



Insights From the Scott Learning Center - Scott, MS 2022

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Jay S. Mahaffey
Science Fellow



Thanks for the Invitation!!!



You ask (hopefully) – “So tell me
about the Scott Learning
Center??”





Area: 322.38 ac
Perimeter: 21981.62 ft

SLC Profile

- In Scott since 2008
- 340 Total Acres
- Various soil types
- Corn, Cotton, Soybeans
- Chemistry
- Seed Applied Solutions
- “Commercially Simulated”

Tours at Scott – Talking and Listening



SLC – Profile – 2021

- Soil type ranges from Sandy Loam to Clays
- Soil Ph from 6.61-7.79
- CEC ranges from:
 - 9.2 on Sands; 14 on Sandy Loam; 22 on Clay Loam; 34 on Clays
- Organic Matter ranges from 0.5-1.6%
- 50-55 inches rainfall /year
- Yield Expectations –
 - Irrigated – 240 Corn; 70 Soybeans; 1400 Cotton
 - 2021 – 240/70/1400+
 - Dryland – 110 Corn; 35 Soybean; 750 Cotton
 - 2020-2021 – Similar to Irrigated
 - And every gradation in between



2021 Studies – Potential Results

- Corn
 - Tillage x Depth X Population X Hybrid
 - High Input
- Soybeans
 - Planting Date X Variety
 - High Input
 - Planting Errors
- Cotton
 - PGR x Variety – Stance, Early Applications, Populations, Locule Numbers
 - Planting Configuration – Solid, 1:1, 2:1 x Populations
 - Cotton Fertility



The Difference Between Corn and Cotton

- CORN is a “deliberative” crop
- Make decisions upfront about:
 - Planting Rate
 - Yield Expectation
 - Equipment
 - Planting Date
 - Insect Management
- In season influence is limited compared to cotton



- COTTON is a “reactive” crop
- Make decisions upfront about:
 - Variety
 - Planting rate, fertility
- In season we have influence on:
 - PGR application
 - Insect control
 - Other agronomics
 - Crop termination
- Spend time taking advantage of the ability to compensate





Deltapine® Brand Cotton Products 2021

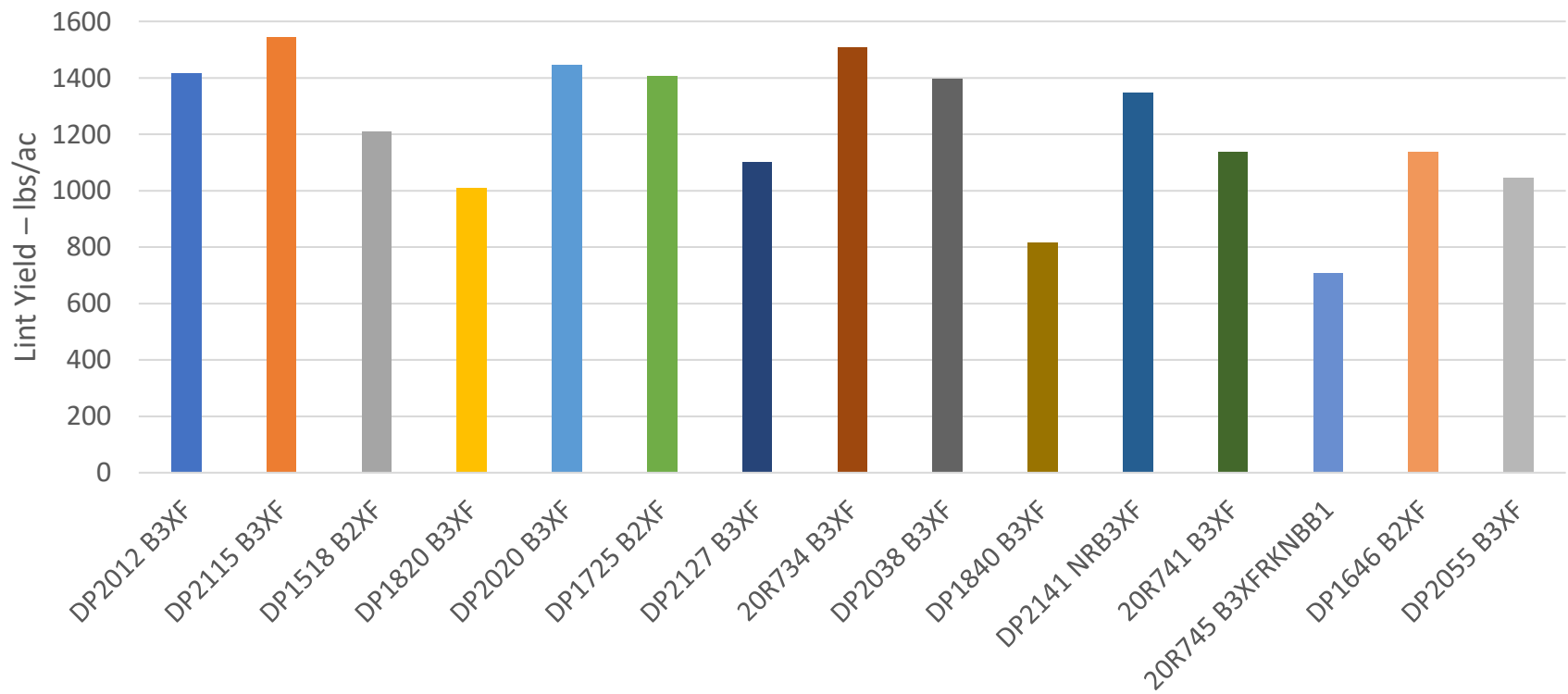


Scott Learning Center



Scott Learning Center 2021

Highway Cut





Cotton Chronicles

Tales from the Bunker

Jay S. Mahaffey – Science Fellow
SLC-2020



Current Varieties - 2021



- Cotton varieties have changed with the system
- Elimination of the weevil has allowed changes
 - Increased fruit retention
 - Longer season
 - Increased yield
- Enabled by less determinate varieties
- Requiring aggressive management which is the SE US history – DP 90, 5415, NuCotn 33B, 555, 1646 – The reason we grow cotton.



Table 2
Results of 40 Location Trials on Deltapine Varieties

Variety	Veg. Nodes	Total Nodes	Final Height	% Ret. Bot 5 FP1	% Ret. 95 % Zone	Cut Out Node
Deltapine 20	4.9	19.6	38.6	61	57	16.4
Deltapine 50	5.1	18.9	36.3	61	56	16.0
Deltapine 51	5.2	19.8	40.4	57	53	17.0
DP 5409	5.2	20.2	38.3	54	54	17.6
DP 5415	5.4	19.6	37.2	51	51	16.6
DP 5690	5.5	20.9	43.8	49	48	18.5
Deltapine Acala 90	5.6	20.9	44.1	47	49	18.3
LSD 0.05	0.3	0.8	2.0	6	4	0.7
% Difference Variety	16	5	7	4	4	12
% Difference Environment	84	95	87	96	96	88

DELTAPINE

BRAND

Field Day 1995

1994 - End of Season 53% FP1 Ret
In the 95% Zone

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Deltapine 50	5.1	18.9	36.3	61	56	16.0
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How a Cotton Plant Thinks

Jay S. Mahaffey - Science Fellow
Scott Learning Center



The Short Answer Is--



It Doesn't!!



The Background

- Cotton Nature:
 - Both *Gossypium hirsutum* and *barbadense*
 - Origins in SA, India/Pakistan and/or Northern Mexico- *G. herbaceum* and *arboretum*
 - Perennial – multi year
 - Indeterminate – fruits/flowers at the same time
 - A continuous set of feedback loops – much like a thermostat



The Fundamental Behavior

- The cotton plant is programmed to be a tree which has fundamental influence on it's behavior.



- The overriding programming is to produce seed
- The underlying factor is being a perennial plant
- Breeders have some influence in the relationship – determinacy, leaf hair, fiber quality



Which fruiting form sheds
first??



Why do newly bloomed
bolls shed first??



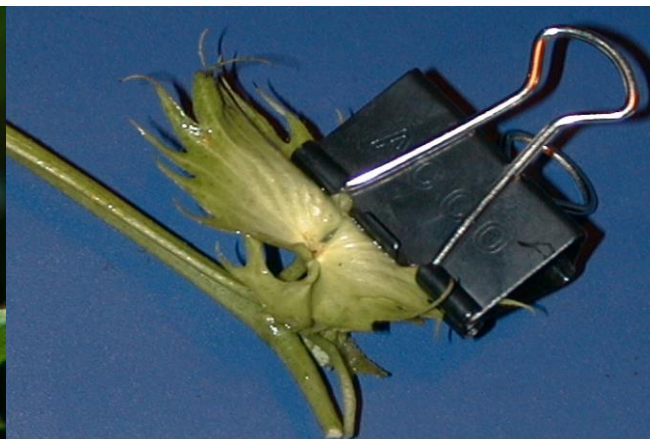
Thinking Like a Cotton Plant – What and Why??

- Squares (and newly bloomed bolls) are photosynthetically independent of the plant. 5-7 days post bloom, bolls are not. Shed can go further in rough conditions.
- “I have little invested in squares but these new bolls are becoming a drag. I’ll shed them and concentrate on developing the seed that is already pollinated. That will make it as good as conditions allow. After all, I have already invested a lot of energy into those bolls.”



Thinking Like a Cotton Plant – What and Why??

Why does cotton grow taller
in response to fruit loss??



Thinking Like a Cotton Plant – What and Why??

- Taller plants are a result of excess available sugars in the plant.
- “I have plenty of sugar and less fruit so I’ll grow bigger and make more fruiting sites/seed . Even if it’s next year.”





RESPONSE OF DELTAPINE® COTTON VARIETIES TO PLANT GROWTH REGULATOR REGIMES

BAYER LEARNING CENTER AT
SCOTT, MISSISSIPPI
2020



RESEARCH SITE DETAILS

- Application regimes of mepiquat chloride (standard 4.2% formulation) were as follows: (Table 1).
 - An untreated check with no PGR applied.
 - Passive regime (representing older growth management methods) – three application rates and three timings totaling 38 oz/acre applied with delayed early application on July 10, 2020 at a reduced rate.
 - Aggressive regime – three applications at a maximum label rates at three timings totaling 48 oz/acre applied.

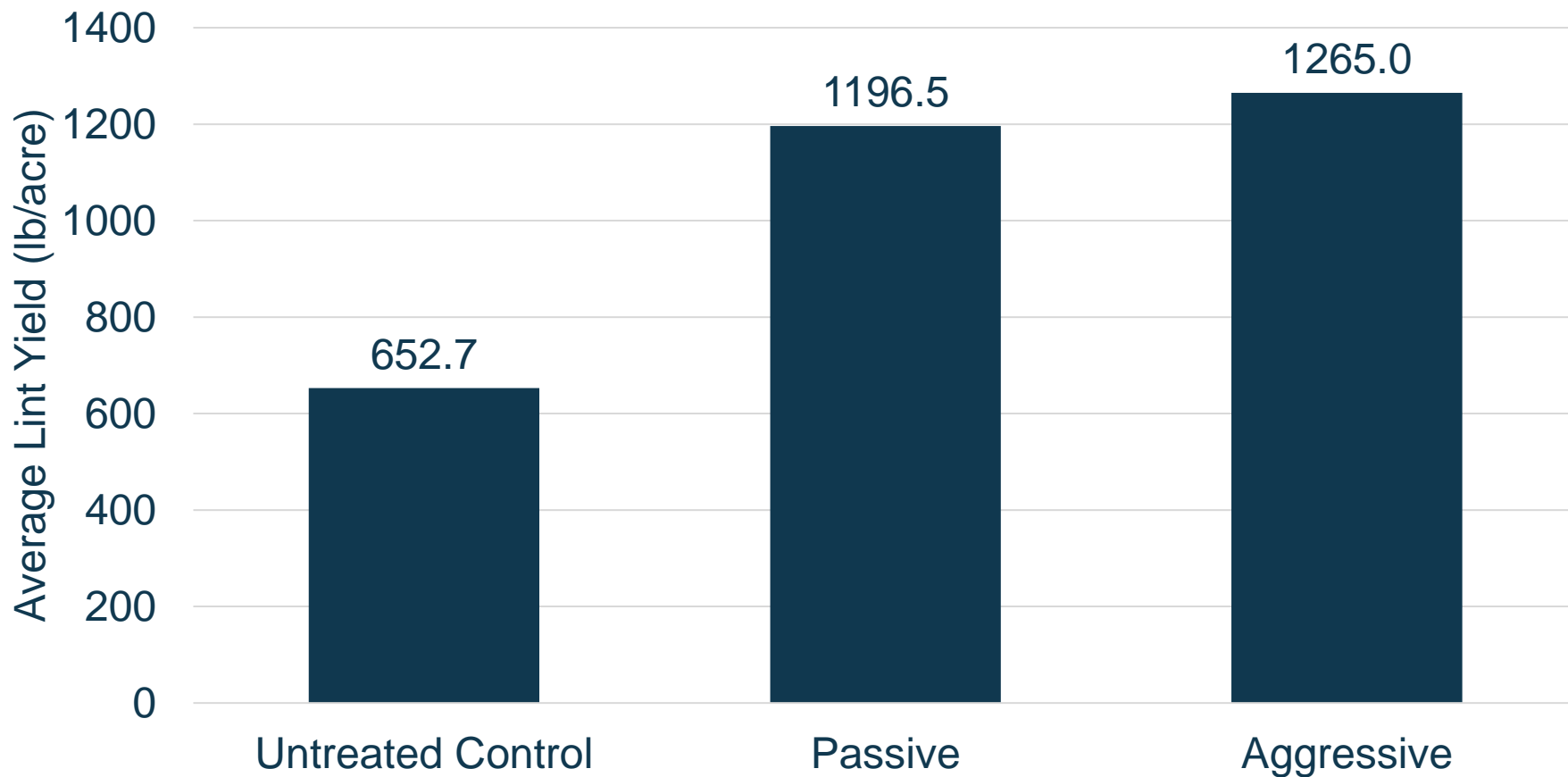
Regime	Date	PGR Rate (ounces/acre)
Passive	July 10	10
	July 26	12
	August 10	16
Aggressive	July 1	16
	July 10	16
	July 26	16

Table 1. 2020 passive and aggressive PGR treatment rates and application timings.



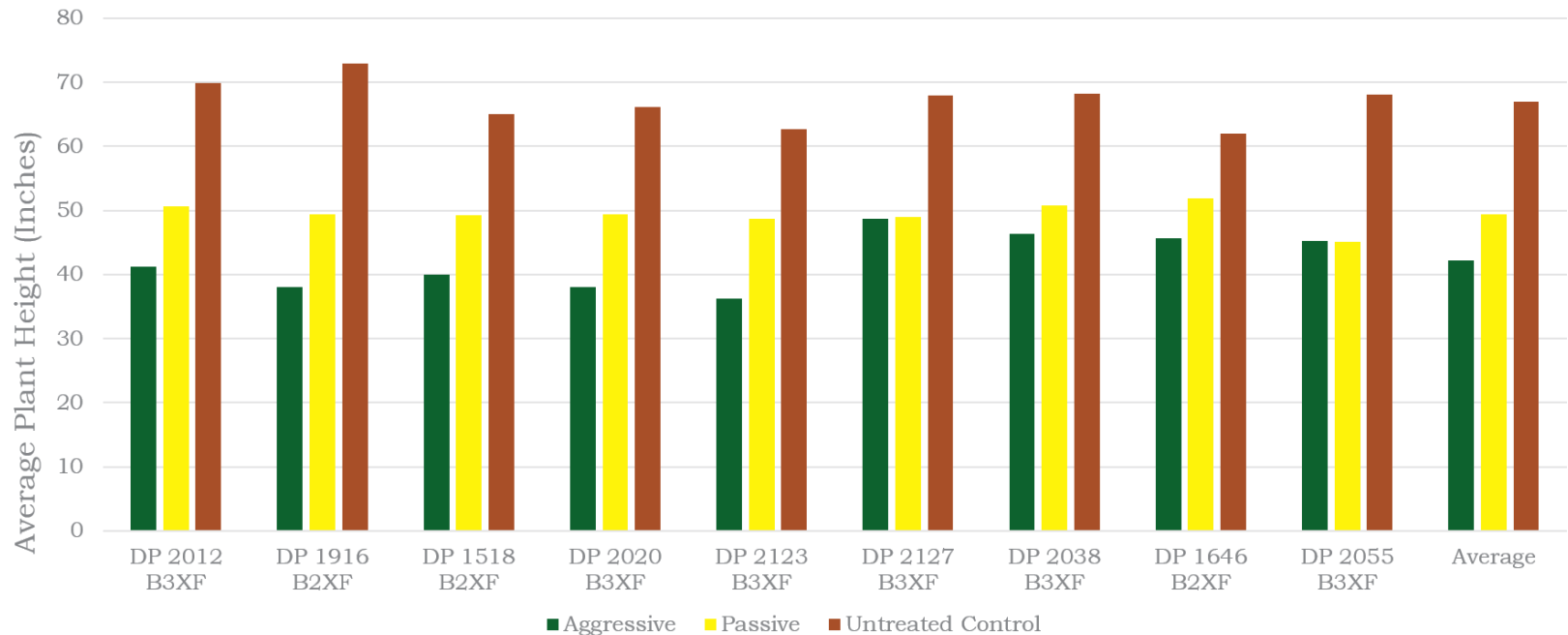
Figure 4.

Average yield of all cotton varieties by PGR regime.



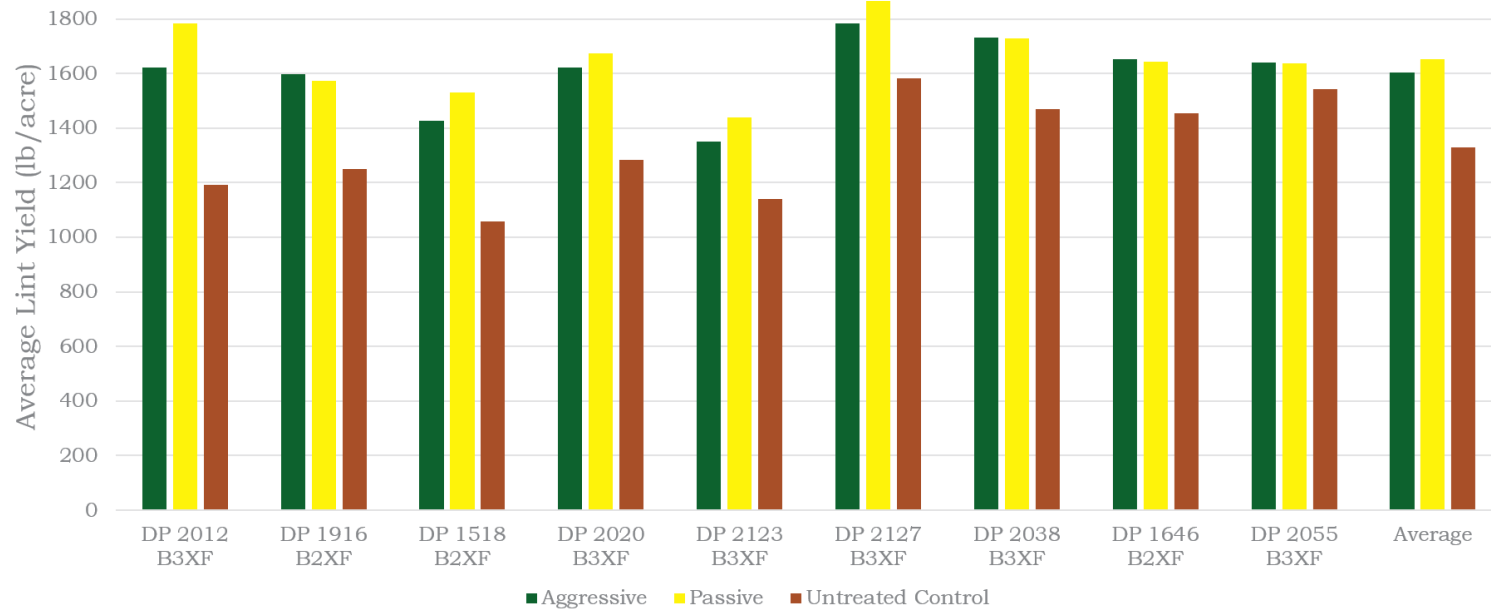
2020 AVERAGE COTTON HEIGHT BY PRODUCT AND PGR REGIME.

- The untreated control treatments averaged 67 inches tall at season end.
- Passive treatments were an average of 49 inches with 18 inches reduction and the aggressive treatments were 42 inches with 25 total inches in height reduction. This echoes results from previous years.



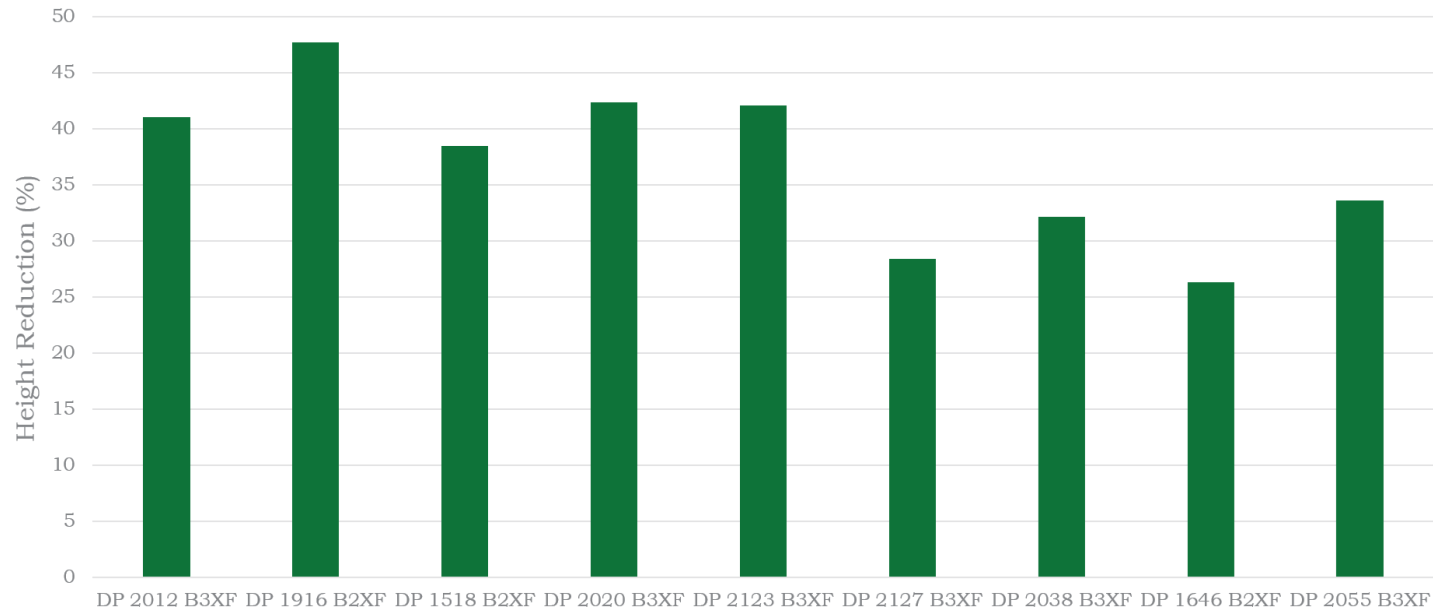
2020 AVERAGE COTTON YIELD BY PRODUCT AND PGR REGIME.

- Like 2019, 2020 was not a year where an aggressive PGR approach was needed at the Bayer Learning Center in Scott, Mississippi. This is seen in both the height data and yield results; plots were generally shorter, and the untreated controls had higher yields than historical averages.
- On average across all cotton varieties, both PGR regimes improved yields in this trial by approximately 300 lbs/acre compared to the untreated control.



2020 PERCENT HEIGHT REDUCTION (COMPARED TO UNTREATED CONTROL) OF AGGRESSIVE PGR REGIME ON COTTON PRODUCTS.

- Earlier, more determinate cotton varieties were more sensitive to higher rates and earlier timings of PGR use as measured in percent height reduction. When comparing the untreated control to the aggressive treatments, cotton variety DP 2123 B3XF and earlier demonstrated greater response to PGR rates and timings as measured in height reduction with 42% reduction in height compared to 30% in the later, less determinate varieties (DP 2127 B3XF and later).





A META-ANALYSIS OF COTTON RESPONSE TO PLANT GROWTH REGULATORS AT THE BAYER LEARNING CENTER AT SCOTT, MS FROM 2011 THROUGH 2021

BAYER LEARNING CENTER
SCOTT, MISSISSIPPI
2011 THROUGH 2021



RESEARCH SITE DETAILS

Location	Soil Type	Previous Crop	Tillage Type	Planting Date	Harvest Date	Potential Yield (lbs/acre)	Seeding Rate (lbs/acre)
Scott, MS	Commerce/Forestdale silt loam	Corn	Conventional	May 1 or later	Vary	1900	41,000 to 45,000

- A total of 10 to 18 Deltapine® brand cotton products were tested each season.
- These studies were set up to encourage excessive vegetative growth due to strong background fertility levels, the previous corn crop, irrigation, and relatively high rates of nitrogen fertility (100 to 120 lb/acre of actual nitrogen soil applied as 32% liquid N).
- All agronomic inputs (weed control, insect control and irrigation) were per local standards for each treatment.
- There was no PGR trial in 2014 and no passive regime in the 2012 trial.

RESEARCH SITE DETAILS

- All PGR plots were treated with labeled but varying rates and application timings of currently available mepiquat chloride (standard 4.2% formulation). These application rates and timings were used to separate differences in Deltapine® brand cotton variety responses and not necessarily to provide specific guidance on PGR management for an individual field, farm, or variety.
- Application regimes (Table 1) included:
 - Untreated with PGR
 - Passive Treatments – represents relatively lower rate/later timing
 - Aggressive Treatments – Applied at labeled timings and within the max product use per season 48 ounces /acre.
- The various treatments are used to separate possible differences in varietal response not necessarily to provide specific guidance specific.

Regime	Treatment	Number of Cotton Nodes at PGR application	PGR Rate (ounces/acre)
PASS	1	10 - 12	8 - 10
	2	15 - 17	10 - 12
	3	20 - 21	16
AGG	1	8 - 9	16
	2	12 - 13	16
	3	15 - 16	16

Table 1. Passive and aggressive PGR treatment rates and application timings.

UNDERSTANDING THE RESULTS – PLANT HEIGHT

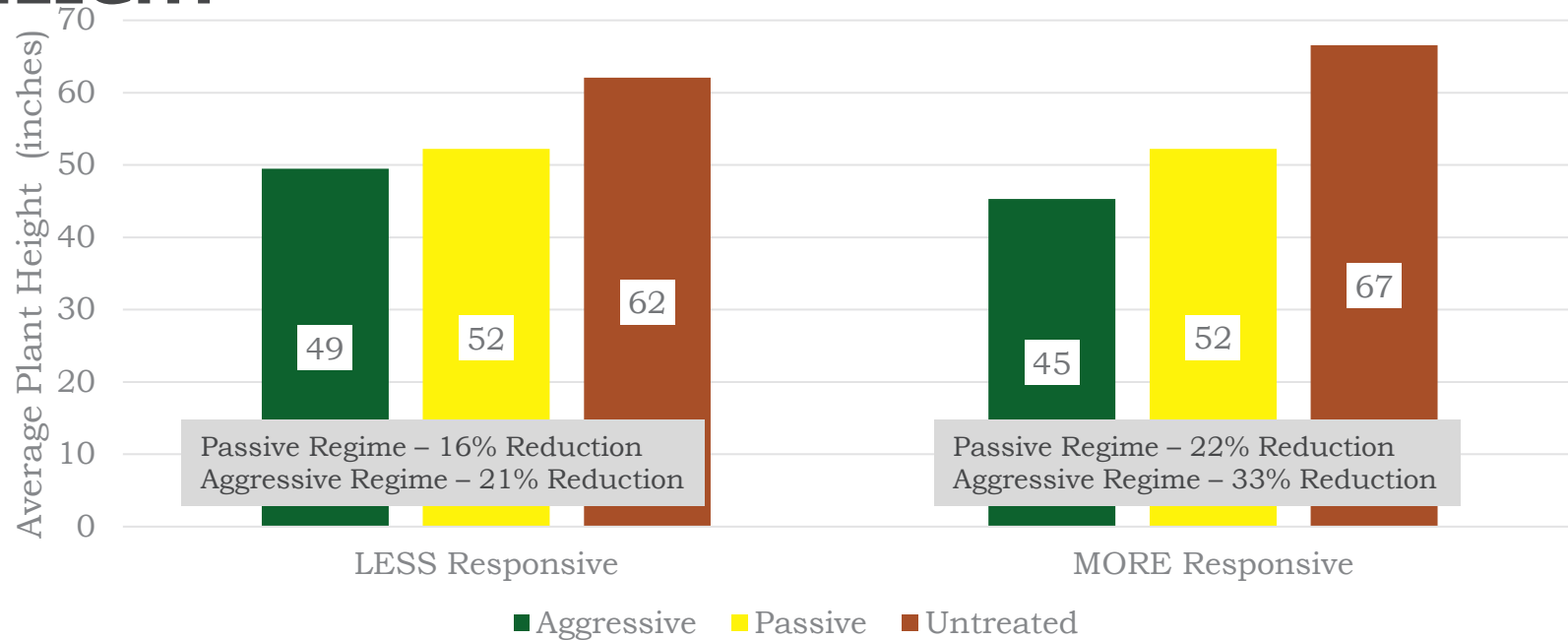


Figure 1A. Average cotton plant height by PGR regime from 2011 through 2021.

UNDERSTANDING THE RESULTS – AVERAGE YIELD

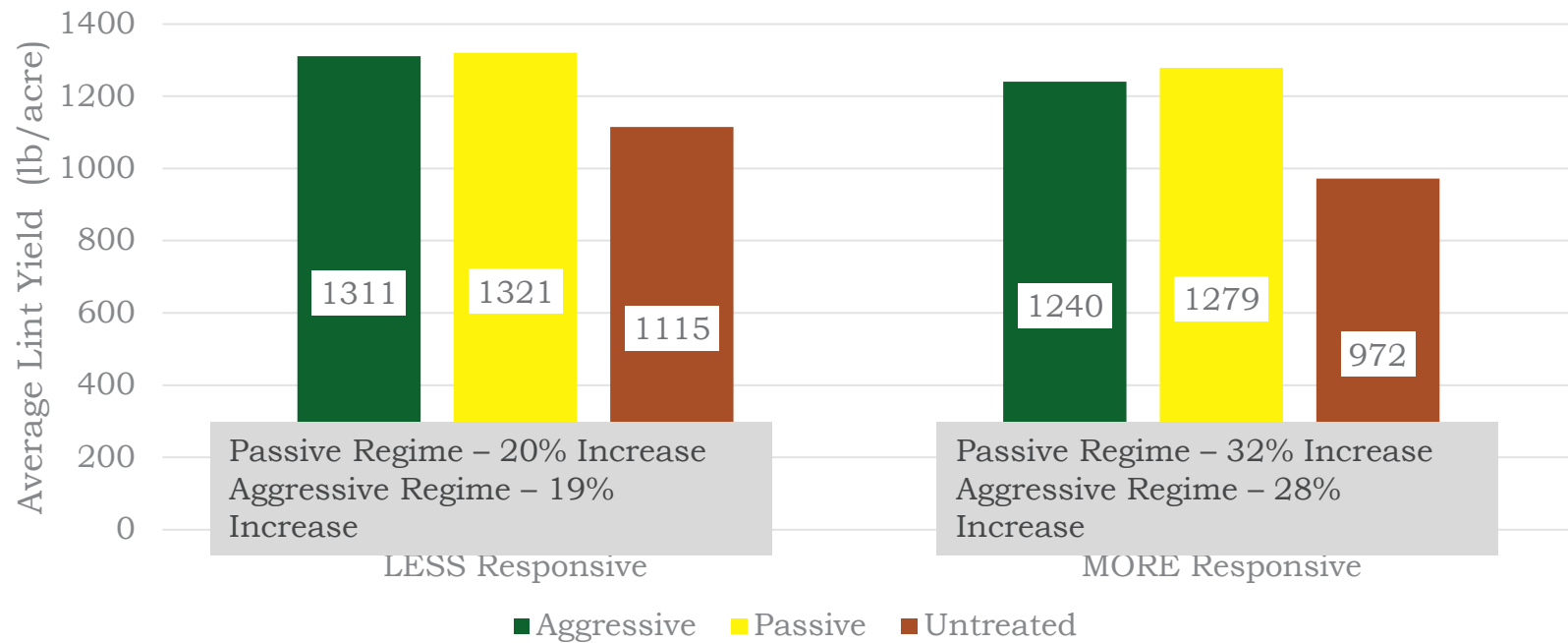


Figure 1B. Average cotton yield by PGR regime from 2011 through 2021.

UNDERSTANDING THE RESULTS – REGRESSION

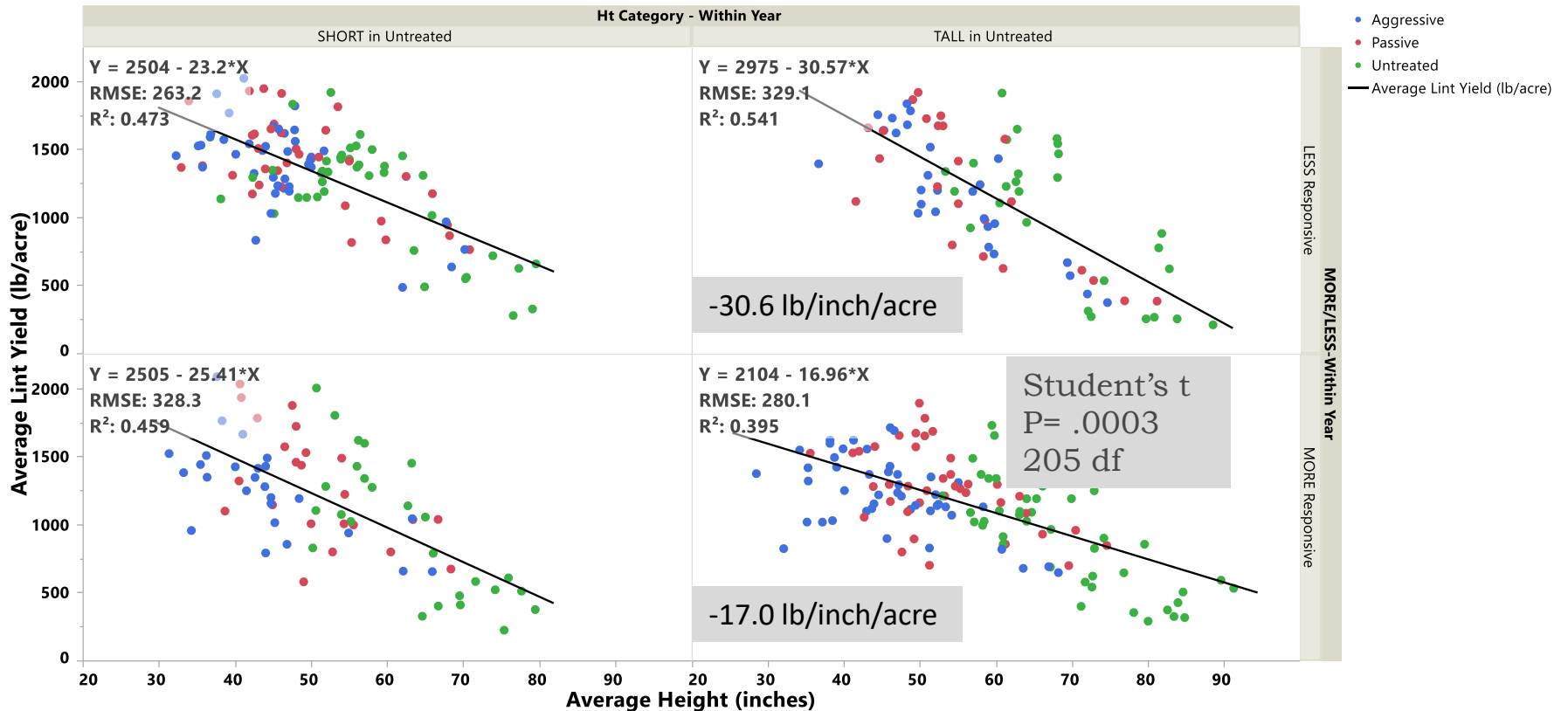


Figure 4B. Linear regression of average lint yield versus average height in Less Responsive and More Responsive Deltapine® cotton varieties from 2011 through 2021 at the Scott Learning Center. (Student t-test was significant at $P=0.0003$).

UNDERSTANDING THE RESULTS – REGRESSION

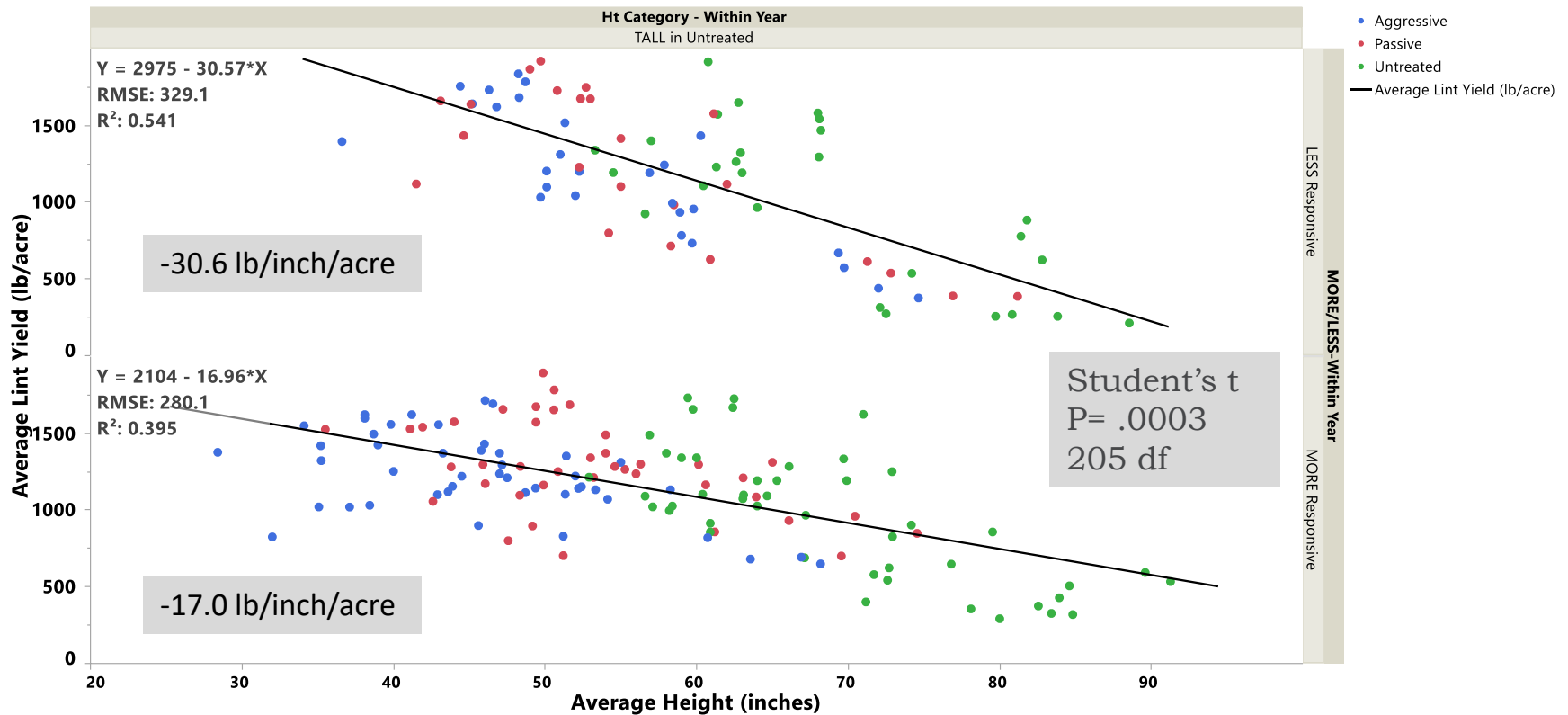


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UNDERSTANDING THE RESULTS - REGRESSION

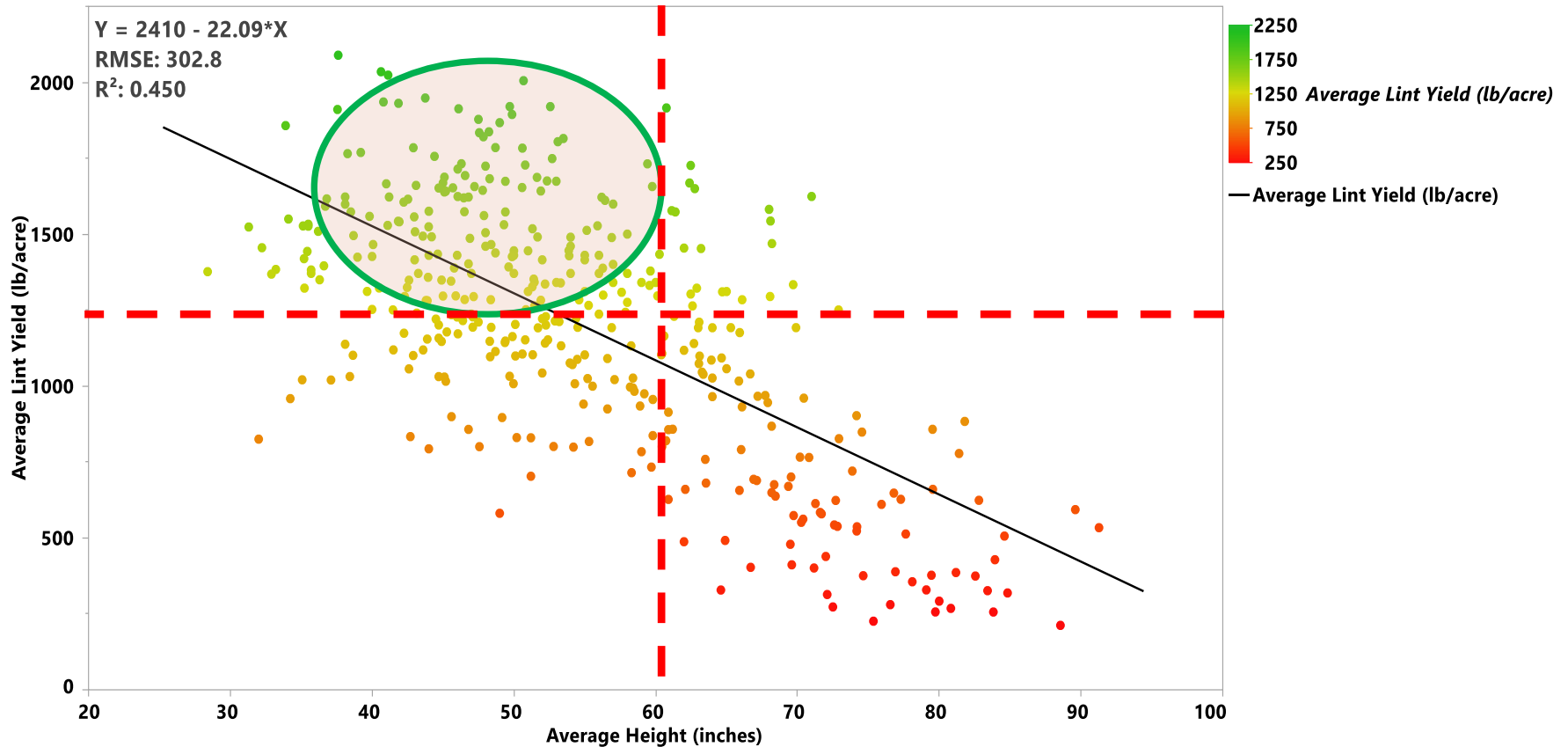


Figure 6. Linear regression of average lint yield versus average height of Deltapine® cotton varieties from 2011 through 2021 at the Scott Learning Center.

ROW CONFIGURATIONS IN COTTON PRODUCTION

SCOTT LEARNING CENTER



RESEARCH SITE DETAILS

Location	Soil Type	Previous Crop	Tillage Type	Planting Date	Harvest Date	Potential Yield (lb/acre)	Seeding Rate (seeds/acre)
Scott, MS	Commerce silt loam	Corn	Conventional	5/30/19	10/22/19	2000	30K, 40K, 50K

Two Deltapine® cotton varieties,

- DP 1646 B2XF and
- DP 1845 B3XF

were planted in three different row configurations:

- solid planted 38-inch rows
- 38-inch 2:1 skip row, and
- 38-inch 1:1 skip row (equivalent to 76-inch solid row spacing).



Figure 1. DP 1646 B2XF planted in 2:1 38-inch rows (left) and 76-inch row spacing (right) at 40,000 seeds/acre.

ROW CONFIGURATIONS IN COTTON PRODUCTION

UNDERSTANDING THE RESULTS

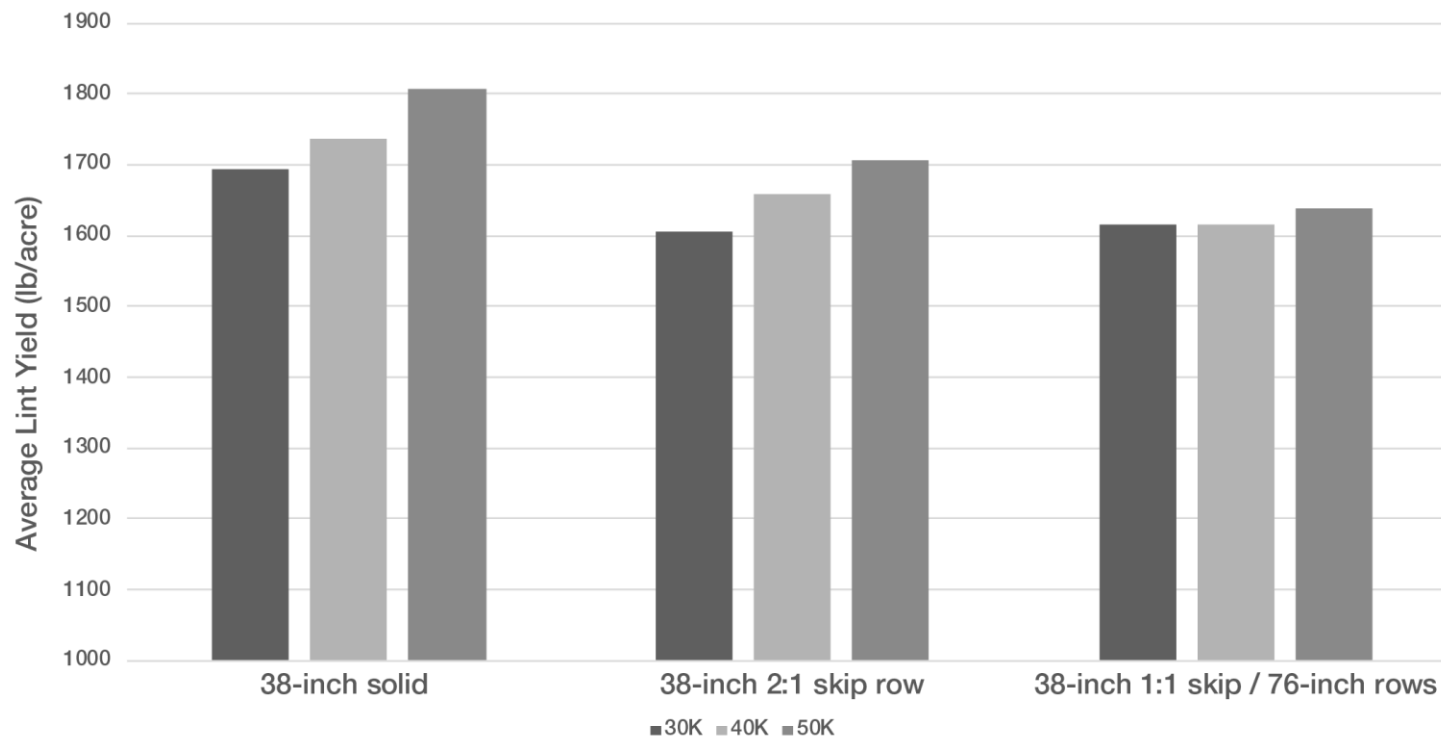


Figure 2. Average lint yield (lb/acre) across varieties tested by row configuration and seeding rate.



UNDERSTANDING THE RESULTS

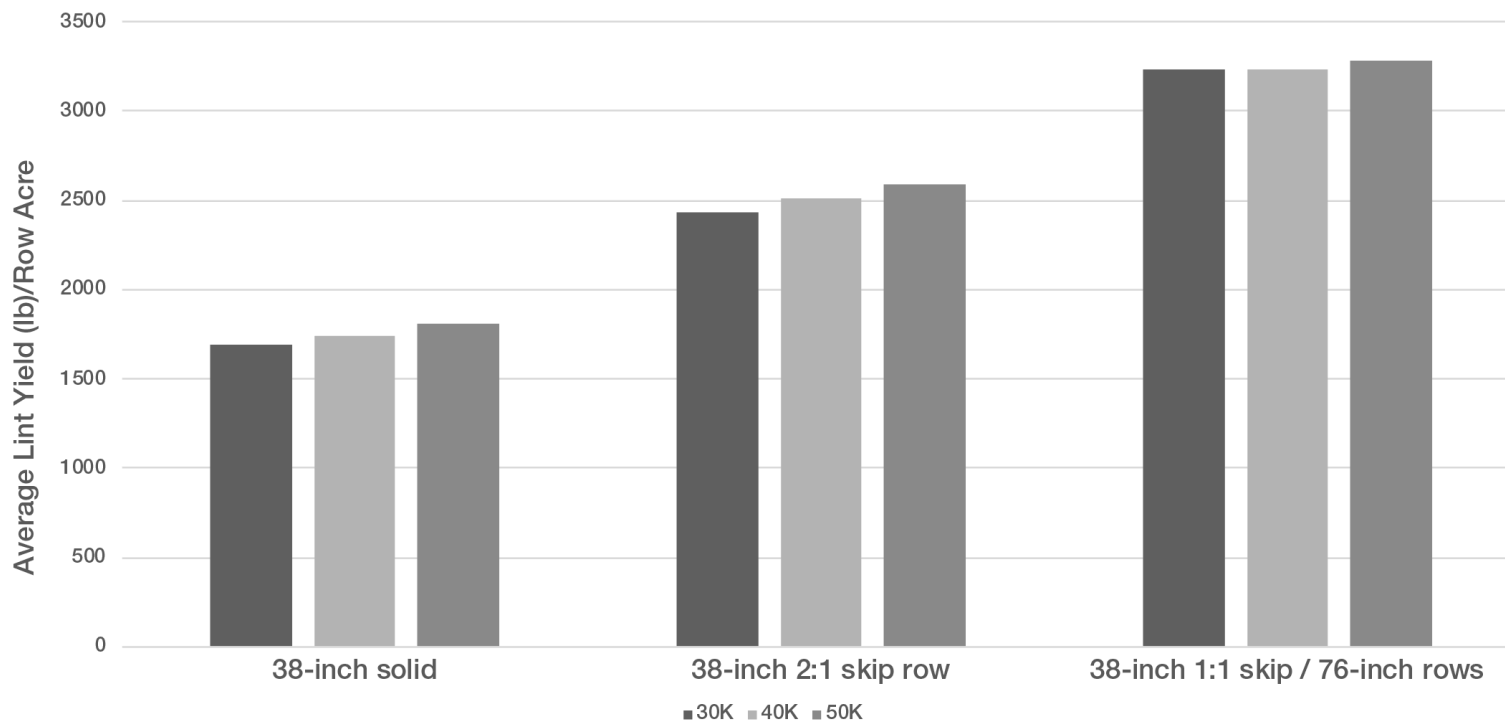
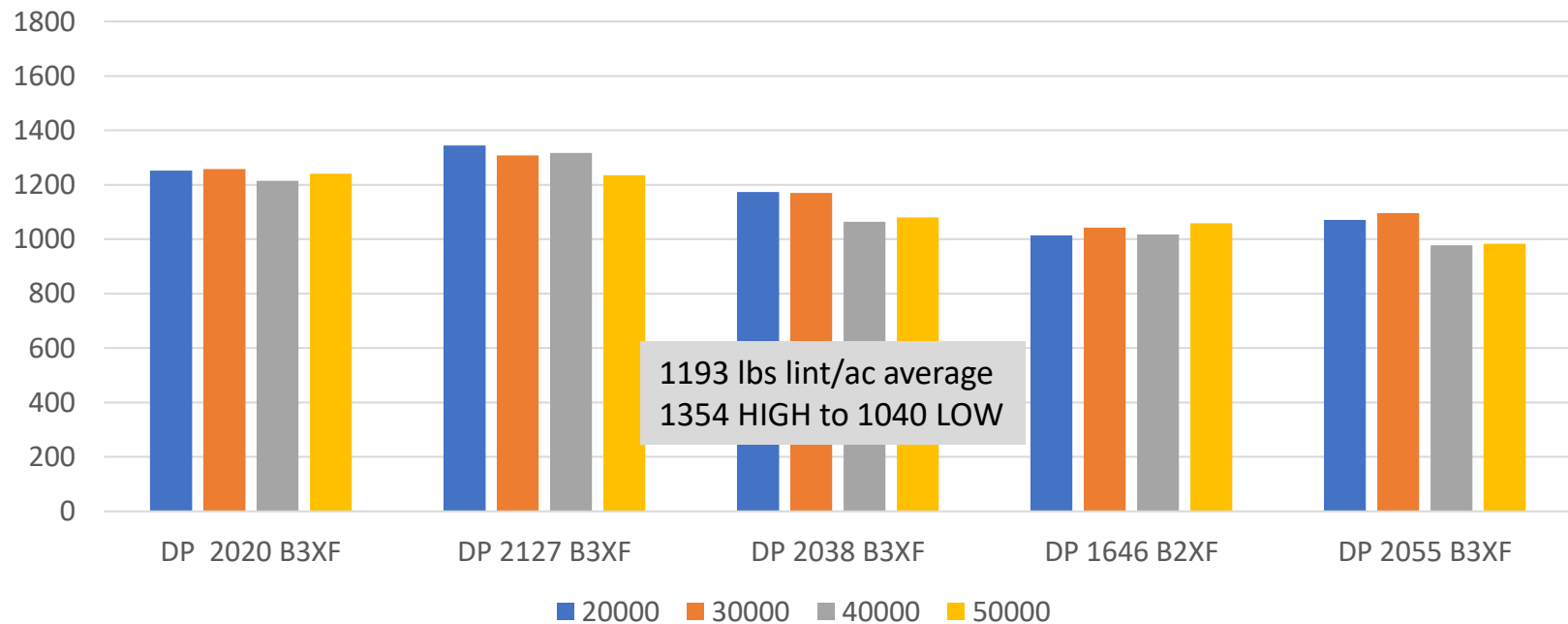


Figure 3. Average lint yield on a per row acre basis across varieties tested by row configuration and seeding rate.

2021 Result

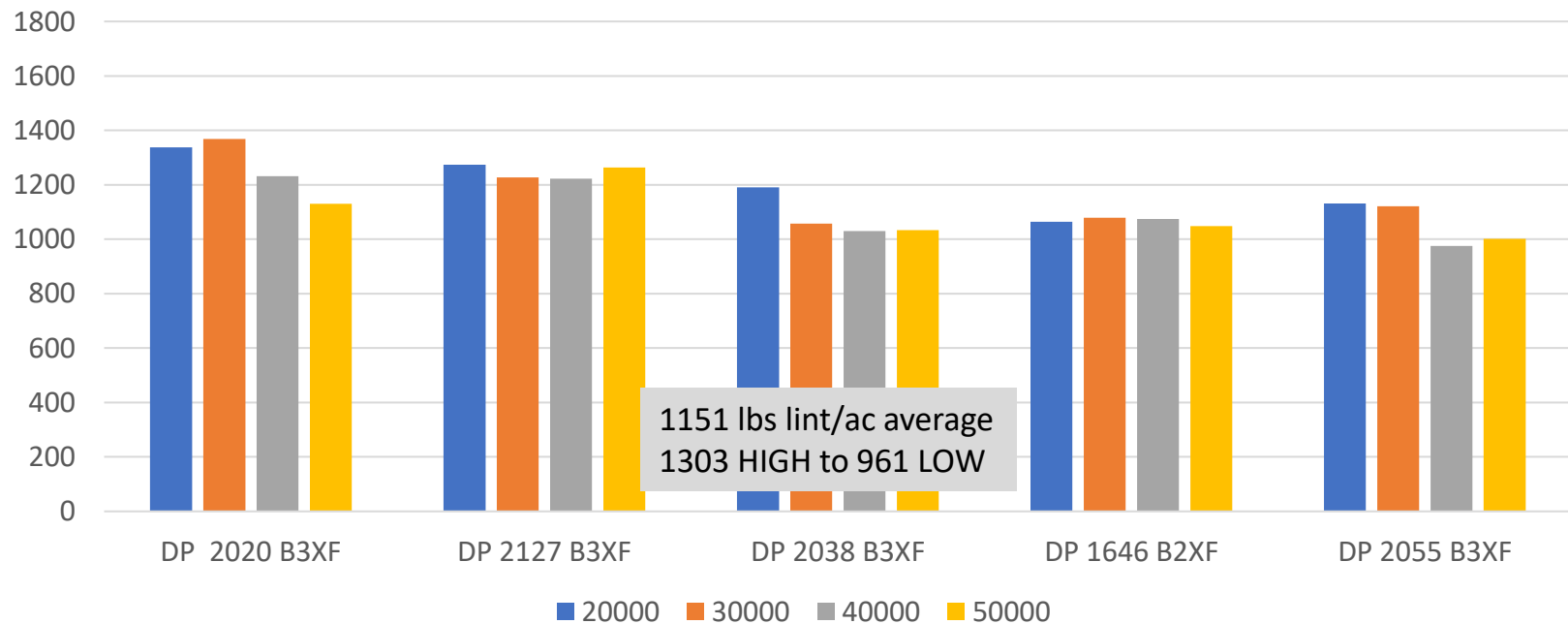


2:1 38" – 2021 PRELIMINARY RESULT SLC – FIELDS D5/D4



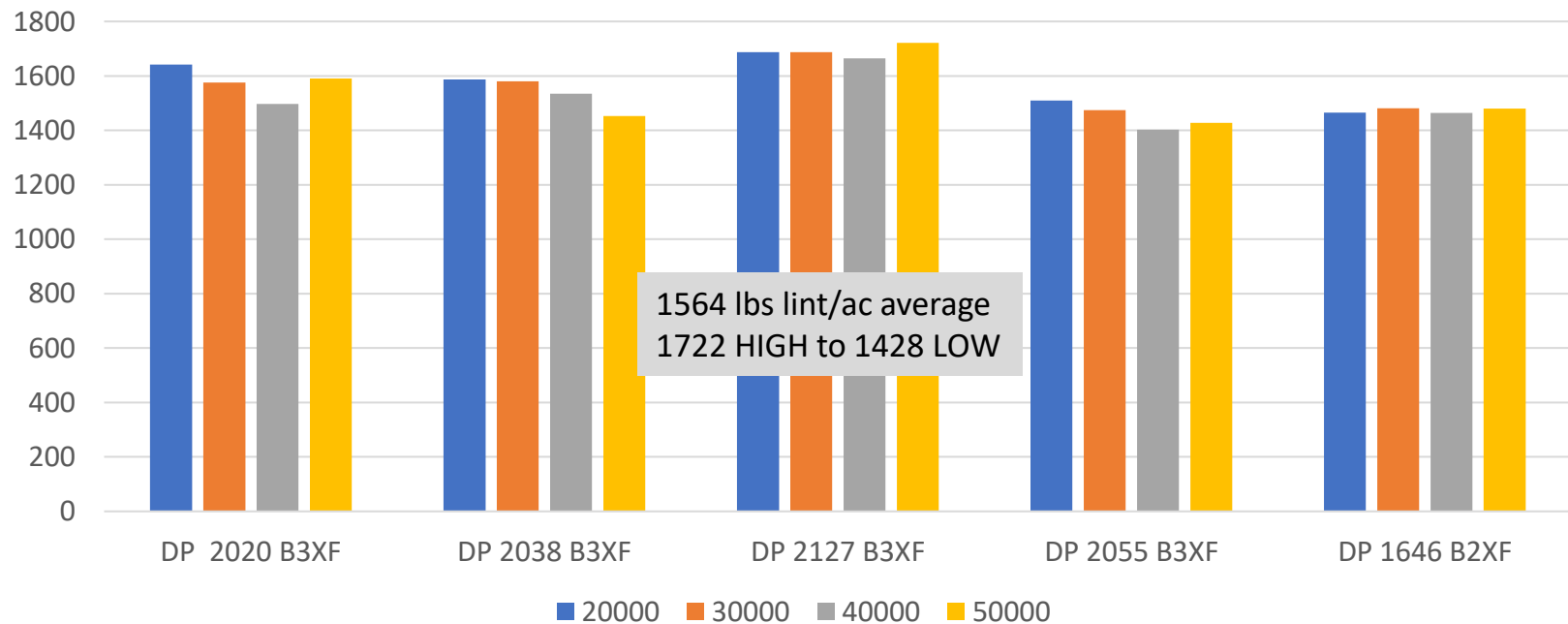
76" – 2021 PRELIMINARY RESULT

SLC – FIELDS D5/D4



Solid – 2021 PRELIMINARY RESULT

SLC – FIELDS D5/D4





RESULTS & DISCUSSION





BOLL LOCULE EVALUATIONS - 2021



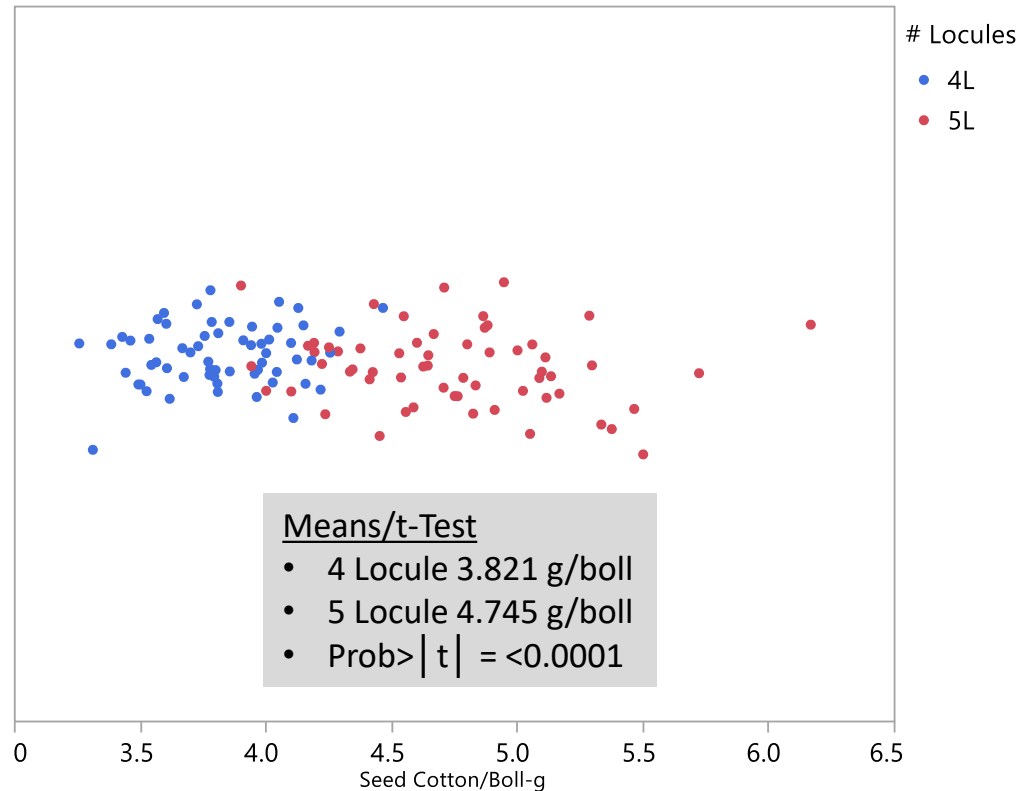




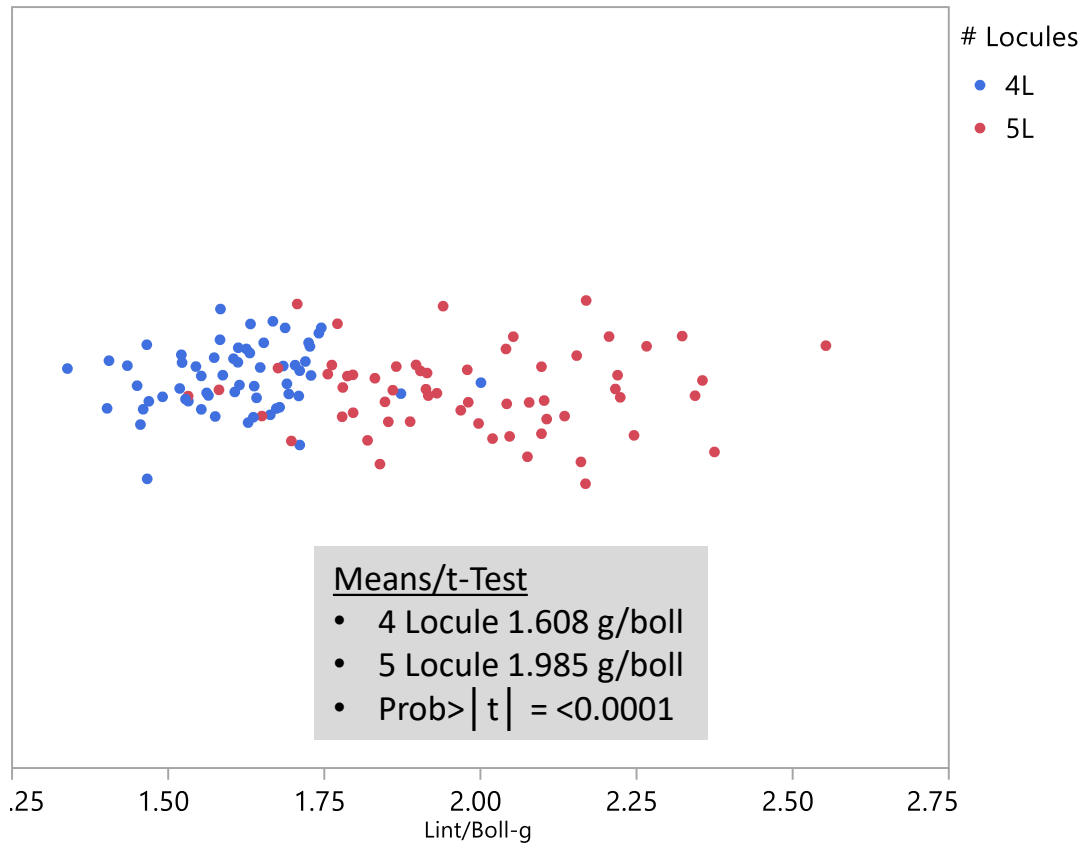
- A total of 11633 bolls were mapped, categorized, delinted and counted from the plots.
 - 10105 – 4 locule – 86.4%
 - 1528 – 5 locule – 13.4%



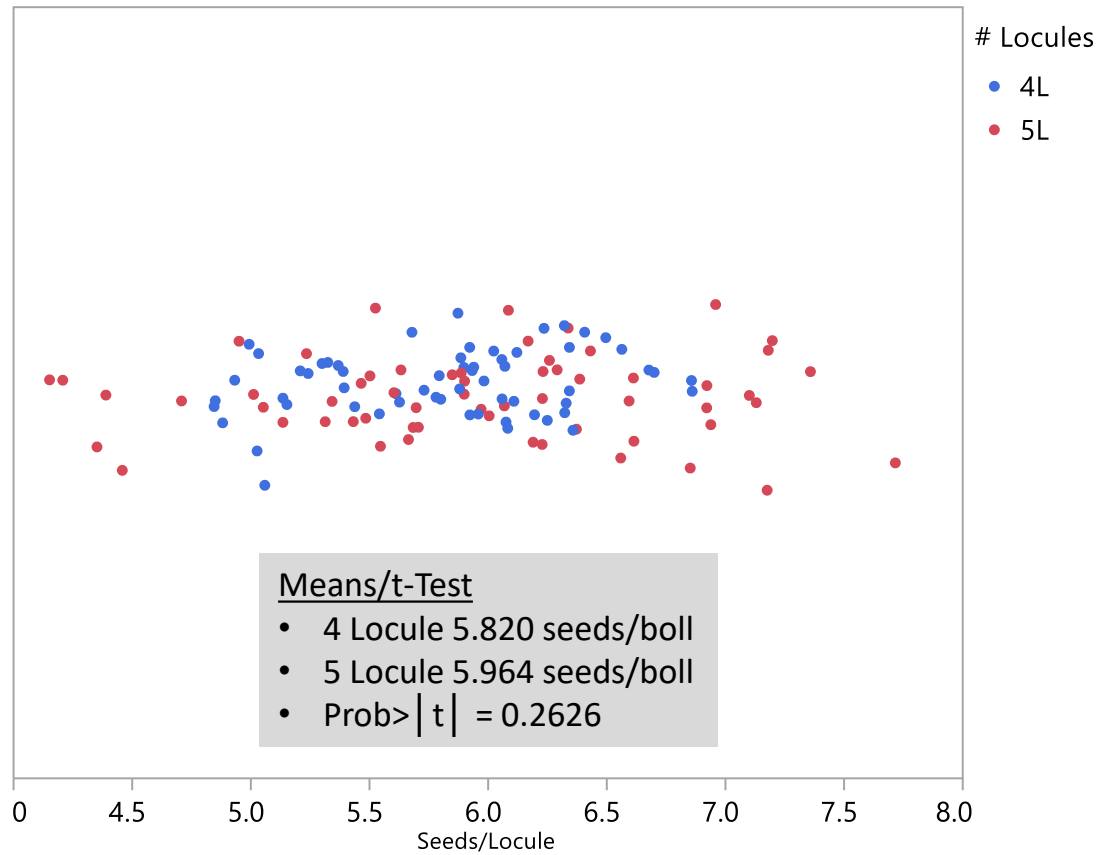
Seed Cotton/Boll-grams 60 samples per cohort



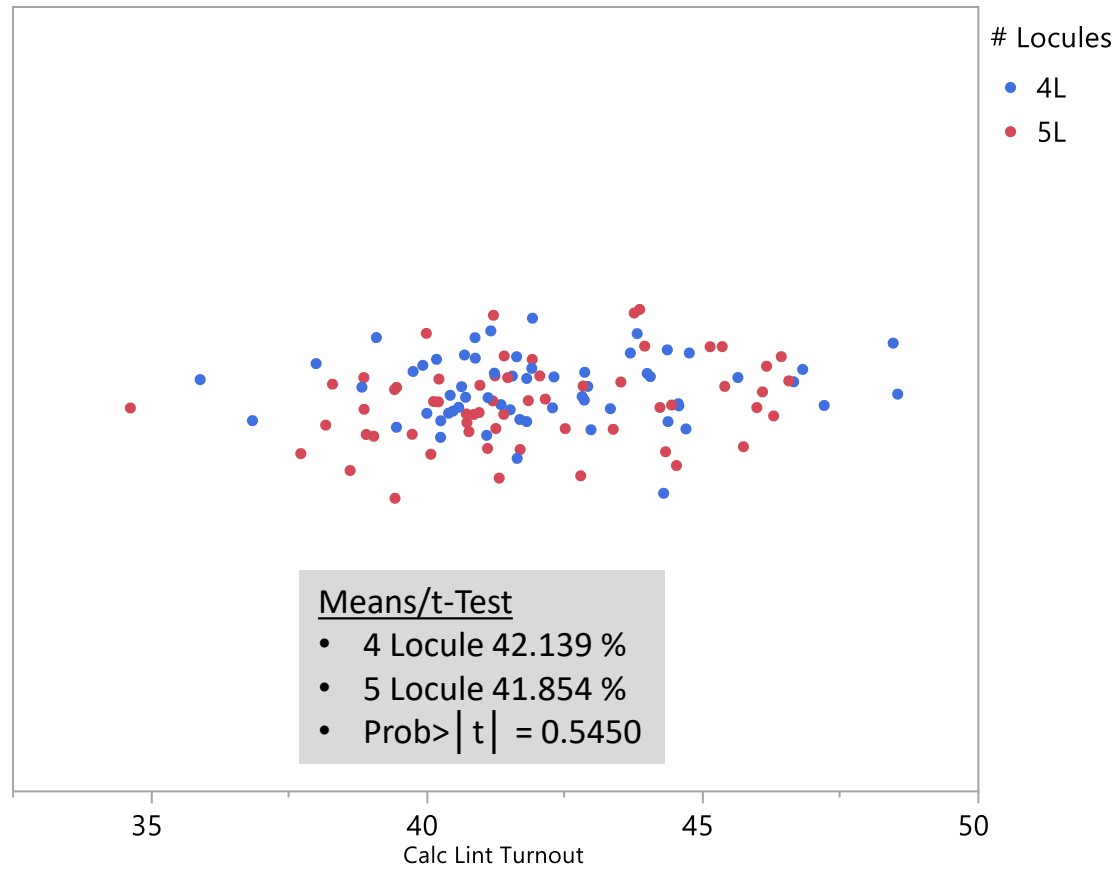
Lint/Boll-g



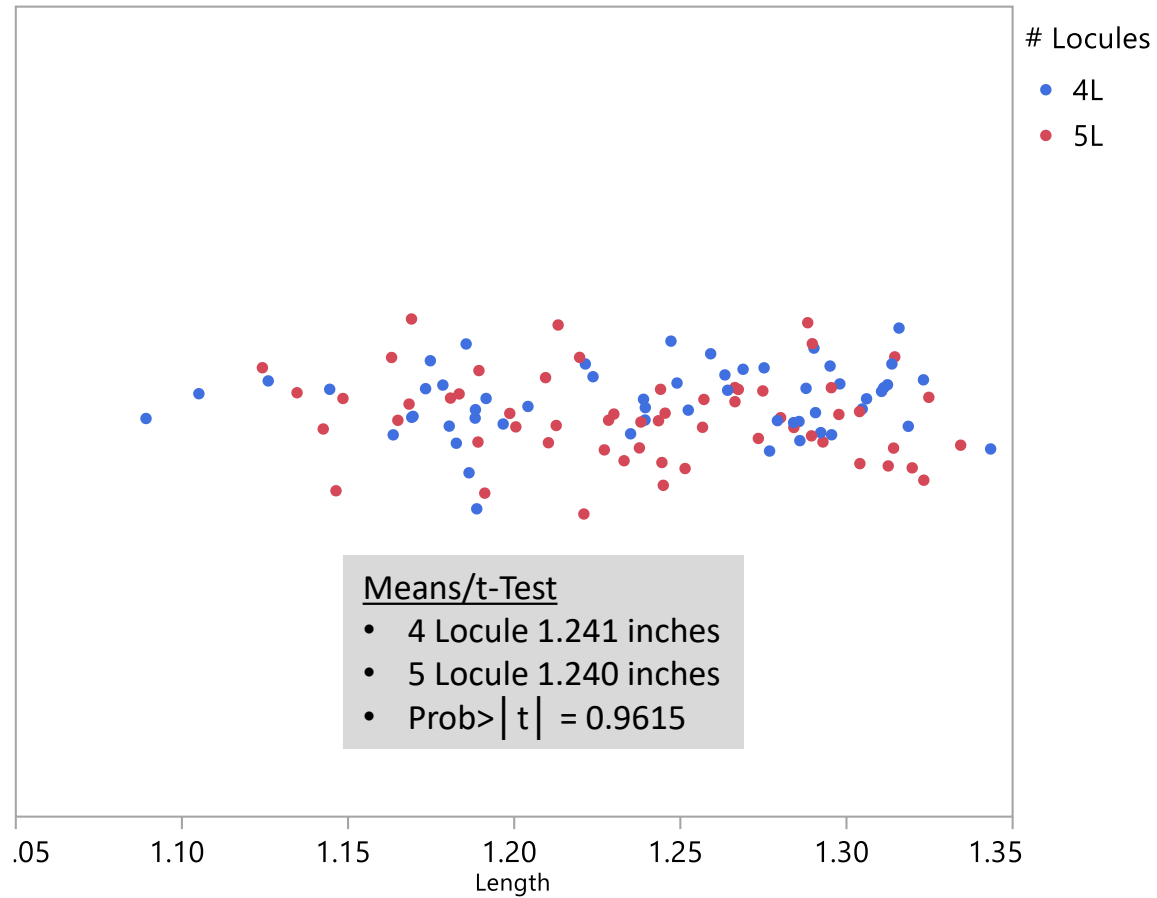
Seeds/Locule



Calc Lint Turnout



Length





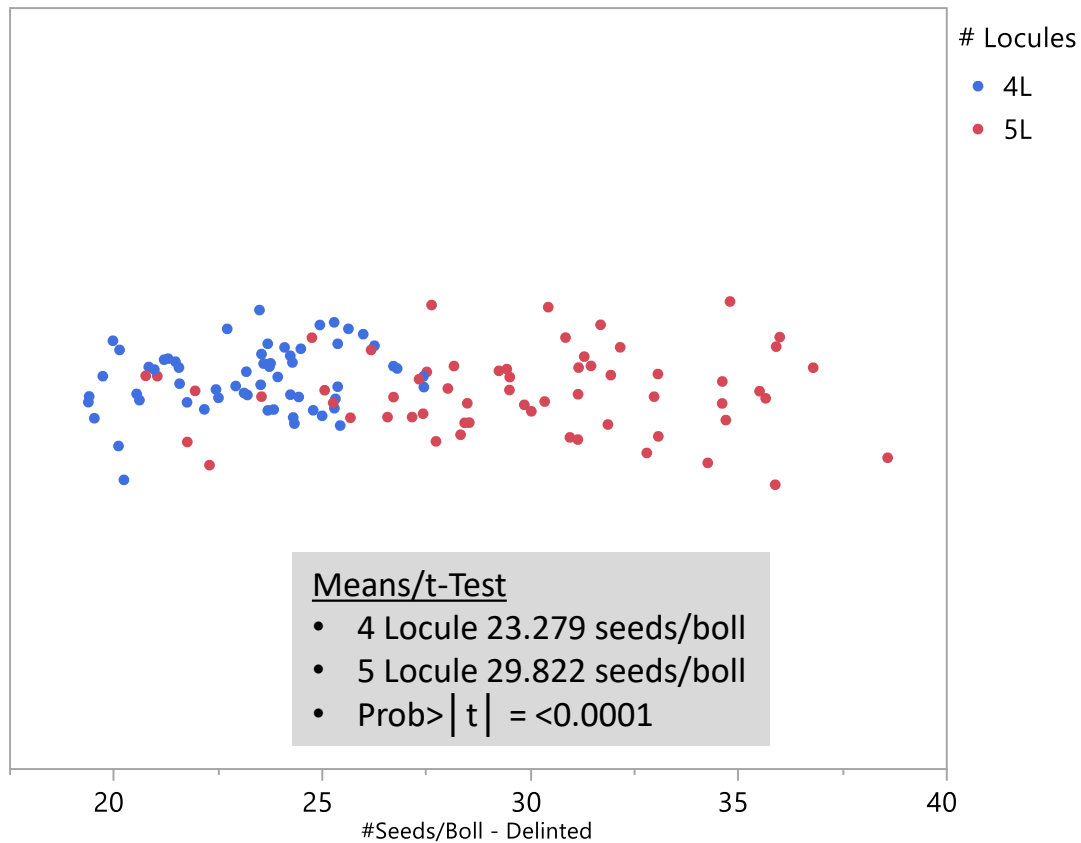
Thank you!



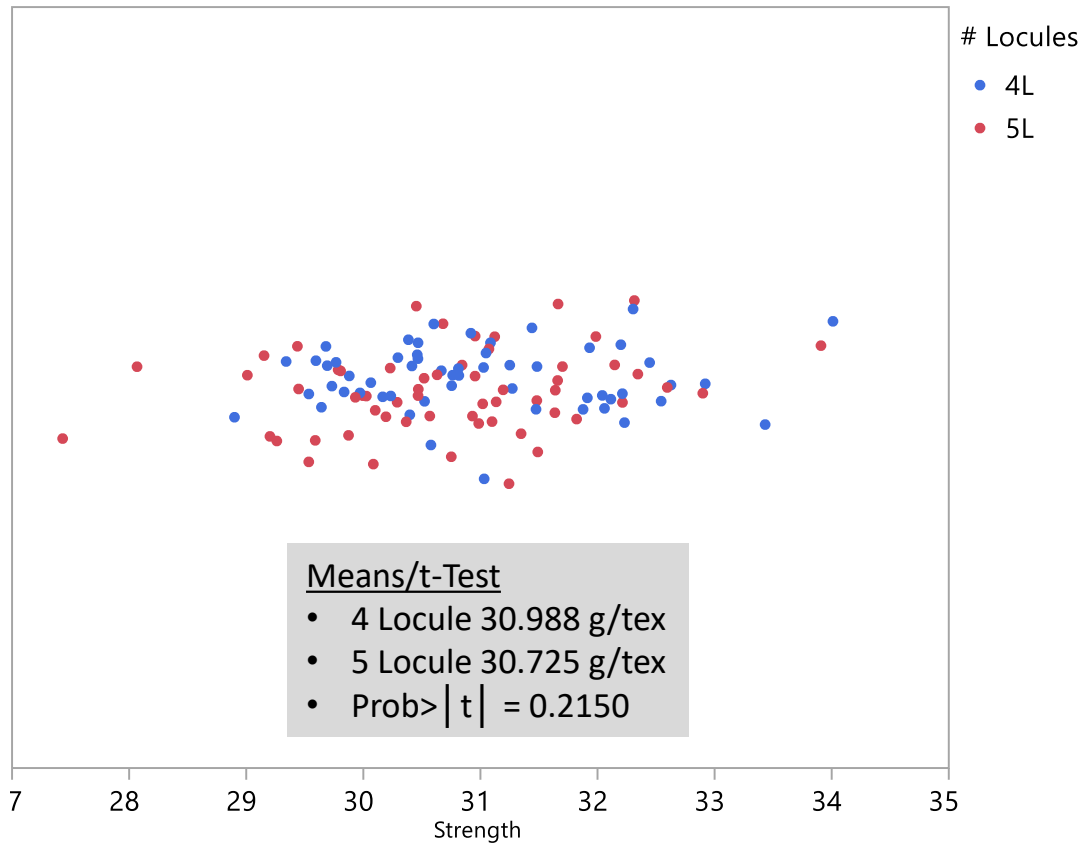
Scott Learning Center



#Seeds/Boll - Delinted



Strength



Micronaire

