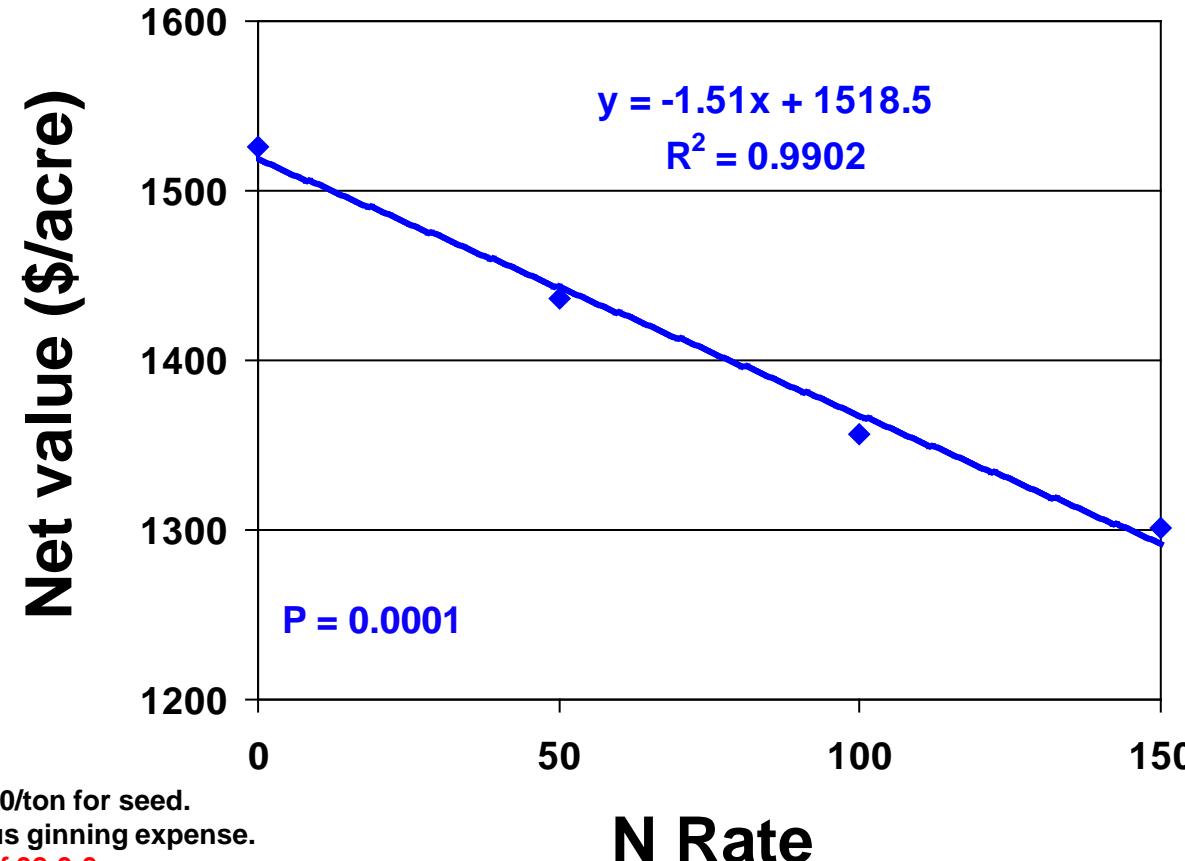


# NexGen 3406 B2XF - N Rate Trial

## Gruver, TX – 2022

### 4 Replicates

**Assumes \$515/Ton for 32-0-0**



Assumes:

\$3.40/cwt commercial ginning cost, and \$430/ton for seed.

Net gin credit is defined as seed credit minus ginning expense.

**N cost was determined based on \$515/ton of 32-0-0.**

Net value is defined as gross loan value/acre plus net gin credit minus N fertilizer cost.

Value for lint based on CCC loan value from commercial ginning and USDA-AMS classing results.

Planted: May 19

Days to bloom: 62

First bloom date: Jul 20

Harvested: Oct 31

# 2022 Gruver, TX - Ag Ingenuity/Ag Partners N Rate Trial

- The 0 N/acre rate essentially maximized potential profitability (\$1526/acre) even with a 4 bale/acre yield. Therefore, the higher fertilizer prices encountered in the spring of 2022 would indicate that from the profit potential perspective, the 0 N fertilizer rate would not necessarily be a bad management decision in this trial.
- The excellent plant management afforded by timely high mepiquat chloride applications resulted in fairly uniform cutout across N rates.
- Although not extreme, the late season elevated leaf N concentration arising from N fertilization likely had some effect on fiber maturity.

# **2022 Gruver, TX - Ag Ingenuity/Ag Partners N Rate Trial**

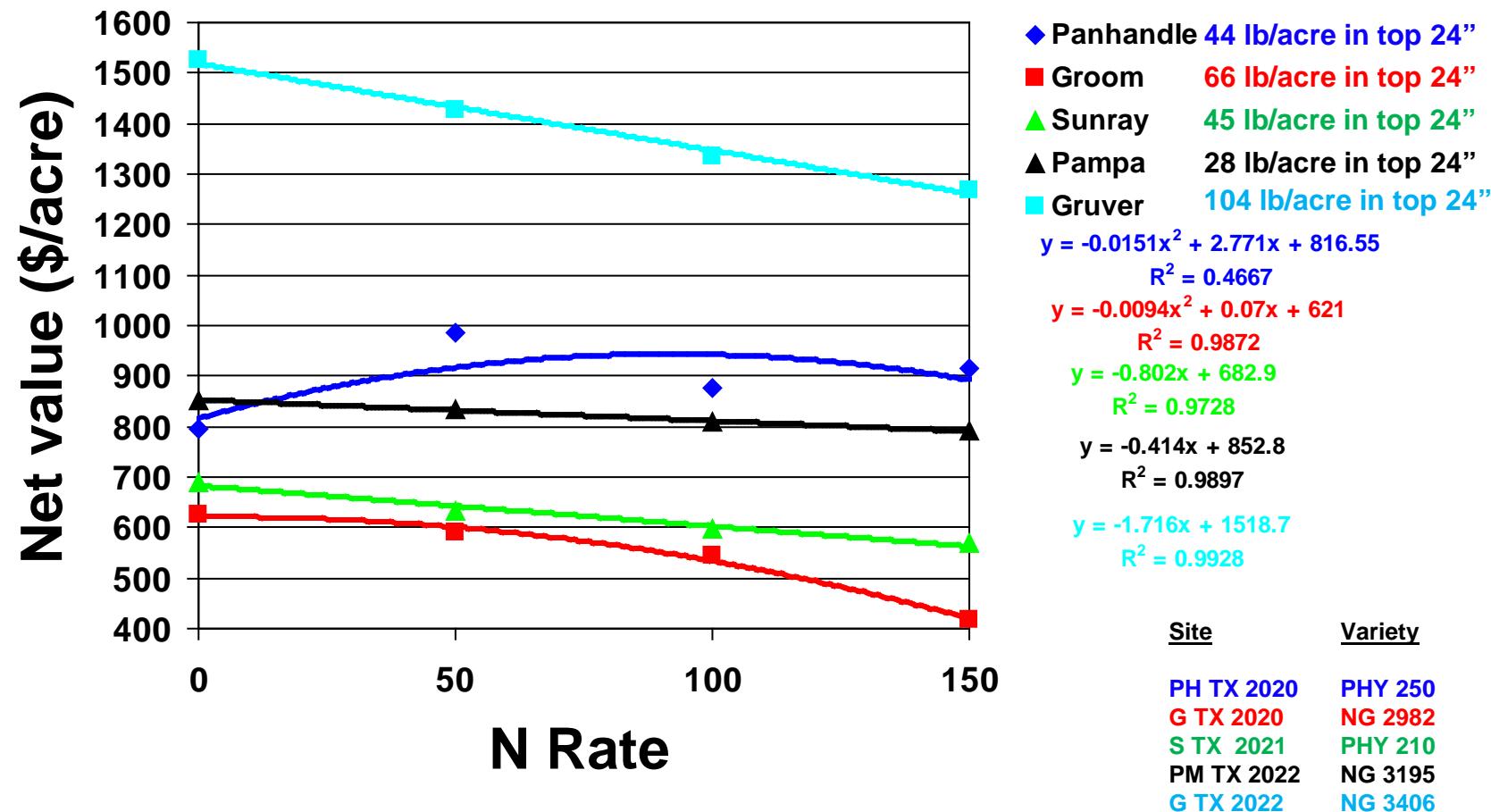
- Therefore, the higher N rates resulted in lower micronaire values and thus Loan rate discounts were encountered in the 50, 100, and 150 lb/acre N rate treatments.
- In this commercial field trial, negative CCC Loan value impacts due to N fertilization were documented.
- Although an extremely high and effective mepiquat chloride regime was utilized successfully to keep plants rather small (less than 24.5 inches for all treatments), it is worth noting that excellent plant growth regulator management was unable to overcome the physiological effects of excess N on crop maturity and micronaire.
- This is an important and profound observation in this excellent applied research field trial.

# **So what about high fertilizer price effect on “economics”? (Commercially Ginned Trials)**

- Same total revenue as used in each site’s actual fertilizer cost slide
- N fertilizer (32-0-0, UAN) cost was set at \$650/ton (about \$1.01/lb N)
- Net value/acre was then calculated

# Net Value/Acre vs. N Rate

(5 Commercially Ginned Large-Plot Replicated Cotton/Corn Rotation N Rate Trial Sites  
in the Texas Panhandle 2020-2022)  
(Projected 32-0-0 Price of \$650/Ton)



# Nitrogen Thoughts – Irrigated Cotton Following Corn

- Watch residual N when following corn, especially in ultra-short season areas (TX & OK Panhandles, SW KS)
- N requirement depends on realistic yield goal
  - yield depends on variety, irrigation capacity and season
  - generally 50 lb N / bale of yield goal (*this should be lower based on recent trials*)
    - subtract from N required for yield goal:
      - residual N in 0-18 (or 0-24) inch depth, N estimate from manure or compost additions, and N from irrigation water
      - *Great unknown is how much comes out of the “organic N pool”*
      - *Preplant NO<sub>3</sub>-N sampling does not indicate what will be mineralized from the organic N pool during the growing season. It only measures what is present as NO<sub>3</sub>-N on the day you sample.*





# Points to Ponder

- **For irrigated cotton produced following irrigated corn:**
- Significant residual NO<sub>3</sub>-N is typically found
- Range has been 26 to 132 lb residual NO<sub>3</sub>-N/acre in top 24 inches in fields (including lost trials) sampled for these projects
- Cotton can and does extract residual NO<sub>3</sub>-N from at least 24 inches in irrigated fields
- Watch N rates
- **Significant scientific evidence exists that N fertilization in short season environments in irrigated corn/cotton rotation reduces micronaire regardless of end of season heat units obtained**



# Points to Ponder

- Recent replicated commercially harvested trials indicate that most likely 50 lb actual N/acre is likely a good target for the 2+ to 3+ bale/acre yields obtained
- Since fertilizer prices have increased, 50 lb actual N/acre may be a bit high to optimize net returns, but not necessarily lint yields
- *If MAXIMUM YIELD is the goal, higher N rates can generate some lint pounds (to improve APH), but REDUCE MICRONAIRE and TRIGGER DISCOUNTS in Loan Rate*
- *Zero applied N may not be a wrong answer in some cases if HIGHER MICRONAIRE and OPTIMIZING NET RETURNS are goals*

**What about irrigation termination that results in substantial water stress?**

**Can that affect micronaire?**

# **2015 Furrow Irrigation Termination Project – SWREC, Altus**

**Randy Boman, Ph.D.**

**Saleh Taghvaeian, Ph.D.**

**Jerry Goodson**

**Published in an online journal at [www.mdpi.com/journal/agriculture](http://www.mdpi.com/journal/agriculture)**

**Masai, Taghvaeian, Boman and Datta. 2019. Agriculture: 9-39. Impacts of  
Irrigation Termination Date on Cotton Yield and Irrigation Requirement**



# Site Information

- Planted June 4 (late due to high rainfall in May)
- Deltapine DP 1044B2RF
- 62,000 plants/acre final stand
- Furrow irrigated – Lugert-Altus Irrigation District
- Tillman-Hollister clay loam soil type
- About 3" per irrigation using siphon tubes/concrete ditch
- Typical irrigation termination in area is around September 1

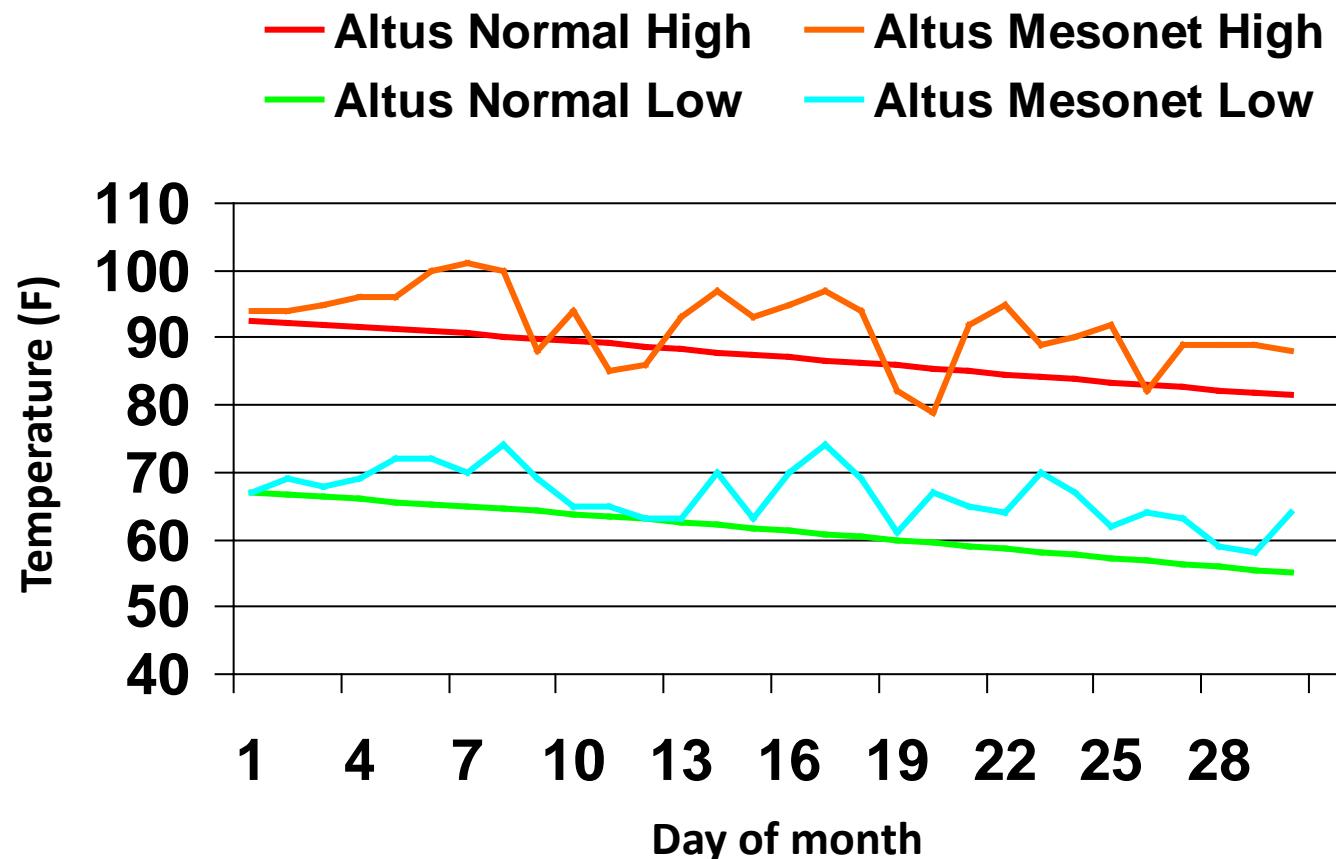


# Site Information

- Planted June 4 (high May rainfall)
- Very hot, dry September
- Very rapid onset of moisture stress observed
- WaterMark sensor data for 10, 20 and 30 inch depths, monitored weekly
- Little water removed from below 20 inch depth based on sensor reading changes
- Also collected NAWF and NACB data



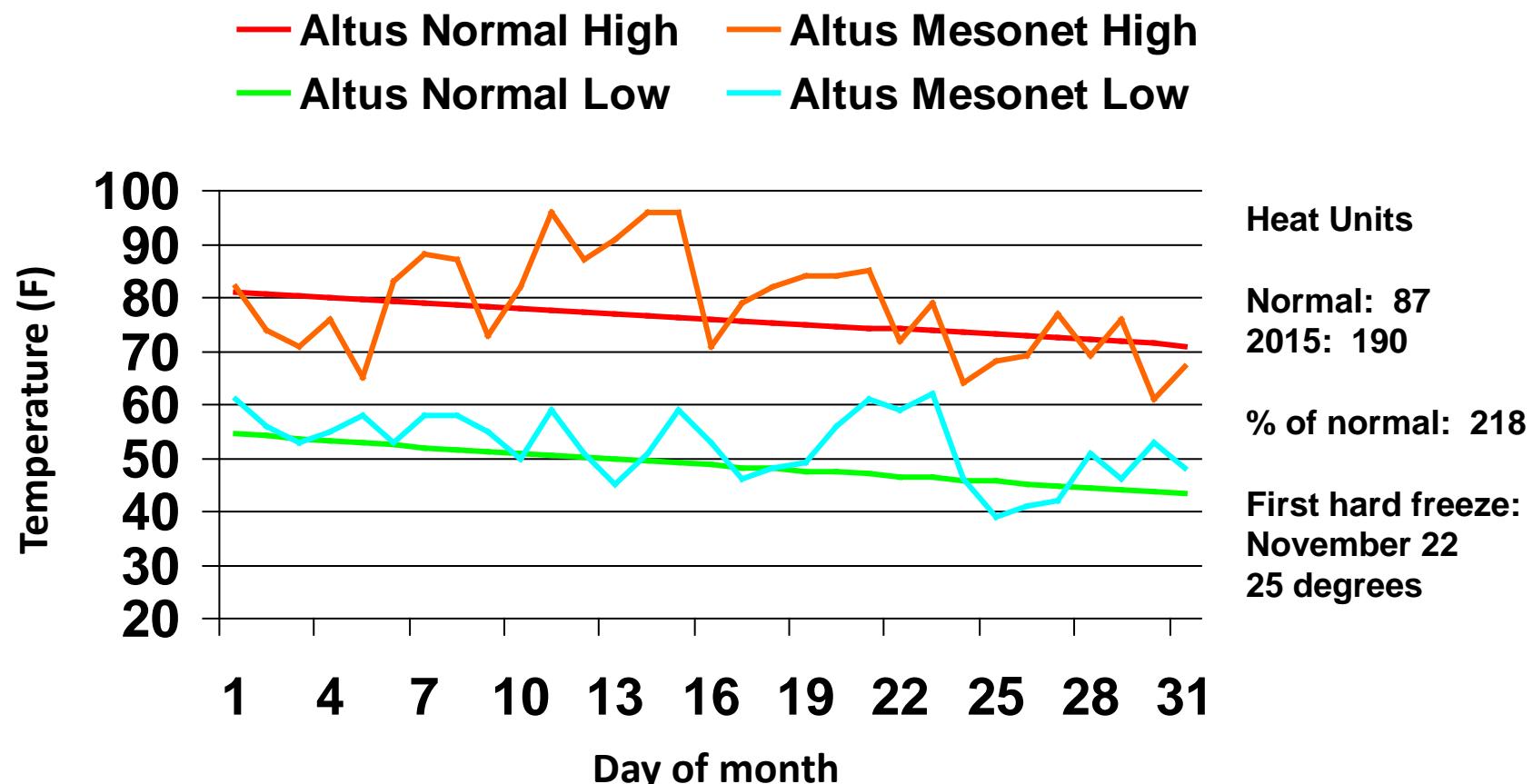
# Altus Normal (1981-2010) and Mesonet Air Temperatures September 2015



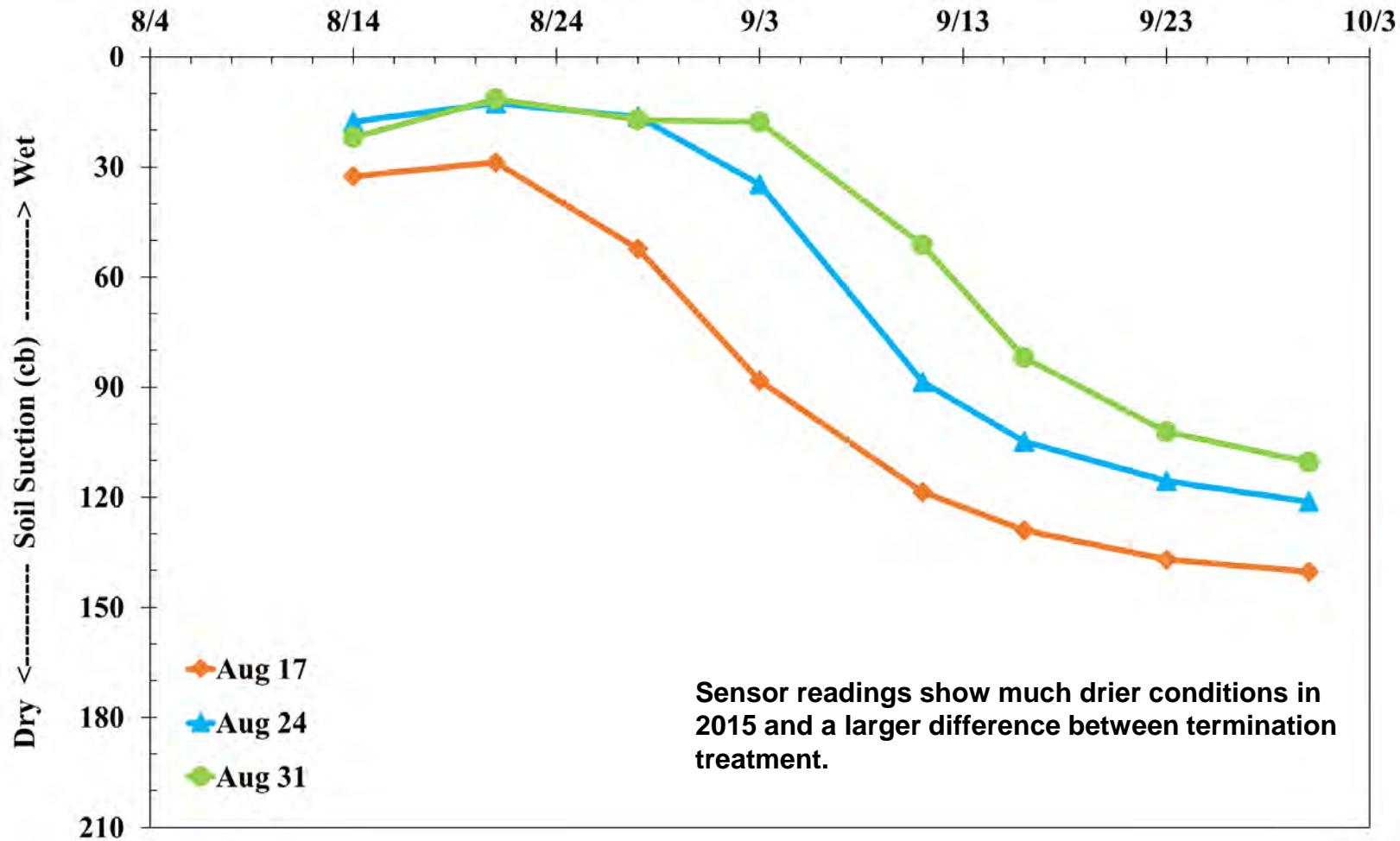
Heat Units  
Normal: 427  
2015: 575  
% of normal: +35



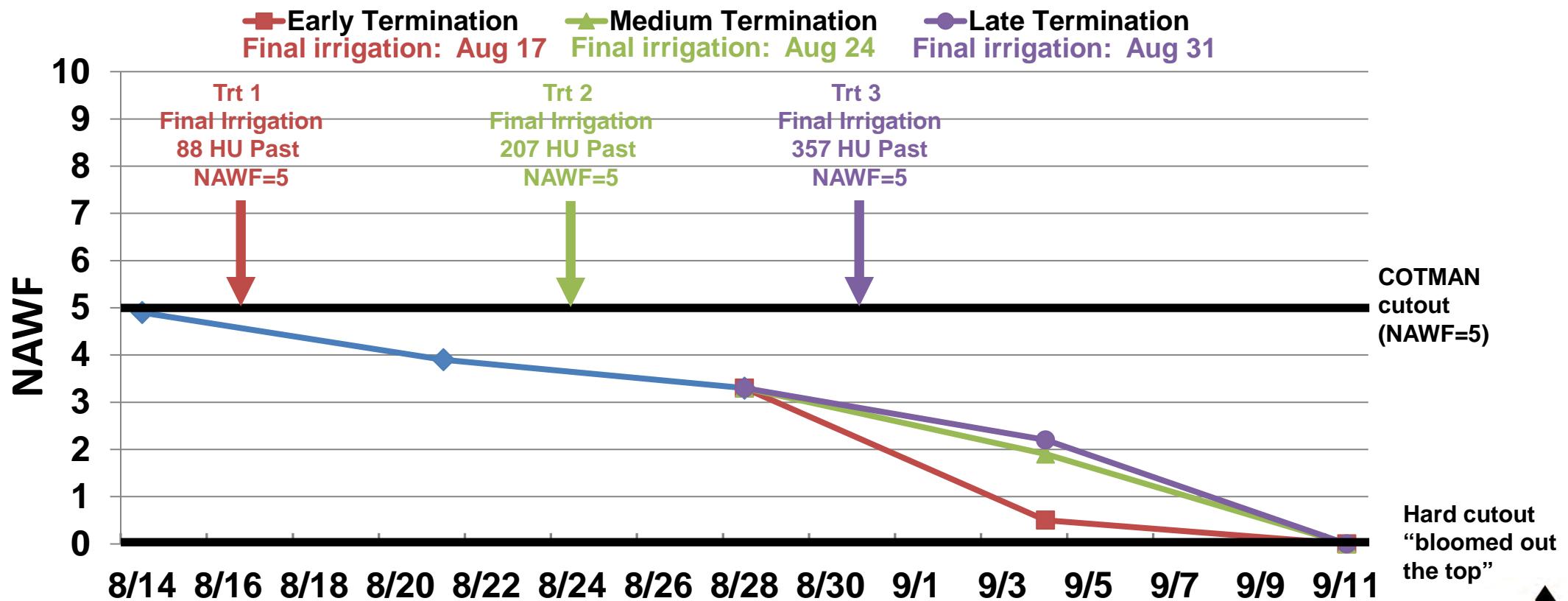
# Altus Normal (1981-2010) and Mesonet Air Temperatures October 2015



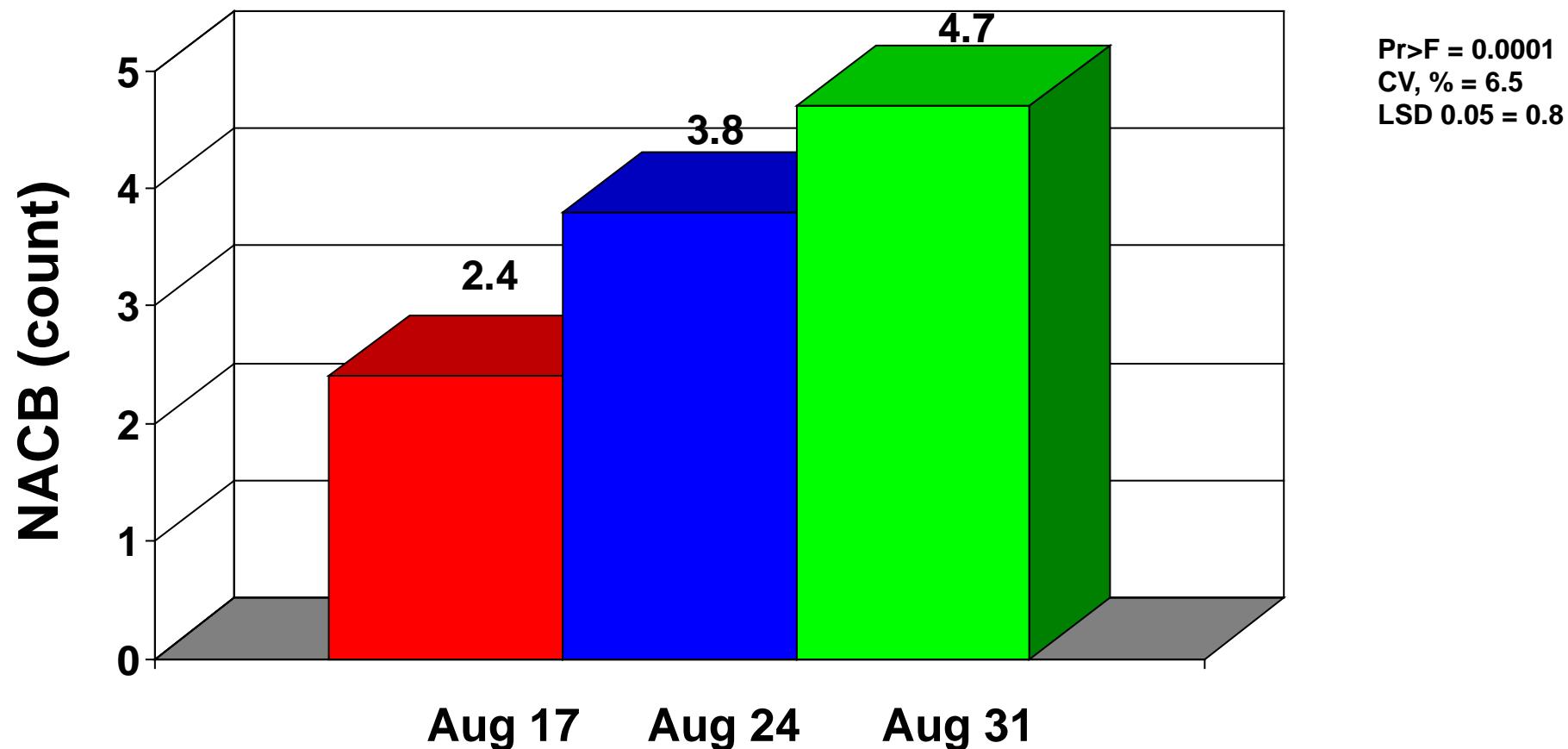
# 2015 Average Soil Moisture



# 2015 NAWF – SWREC Irrigation Termination Project



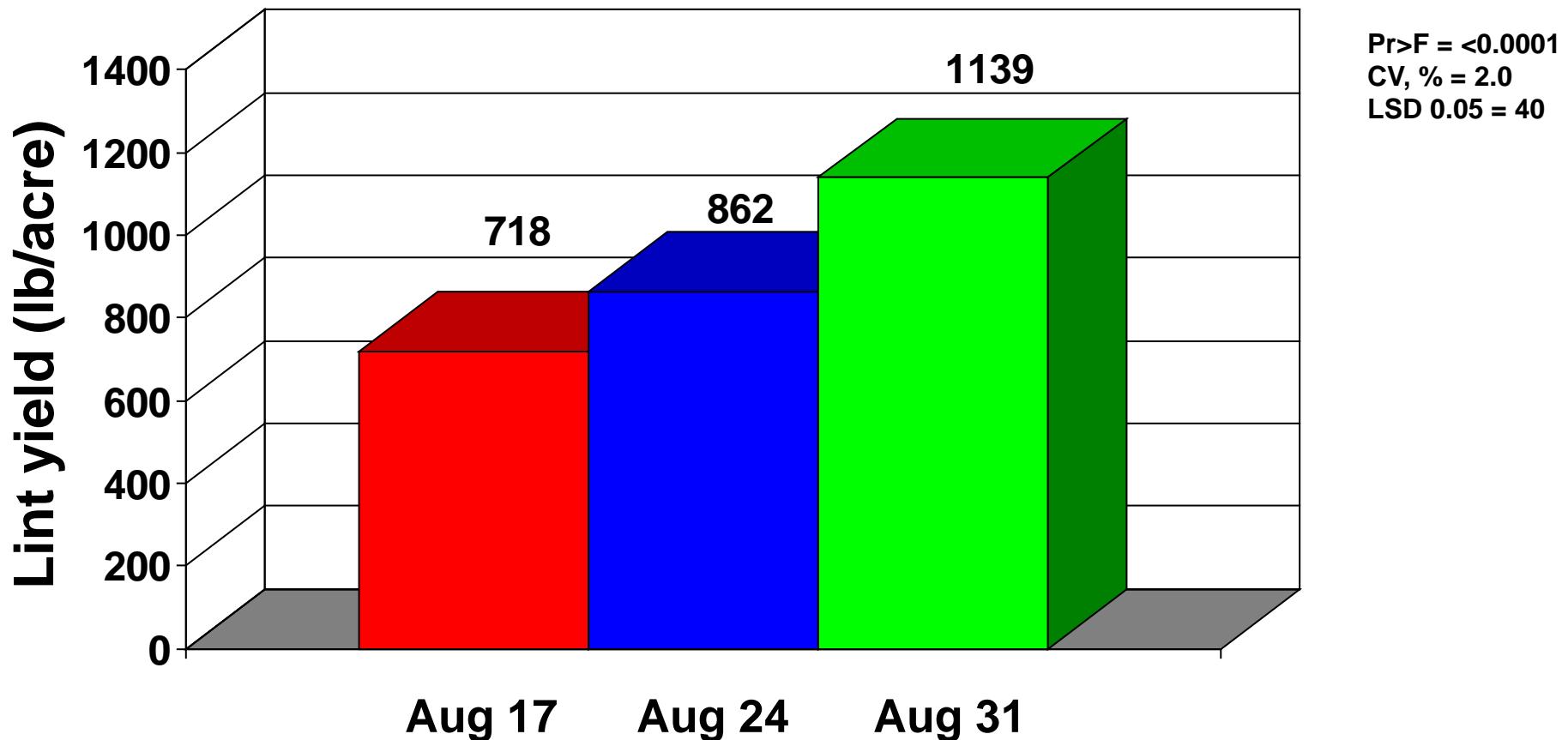
# Nodes Above Cracked Boll on September 16



# Lint Yield

Yield difference compared  
to August 17 termination

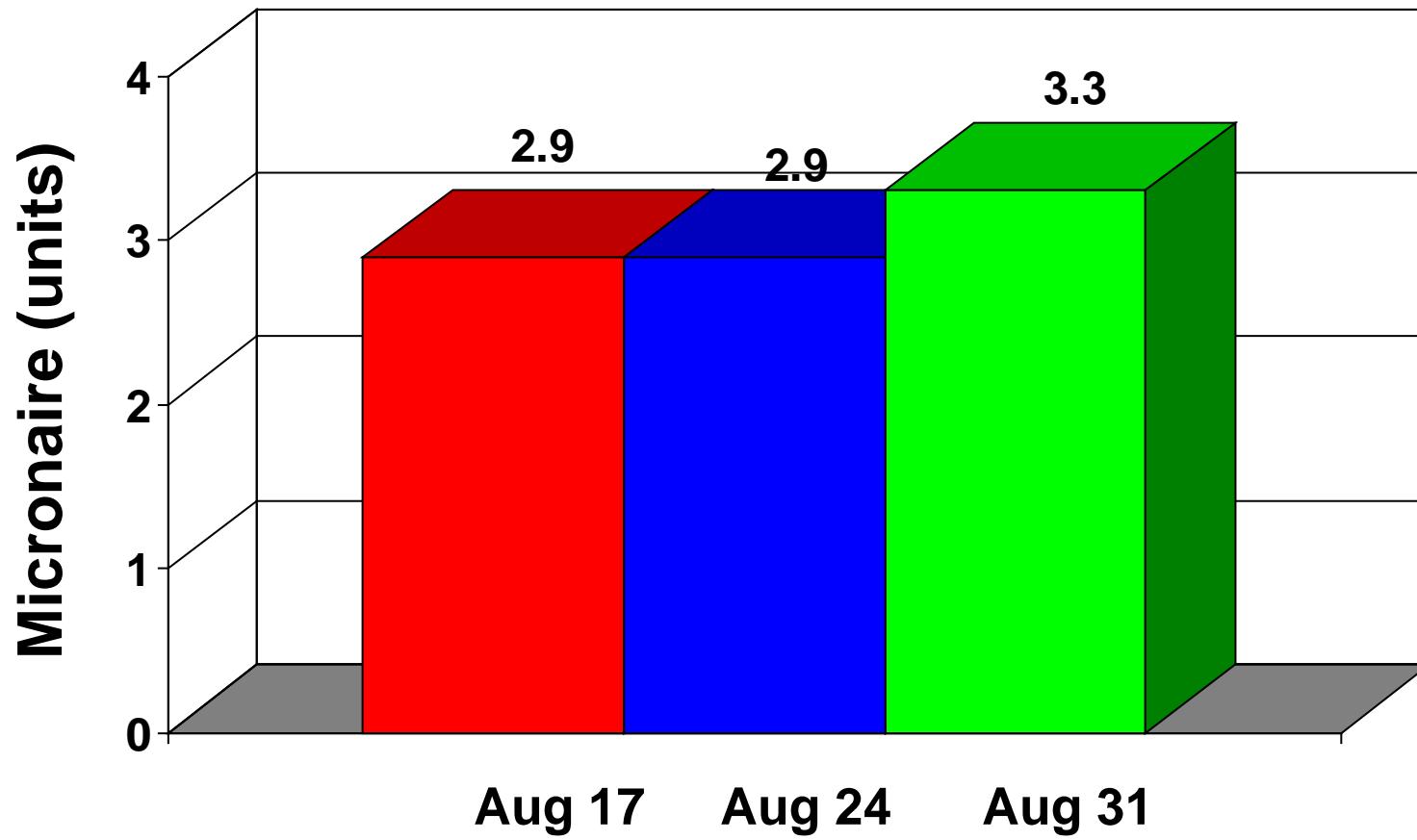
+144 lbs      +421 lbs



Pr>F = <0.0001  
CV, % = 2.0  
LSD 0.05 = 40



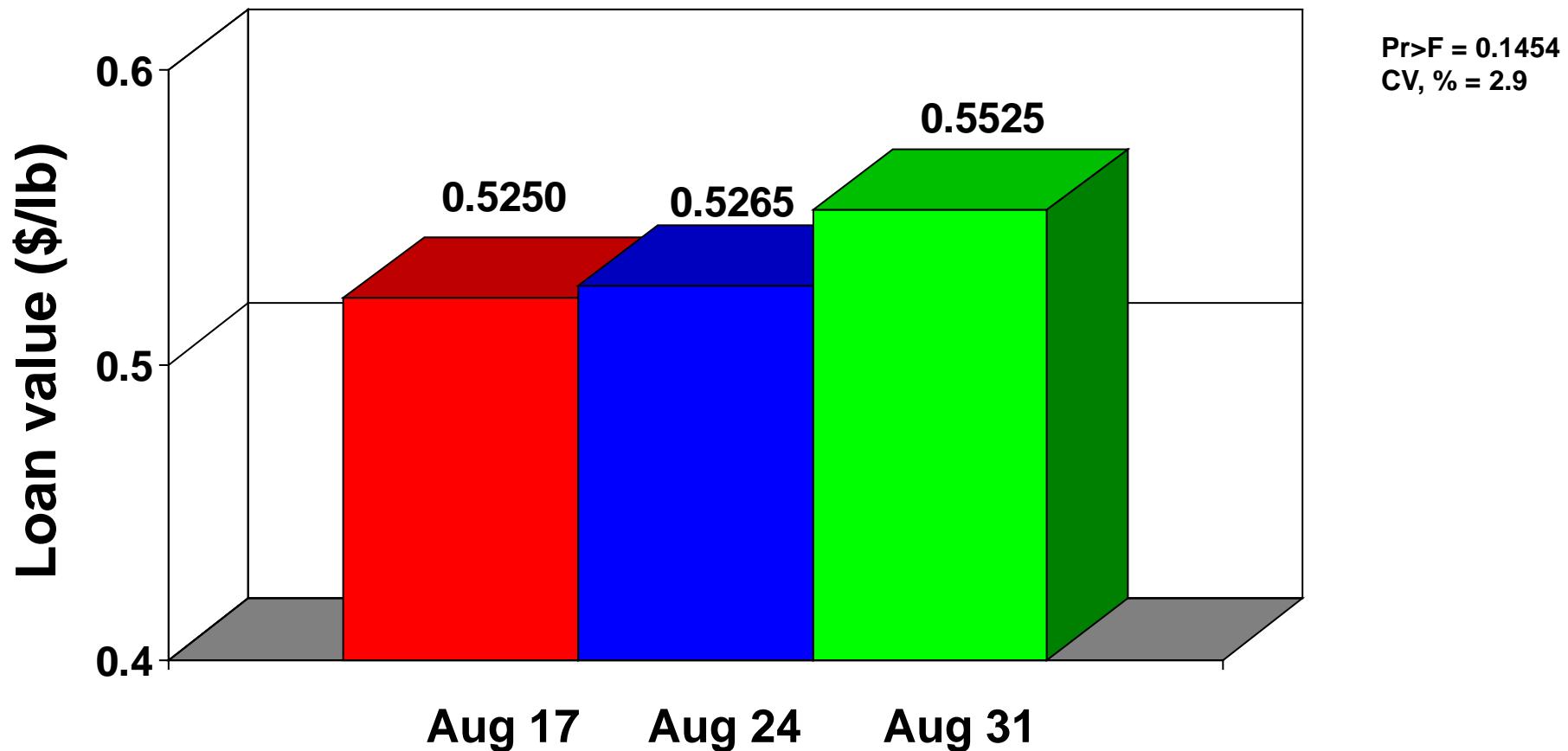
# Micronaire



Pr>F = 0.0178  
CV, % = 4.0  
LSD 0.05 = 0.3



# Loan Value



**How much difference CAN variety selection make?**

**Let's look at 4 entries across 4 panhandle locations in 2022...**

# 2022 PhytoGen Trials

## Averages Across 4 Sites and 4 Entries

Trial	Location	Previous crop/ Tillage System	Planting date	Harvest date
George	Kress	grain sorghum/no-till	10-May	20-Nov
Gruhlkey	Wildorado	wheat silage/no-till	9-May	3-Nov
Williams	Panhandle 1	corn/strip-till	5-May	1-Nov
Friemel	Panhandle 2	corn/conventional	17-May	21-Nov

Note: Where statistics are presented, they represent analysis of variance results for all entries planted at that particular site.

# 2022 PhytoGen Trials

## Averages Across 4 Sites and 4 Entries

<b>Lint yield</b>	Kress	Wildorado	Panhandle 1	Panhandle 2	Mean across sites
PHY 205 W3FE	1,335	1,497	1,673	1,628	1,533
PHY 332 W3FE	1,395	1,393	1,641	1,495	1,481
PX22A213 W3FE	1,352	1,431	1,594	1,525	1,476
PX22A214 W3FE	1,433	1,542	1,775	1,690	1,610
Mean	1,379	1,466	1,671	1,585	1,525
CV, %	4.7	2.1	3.1	5.6	--
Prob>F	0.2358	0.0001	0.0009	0.0418	--
LSD 0.10	NS	43	73	124	--
<b>Loan value</b>	Kress	Wildorado	Panhandle 1	Panhandle 2	Mean across sites
PHY 205 W3FE	0.5509	0.5577	0.4702	0.4998	0.5197
PHY 332 W3FE	0.5606	0.5109	0.4536	0.4944	0.5049
PX22A213 W3FE	0.5619	0.5015	0.4184	0.4552	0.4843
PX22A214 W3FE	0.5500	0.5212	0.4549	0.4915	0.5044
Mean	0.5559	0.5228	0.4493	0.4852	0.5033
CV, %	--	--	--	--	--
Prob>F	--	--	--	--	--
LSD 0.10	--	--	--	--	--

# 2022 PhytoGen Trials

## Averages Across 4 Sites and 4 Entries

<b>Net value</b>	Kress	Wildorado	Panhandle 1	Panhandle 2	Mean across sites
PHY 205 W3FE	936	1,144	1,114	1,107	1,075
PHY 332 W3FE	1,014	1,026	1,080	1,003	1,031
PX22A213 W3FE	977	1,041	1,013	984	1,004
PX22A214 W3FE	1,005	1,124	1,164	1,136	1,107
Mean	983	1,084	1,093	1,058	1,054
CV, %	4.7	2.0	3.1	5.7	--
Prob>F	0.161	0.0001	0.0002	0.0229	--
LSD 0.10	NS	30	47	85	--

<b>Micronaire</b>	Kress	Wildorado	Panhandle 1	Panhandle 2	Mean across sites
PHY 205 W3FE	4.71	3.73	3.07	3.37	3.72
PHY 332 W3FE	4.07	3.27	2.73	3.06	3.28
PX22A213 W3FE	4.33	3.31	2.78	3.00	3.36
PX22A214 W3FE	4.26	3.37	2.82	3.13	3.40
Mean	4.34	3.42	2.85	3.14	3.44
CV, %	--	--	--	--	--
Prob>F	--	--	--	--	--
LSD 0.10	--	--	--	--	--

# 2022 PhytoGen Trials

## Averages Across 4 Sites and 4 Entries

<b>Staple</b>	Kress	Wildorado	Panhandle 1	Panhandle 2	Mean across sites
PHY 205 W3FE	35.4	36.7	37.4	36.6	36.5
PHY 332 W3FE	37.3	38.1	38.8	37.3	37.9
PX22A213 W3FE	37.6	38.5	39.7	38.6	38.6
PX22A214 W3FE	35.8	37.5	38.6	37.6	37.4
Mean	36.5	37.7	38.6	37.5	37.6
CV, %	--	--	--	--	--
Prob>F	--	--	--	--	--
LSD 0.10	--	--	--	--	--
<b>Leaf grade</b>	Kress	Wildorado	Panhandle 1	Panhandle 2	Mean across sites
PHY 205 W3FE	2.8	3.5	3.9	3.6	3.5
PHY 332 W3FE	2.7	3.0	3.4	3.0	3.0
PX22A213 W3FE	3.0	4.0	4.8	3.6	3.9
PX22A214 W3FE	3.0	3.7	3.7	3.2	3.4
Mean	2.9	3.6	4.0	3.4	3.4
CV, %	--	--	--	--	--
Prob>F	--	--	--	--	--
LSD 0.10	--	--	--	--	--

# **Causes of Low Micronaire**

## **Directly Under Producer Control**

- Some varieties have inherently lower micronaire than others; identify and avoid.
- Verticillium wilt disease will reduce micronaire in lint from infected plants. If a large number of plants have this disease, it can reduce overall micronaire for the field. Identify problem fields and plant higher tolerance varieties.
- Potassium deficiency can result in low micronaire. Not generally a problem in our region, but we can see this in some field situations. Watch K nutrition.

# **Causes of Low Micronaire Directly Under Producer Control**

- A decision to plant later than optimal for geography
- Lack of OR poorly timed insecticide applications which result in loss of early fruit due to insect damage, which pushes first blooming to later than optimal date.
- Excessive N fertility can arise from high residual nitrates in the soil profile. Not recognizing or underestimating N mineralization from the organic N pool in the soil, and/or excessive N fertilization are problematic.

# **Causes of Low Micronaire**

## **Directly Under Producer Control**

- High growth potential conditions can delay crop maturity and negatively impact micronaire.
- Mis-timed harvest aid application (too early) by incorrect evaluation of overall crop maturity. In this case, too many bolls do not have adequate maturity for harvest aid application and stops fiber development if prematurely terminated.
- Etc.

# **Causes of Low Micronaire**

## **NOT Necessarily Under Producer Control**

- Late planting (caused by weather delays) that results in less than optimal first bloom date.
- Seedling disease may result in low vigor plants, especially under cool growing conditions. This also sets up a possible thrips damage and setback. These can combine to push back first bloom date substantially.
- Loss of early fruit due to weather damage, etc, which pushes first blooming to later than optimal date.
- Excess late-season water (from irrigation or rainfall) that coincides with cool or cloudy conditions can result in delayed maturity.

# **Causes of Low Micronaire**

## **NOT Necessarily Under Producer Control**

- Severe drought (moisture) stress during boll fill. If plants severely wilt for an extended period during the secondary wall thickening phase, fiber development may be terminated or significantly reduced. This typically results in smaller bolls which do not properly fluff upon opening.
- High retention of late-set fruit associated with high yield potential. Excessive boll load for the amount of fiber maturing weather remaining in the season. This is the classical “clock runs out” situation. Not enough heat units have been nor can be obtained to mature the late boll load.

# Causes of Low Micronaire

## NOT Under Producer Control

- Leaf loss due to disease or other factors
- Crop damaging weather events such as wind/hail that destroys plant terminals or strips off leaves which results in plant growth set backs and subsequently first bloom date
- Lack of solar radiation to maximize photosynthesis (cloudy conditions for an extended period).
- End of season temperatures slightly above freezing can terminate fiber development regardless of post-event warmup. This is most severe when a large number of remaining bolls lack adequate maturity. It is hypothesized that the cellulose synthase enzyme system breaks down or is impaired, and some varieties may be more sensitive than others to this.
- Early freeze, etc.



# Questions?

Randy's cell number:  
**580-481-4050**

