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Cotton and Agronomy Overview

Water Supply – Vegetative

- Vegetative – shortage/excess: inhibited root growth and soil profile access, can result in reduced uptake of water and nutrients

- Vegetative – optimal: adequate water to prevent water stress, allow for root development and timely progress to squaring

Water Supply - Squaring

- Squaring – shortage: reduction in square retention and development, can delay onset of flowering
- Squaring – excess: increased square formation and aboveground vegetative growth; too much plant/fruit for plant (roots) to support
- Squaring – optimal: some square shed prior to first bloom is acceptable, ≥ 80% retention, higher with later planting dates

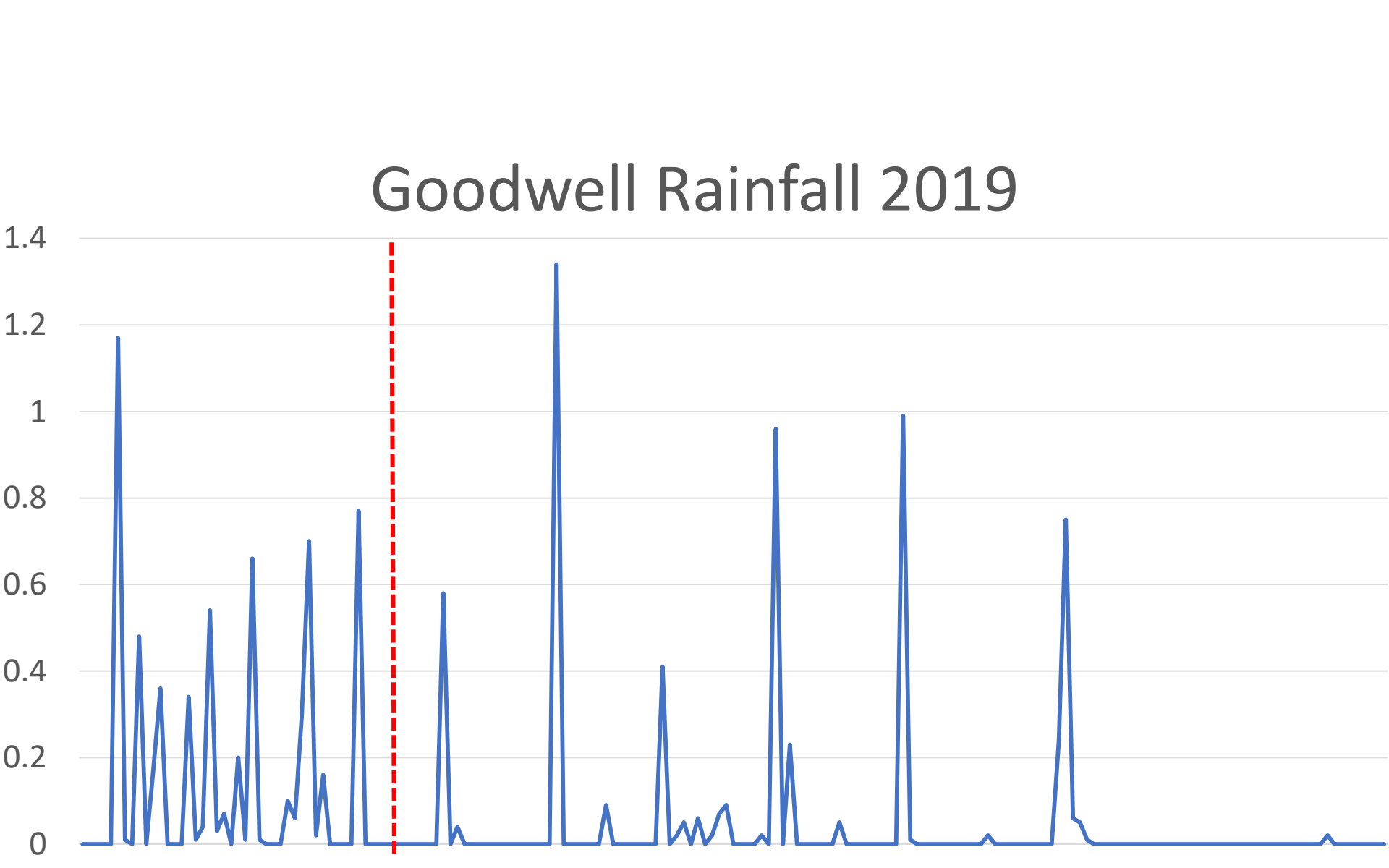
Water Supply - Flowering

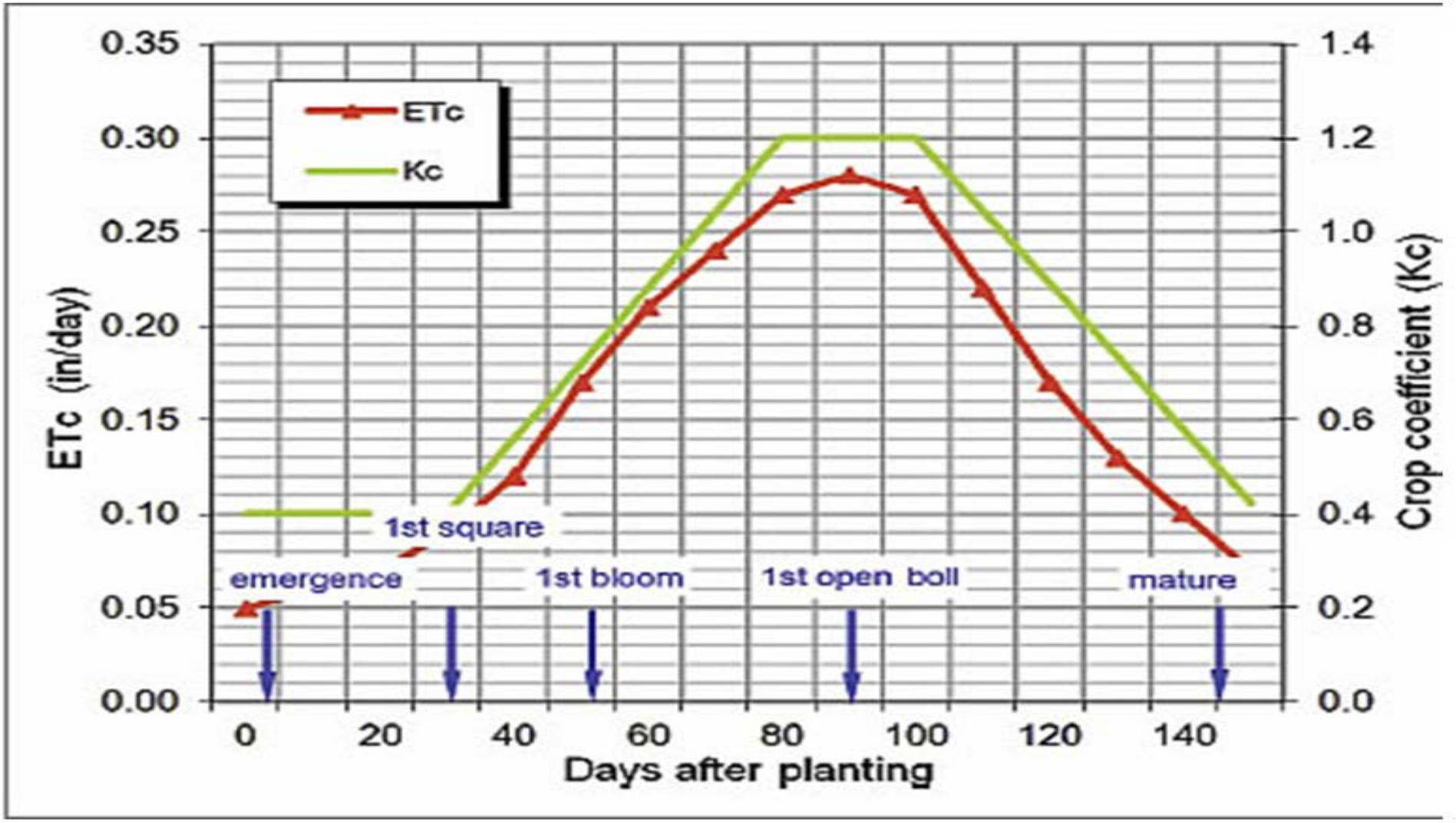
- Flowering – shortage: fruit shed, delayed fruit development and maturity, reduced yield
- Flowering – excess: excess vegetative growth, delayed maturity (heat unit accumulation), immature fiber
- Flower – optimal: matches bell shaped curve to meet demand but avoid stress and excess

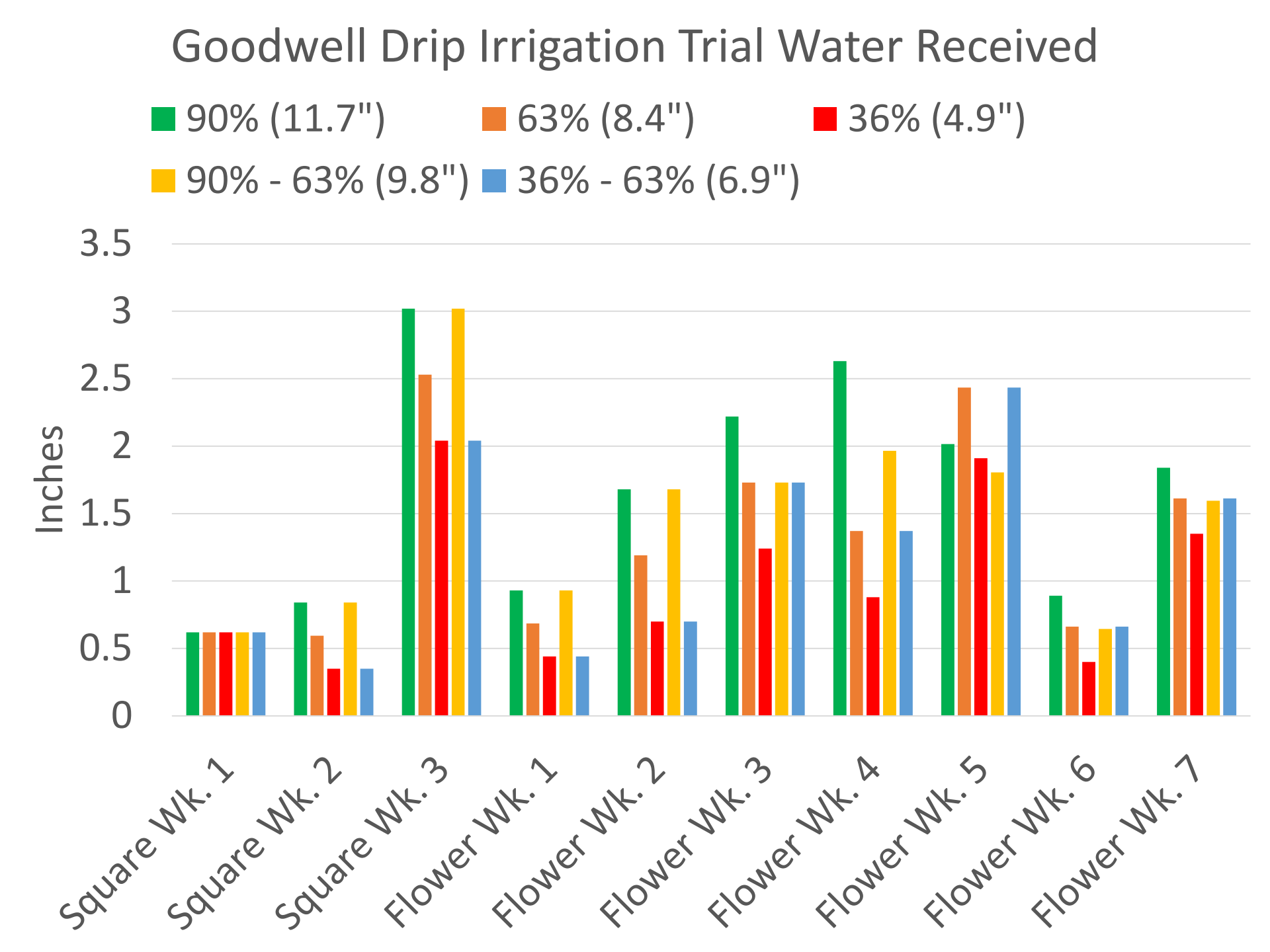
Current Irrigation Research

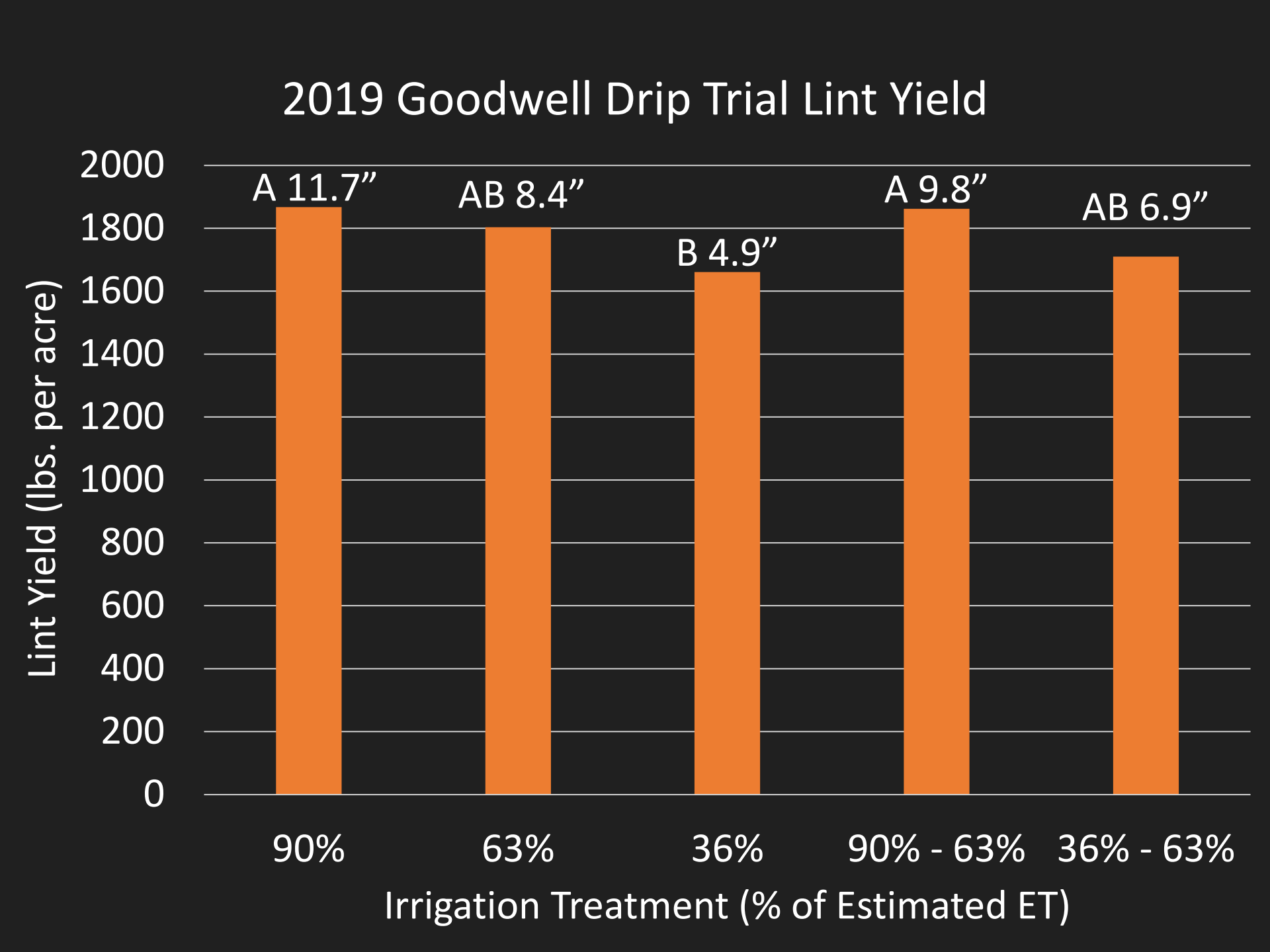
- Identified that ET was likely being overestimated
- Cotton planted May 15th; irrigation initiated on July 10th (mid-squaring), terminated Sept. 6th

- Schedules utilized in 2019:
- 90% of ET
- 63% of ET
- 36% of ET
- 90% of ET during squaring, 63% during flowering
- 36% of ET during squaring, 63% during flowering
- Seasonal rainfall = 11.5”


Goodwell Rainfall 2019
1.4
1.2
1
0.8
0.6
0.4
0.2
0
5/15/2019
6/15/2019
7/15/2019
8/15/2019
9/15/2019
10/15/2019
11/15/

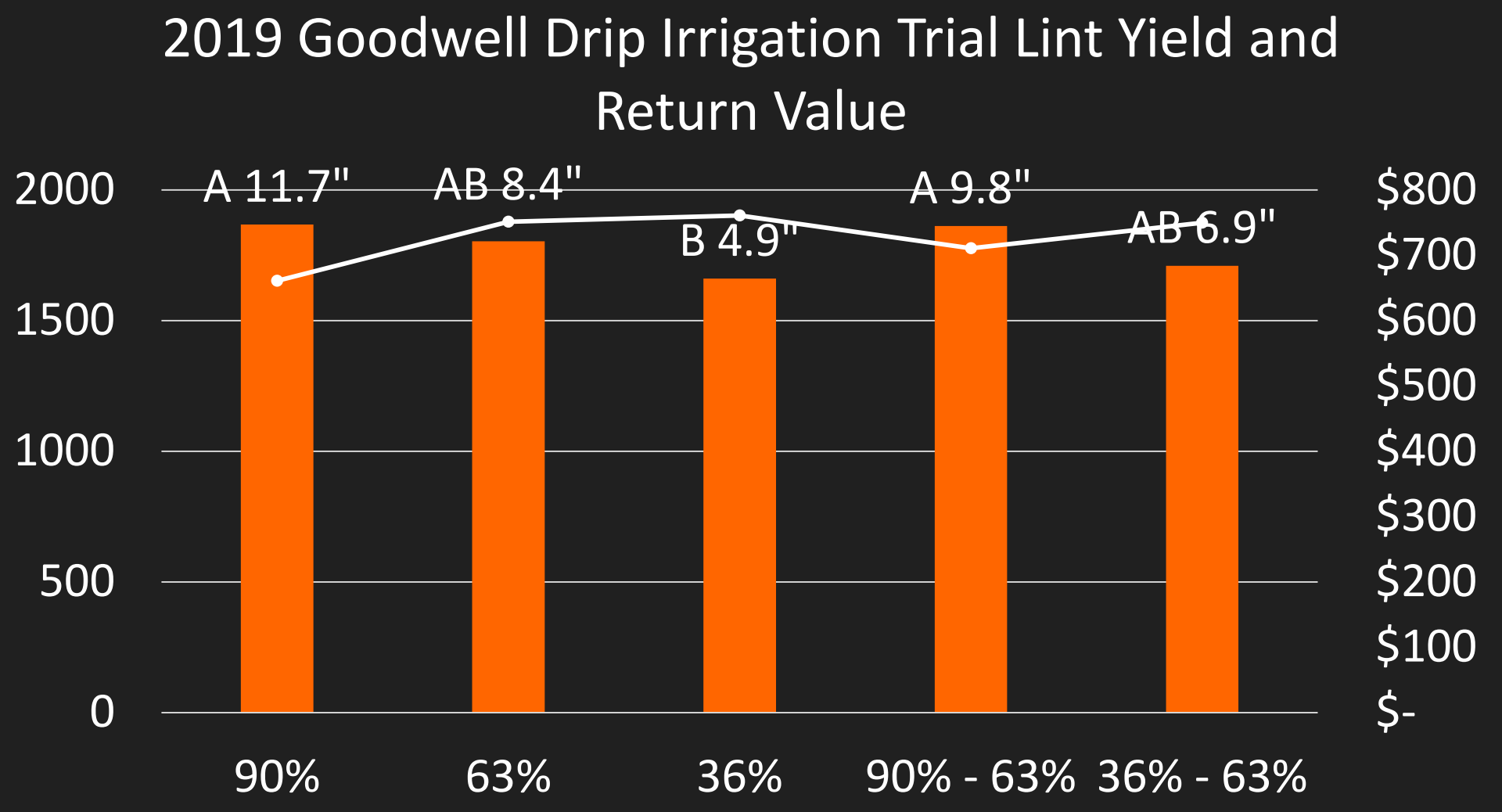

ETc
Kc
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
ETc (in/day)
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
Crop coefficient (Kc)
1st square
emergence
1st bloom
1st open boll
mature
0
20
40
60
80
100
120
140
Days after planting


Goodwell Drip Irrigation Trial Water Received
90% (11.7")
63% (8.4")
36% (4.9")
90% - 63% (9.8")
36% - 63% (6.9")
Inches
3.5
3
2.5
2
1.5
1
0.5
0
Square Wk. 1
Square Wk. 2
Square Wk. 3
Flower Wk. 1
Flower Wk. 2
Flower Wk. 3
Flower Wk. 4
Flower Wk. 5
Flower Wk. 6
Flower Wk. 7


2019 Goodwell Drip Trial Lint Yield
Lint Yield (lbs. per acre)
2000
1800
1600
1400
1200
1000
800
600
400
200
0
A 11.7”
AB 8.4”
B 4.9”
A 9.8”
AB 6.9”
90%
63%
36%
90% - 63%
36% - 63%
Irrigation Treatment (% of Estimated ET)

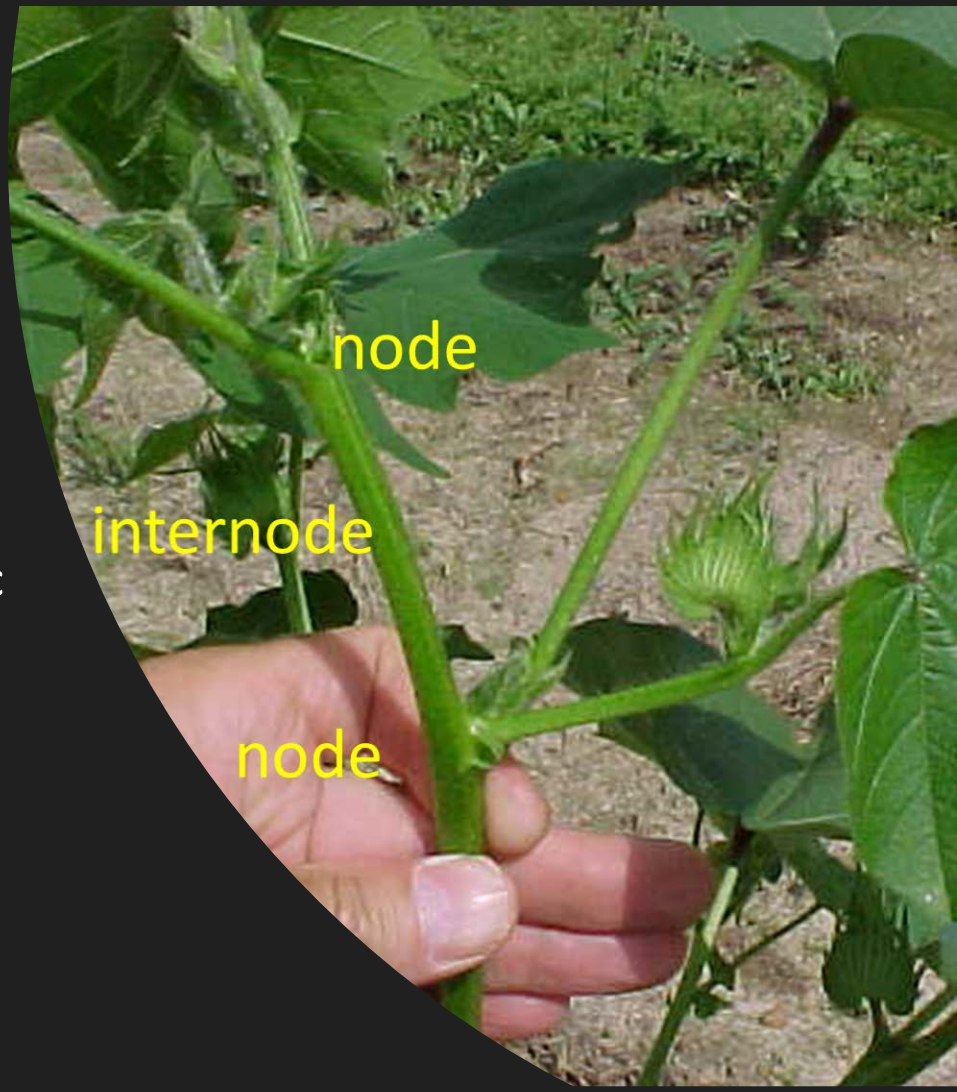
2019 Goodwell Drip Irrigation Trial Quality and Value

Variety	Mic	Staple	Uniformity (%)	Strength (g/tex)	Loan Value (cents/lb)	Return ($/acre)
PHY 210 W3FE	3.3 a	37.1	83.3 a	31.6 a	49.12 a	$756
PHY 320 W3FE	3.3 a	37.1	83.3 a	30.5 bc	45.25 bc	$723
PHY 350 W3FE	3.4 a	37.1	82.0 b	29.8 c	46.47 ab	$739
PHY 400 W3FE	3.1 b	37.1	81.6 b	30.7 b	43.33 c	$689
Irrigation						
90%	2.8 c	37.8 a	82.2	29.6 b	40.21 c	$661
63%	3.3 b	37.4 ab	82.8	30.7 a	46.88 b	$751
36%	3.8 a	36.5 c	82.8	31.1 a	51.36 a	$761
90% - 63%	3.0 c	37.4 a	82.8	31.2 a	42.90 c	$711
36% - 63%	3.5 b	36.8 bc	82.2	30.6 a	48.85 ab	$750
CV	13.4410	2.1693	1.5083	3.8078	12.3402	14.2355


2019 Goodwell Drip Irrigation Trial Lint Yield and Return Value
2000
1500
1000
500
0
$800
$700
$600
$500
$400
$300
$200
$100
$-
A 11.7"
AB 8.4"
B 4.9"
A 9.8"
AB 6.9"
90%
63%
36%
90% - 63%
36% - 63%

How do PGRs work?

- How do plants and animals grow?
  - Cell expansion and division
- PGRs reduce the synthesis of Gibberellic Acid (GA)
- GA is responsible for cell expansion
- PGRs inhibit cell expansion = shorten internodes



Situations Where Rank Growth can Occur

- Late maturing variety
- Excess nitrogen
- Excess water (rain and/or irrigation)
- Combination of the 3
- Fruiting gaps/loss

Considerations for PGR Use

EXTENSION

- Bigger plants require higher rates for same effect – diluted by plant growth
- Not permanent – hormonal effect diluted over time and with good growing conditions; sequential applications common
- Can only impact future growth; applications should be based off growth potential not current plant height; slight impact on accelerating cutout
- “Pix effect” – darker green plants post application
  - Inhibits cell expansion in stems AND leaves = thicker leaves = thicker layer of green cells = darker green

PGR Trial Overview

EXTENSION

- Two varieties – DP 1646 B2XF & FM 1830 GLT

- Drip irrigation (30” rows, tape every other row middle).
  - 16” rain + ~6” of irrigation

- Four PGR (mepiquat chloride) application schedules:
  - 1. nontreated
  - 2. 4 oz @ pinhead, EB, EB + 2 wk; 8 oz @ EB + 4 wk (20 oz total)
  - 3. 12 oz @ EB and EB + 4 wk (24 oz total)
  - 4. 24 oz @ EB + 4 wk (24 oz total)

Plant Height (in)	8-leaf	EB	EB + 2 wk.	EB + 4 wk.	EB + 6 wk.
Variety					
DP 1646 B2XF	15.6 a	20.0 a	27.4 a	31.5 a	34.3 a
FM 1830 GLT	14.1 b	17.0 b	22.1 b	27.1 b	28.3 b
Range	*1.5*	*3*	*5.3*	*4.4*	*6*
PGR Treatment					
None	14.6	19.1 a	26.0 a	31.0 a	33.5 a
1 (4, 4, 4, 8)	14.9	17.5 b	24.2 b	27.9 b	28.0 b
2 (0, 12, 0, 12)	14.7	18.8 a	23.9 b	27.7 b	30.4 b
3 (0, 0, 0, 24)	15.1	18.6 a	24.9 ab	30.7 ab	33.4 a
Range	*0.5*	*1.6*	*2.1*	*3.3*	*5.5*

Maturity	Height	NUCB	Total Nodes	% Open
Variety				
DP 1646 B2XF	34.1 a	11.4 b	22.5 a	42.1 b
FM 1830 GLT	26.3 b	12.6 a	20.7 b	62.3 a
Range	*7.8*	*1.2*	*1.8*	*20.2*
PGR Treatment				
None	33.2 a	11.7	22.6 a	47.3
1 (4, 4, 4, 8)	27.5 b	12.1	20.6 b	53.5
2 (0, 12, 0, 12)	27.8 b	12.3	21.0 b	54.5
3 (0, 0, 0, 24)	32.4 a	11.9	22.1 a	53.4
Range	*5.7*	*0.6*	*2*	*7.2*

Panhandle Plant Growth Regulator Demo

EXTENSION

- Treatments: Applications of generic mepiquat chloride applied at early squaring (SQ, pinhead – matchhead square), early bloom (EB), and mid bloom (MB).
  - Treatment 1 – Non-treated check (NTC) **(0 total ounces)**
  - Treatment 2 – 4 oz @ SQ, 8 oz @ EB, and 16 oz @ MB **(28 total ounces)**
  - Treatment 3 – 8 oz @ SQ, 16 oz @ EB, and 24 oz @ MB **(48 total ounces)**
  - Treatment 4 – 0 oz @ SQ, 16 oz @ EB, and 16 oz @ MB **(32 total ounces)**

- In-season measurements taken 9/4/2019, approximately 2 weeks after MB application.

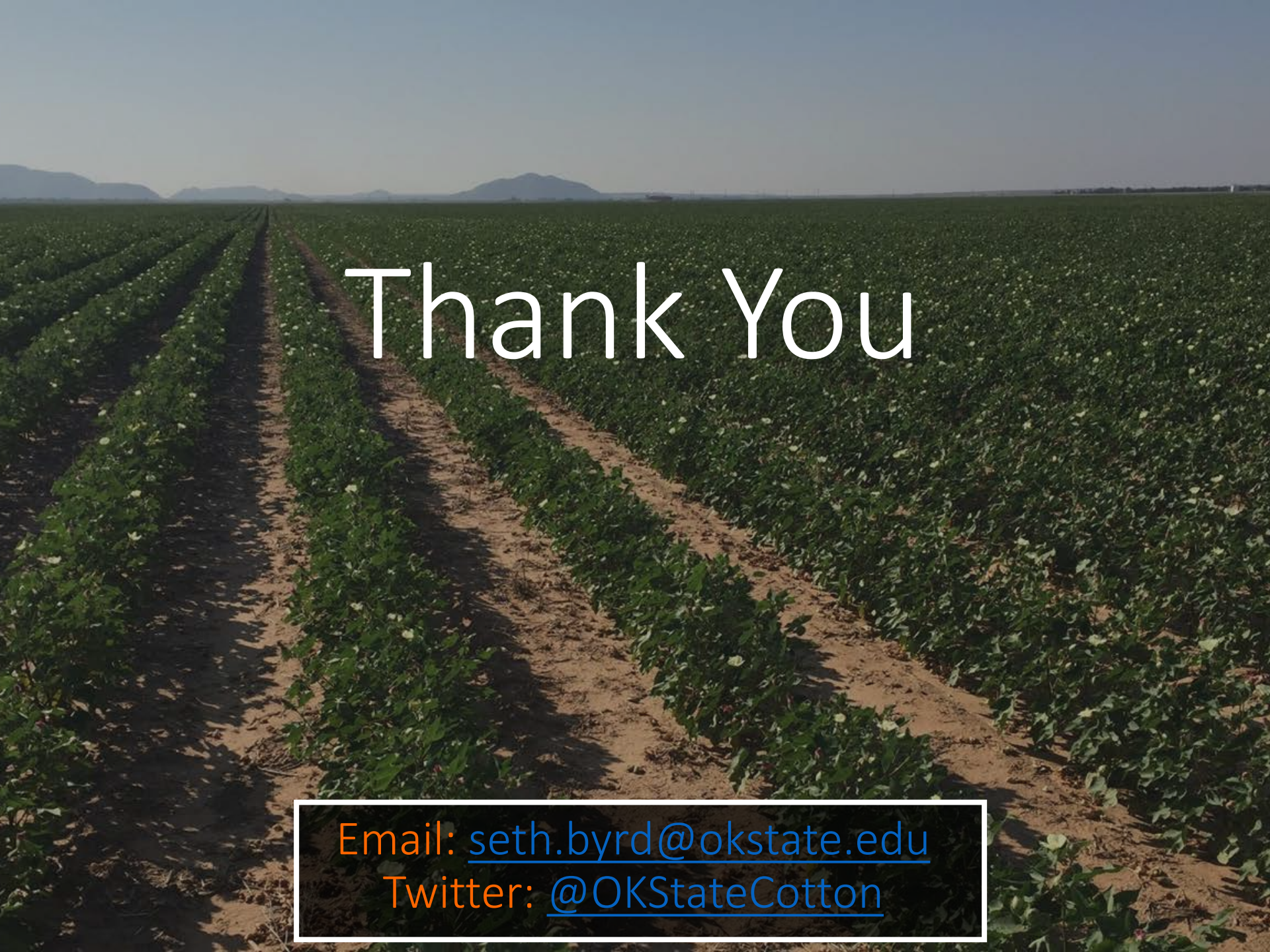
Variety	Height (in)	Total Nodes	H:N	NAWF
PHY 210 W3FE	23.3 c	17.9 ab	1.31 c	2.71
PHY 250 W3FE	23.8 c	17.6 b	1.37 c	2.76
PHY 320 W3FE	27.5 a	18.5 a	1.50 ab	2.94
PHY 350 W3FE	27.8 a	18.4 a	1.52 a	2.78
PHY 400 W3FE	25.7 b	18.0 ab	1.43 b	2.94
PX2C14	26.4 b	18.4 a	1.44 b	2.94
Range	*4.5*	*0.9*	*0.21*	*0.23*

Treatment	Height (in)	Total Nodes	H:N	NAWF
1 (NTC)	25.8 b	18.0	1.44 ab	2.88
2 (4, 8, 16)	25.3 b	18.1	1.40 b	2.83
3 (8, 16, 24)	25.3 b	18.0	1.41 b	2.81
4 (0, 16, 16)	26.7 a	18.4	1.46 a	2.86
Range	*1.4*	*0.4*	*0.06*	*0.07*

Maturity	Height	NUCB	Total Nodes	% Open
Variety				
DP 1646 B2XF	34.1 a	11.4 b	22.5 a	42.1 b
FM 1830 GLT	26.3 b	12.6 a	20.7 b	62.3 a
Range	*7.8*	*1.2*	*1.8*	*20.2*
PGR Treatment				
None	33.2 a	11.7	22.6 a	47.3
1 (4, 4, 4, 8)	27.5 b	12.1	20.6 b	53.5
2 (0, 12, 0, 12)	27.8 b	12.3	21.0 b	54.5
3 (0, 0, 0, 24)	32.4 a	11.9	22.1 a	53.4
Range	*5.7*	*0.6*	*2*	*7.2*

Other Factors that Regulate Growth

- Variety selection – range of maturity classes in cotton will also differ in growth habits/potential
- Fruit retention – cotton is indeterminate but supplying developing flower buds and fruit is priority
- Proper management of nutrients and water – avoid stress and excesses when possible
- All of these are more effective (and cheaper) than applying PGRs. PGR products are very good at inhibiting growth in periods of extremes or excess; maturity managed through variety selection and timeliness of inputs


Thank You
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