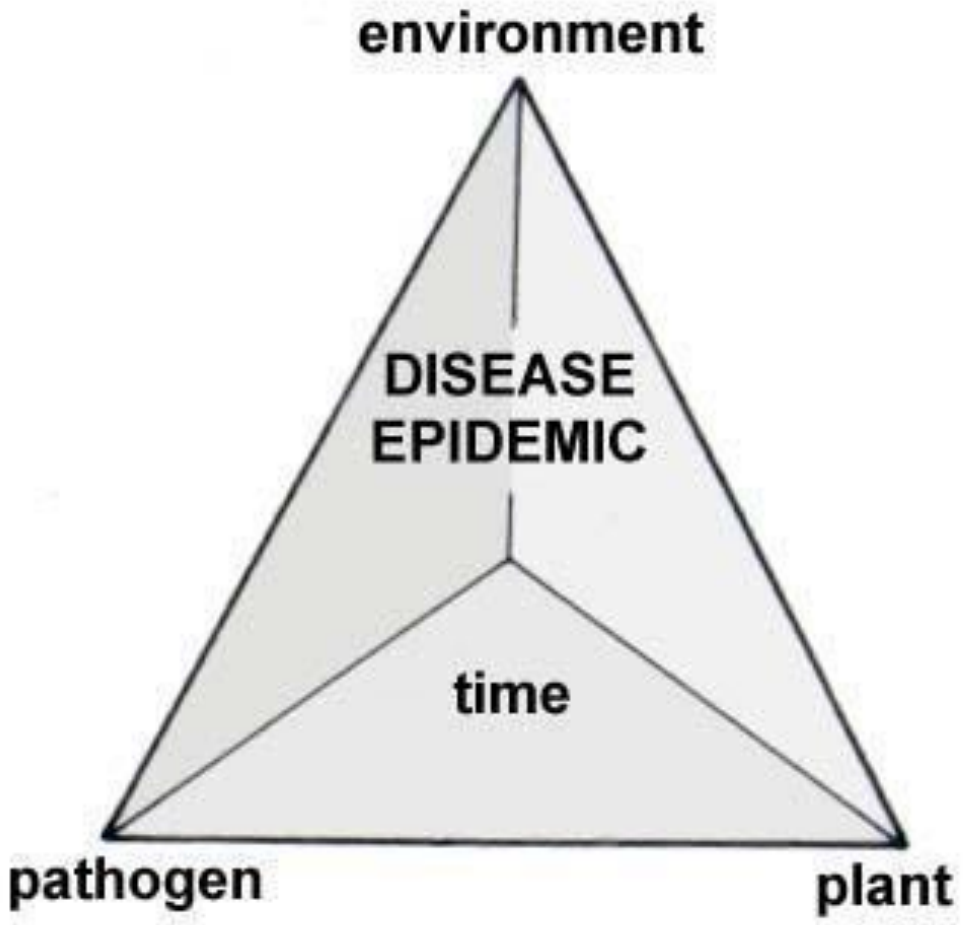
Bacterial Blight and Target Spot – Known Impacts

Heather M. Kelly
Extension/Research Plant Pathology
West Tennessee Research and Education Center
University of Tennessee

Disease Pyramid



Factors needed to result in <u>yield loss due to disease PEST</u>

1. **<u>P</u>athogen** → influenced by field history, location, etc.
2. **<u>E</u>nvironment** → promotes disease development
3. **<u>S</u>usceptible host** → variety
4. **<u>T</u>ime** → all 3 factors have to occur at a critical time/growth stage

- For **<u>yield loss</u>** to be an issue

Bacterial Blight/Angular Leaf Spot

Pathogen → *Xanthomonas citri* pv. *malvacearum* (race 18)

Environment → rain/irrigation, can survive in debris and soil

Susceptible host → clear resistant vs. susceptible varieties

Time → earlier disease develops > the chance of effecting yield

UTIA INSTITUTE OF AGRICULTURE THE UNIVERSITY OF TENNESSEE

Don’t be fooled

Examine:

- Location
  - In canopy
  - In field
- All symptoms
- Variety

UTIA INSTITUTE OF AGRICULTURE THE UNIVERSITY OF TENNESSEE

Varietal Differences

Susceptible

- Stoneville 4949 GLT
- DeltaPine 1522 B2XF
- DeltaPine 1725 B2XF
- NexGen 3406 B2XF
- NexGen 3522 B2XF

UTIA INSTITUTE OF AGRICULTURE THE UNIVERSITY OF TENNESSEE

Varieties inoculated and rated by Texas A&M AgriLife Research personnel

Varietal Differences

Mostly Susceptible

- DeltaPine 1614 B2XF
- Phytogen 312 WRF
- Phytogen 444 WRF
- DeltaPine 1646 B2XF (partially resistant)

UTIA INSTITUTE OF AGRICULTURE THE UNIVERSITY OF TENNESSEE

Varieties inoculated and rated by Texas A&M AgriLife Research personnel

Varietal Differences

Resistant

- Phytogen 330 W3RF
- Phytogen 340 W3RF
- Phytogen 430 W3FE
- Phytogen 440 W3FE
- Phytogen 480 W3FE
- Stoneville 5517 GLTP*
- DeltaPine 1518 B2XF
- DeltaPine 1820 B3XF

INSTITUTE OF AGRICULTURE
THE UNIVERSITY OF TENNESSEE

Varieties inoculated and rated by Texas A&M AgriLife Research personnel
*Ratings were conducted by Bayer CropScience personnel

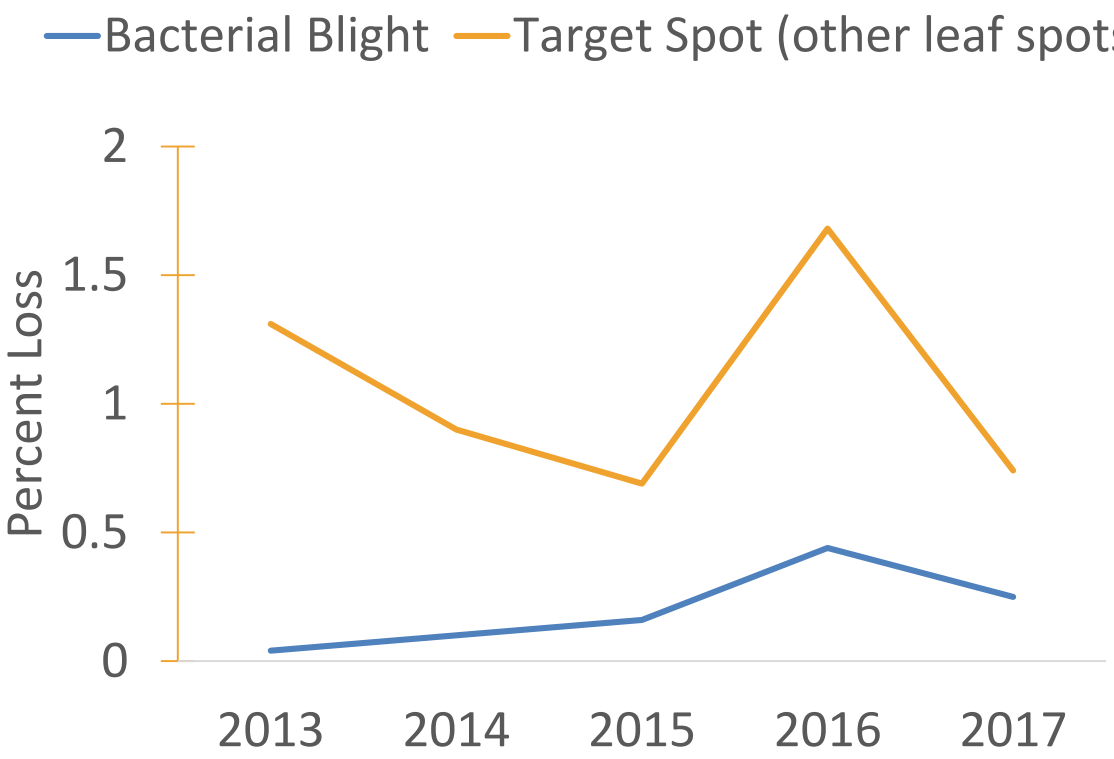
Yield Loss Estimates

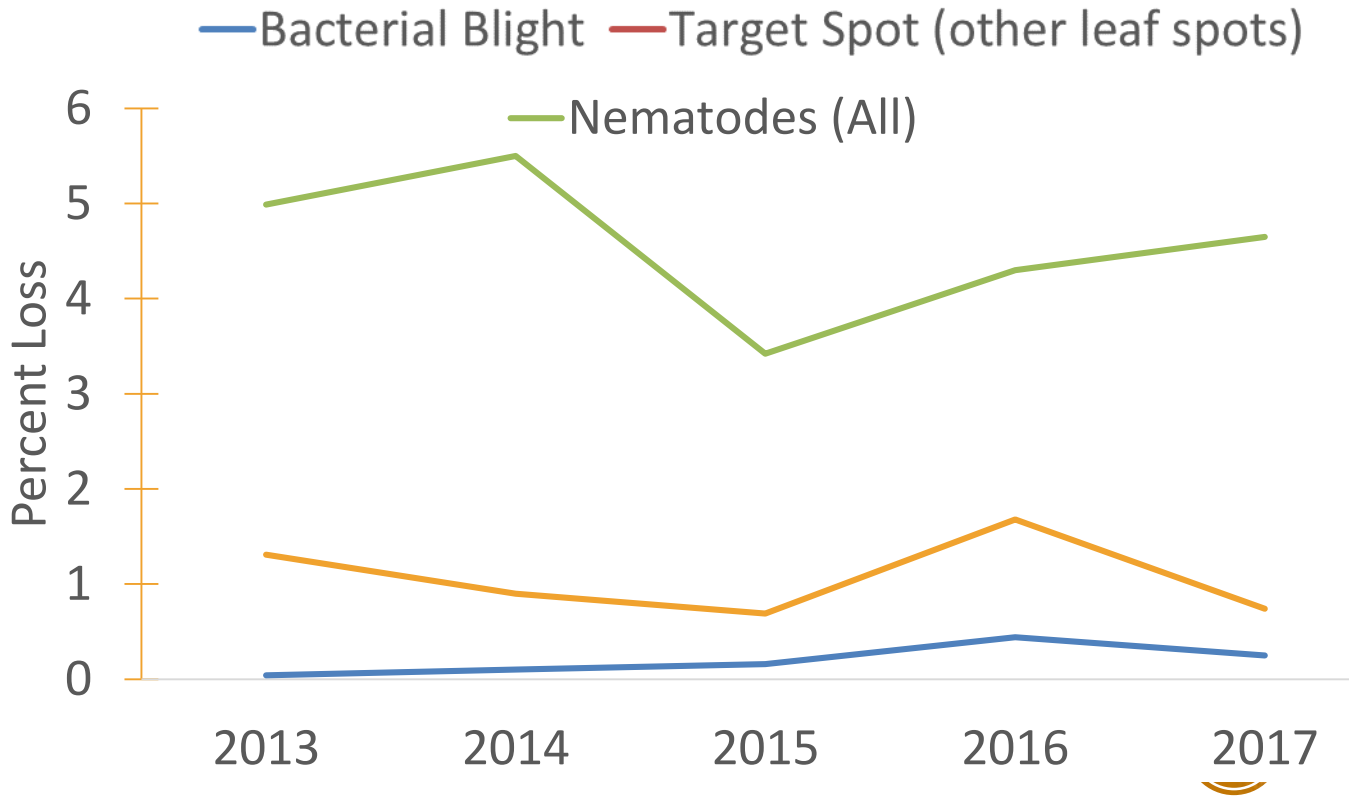
- Main yield loss mechanism – boll rot

	2013		2014		2015		2016		2017	
	% Lost	Total Bales Lost (x1000)	% Lost	Total Bales Lost (x1000)	% Lost	Total Bales Lost (x1000)	% Lost	Total Bales Lost (x1000)	% Lost	Total Bales Lost (x1000)
Bacterial Blight	0.04	4.9	0.1	24	0.16	17.2	0.44	57.8	0.25	52.4
Target Spot (other leaf spots)	1.31	171.4	0.9	136	0.69	39.7	1.68	167.7	0.74	153.2
Nematodes (All)	4.99	651.7	5.5	870	3.42	341.6	4.3	673	4.65	153.2

Yield Loss Estimates

- Main yield loss mechanism – boll rot





Target Spot/Corynespora Leaf Spot

Pathogen → *Corynespora cassicola* ; can survive in debris

Environment → wet/humid, hot; lower canopy, after canopy closure

Susceptible host → all varieties susceptible, but different levels

Time → earlier disease develops > the chance of effecting yield

INSTITUTE OF AGRICULTURE
THE UNIVERSITY OF TENNESSEE

Factors that can increase Target Spot risk:

- No- or strip-till cotton fields that are cotton followed by cotton
- Frequent showers and/or irrigation
- High nitrogen fertility levels
- High-yielding varieties are most effected
- Rank growth
- Field history
- Variety

Target Spot in Tennessee

- First reported in Sept. 2013

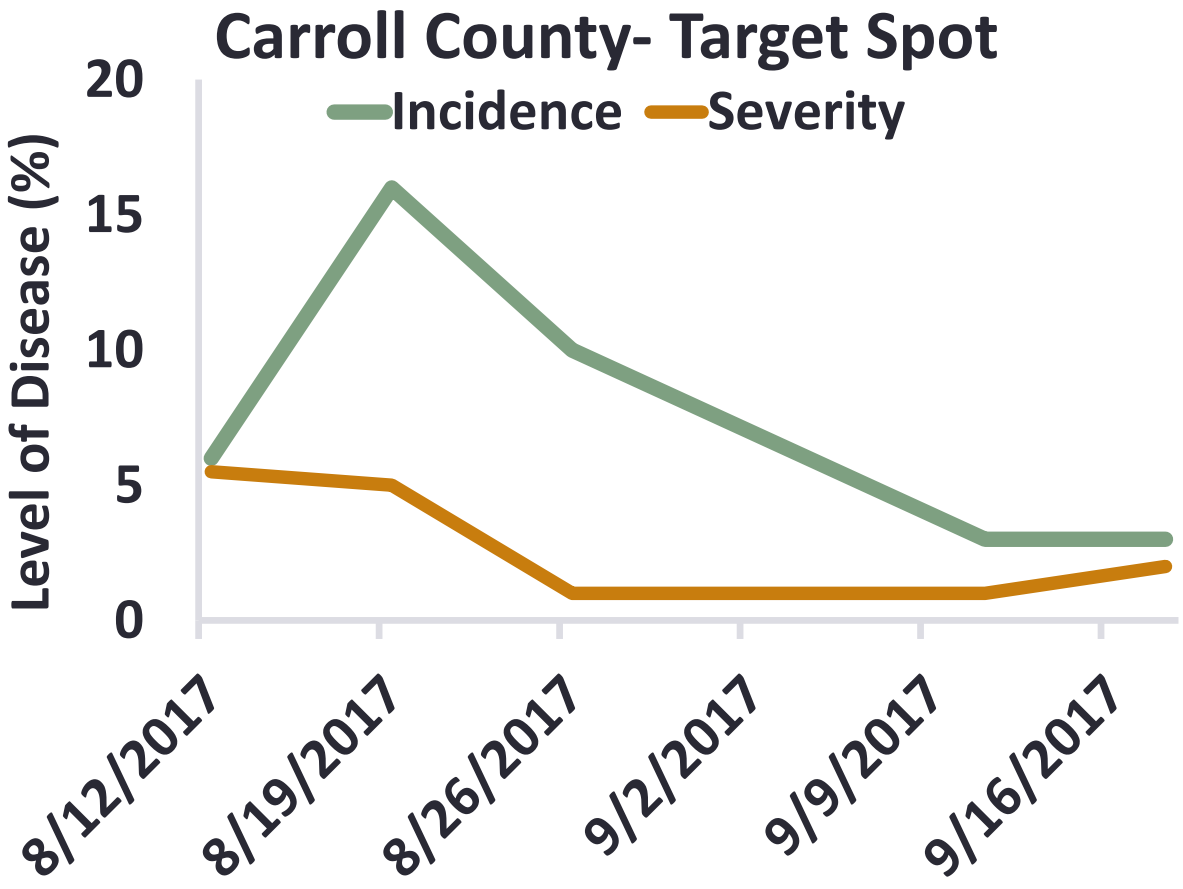
Disease onset

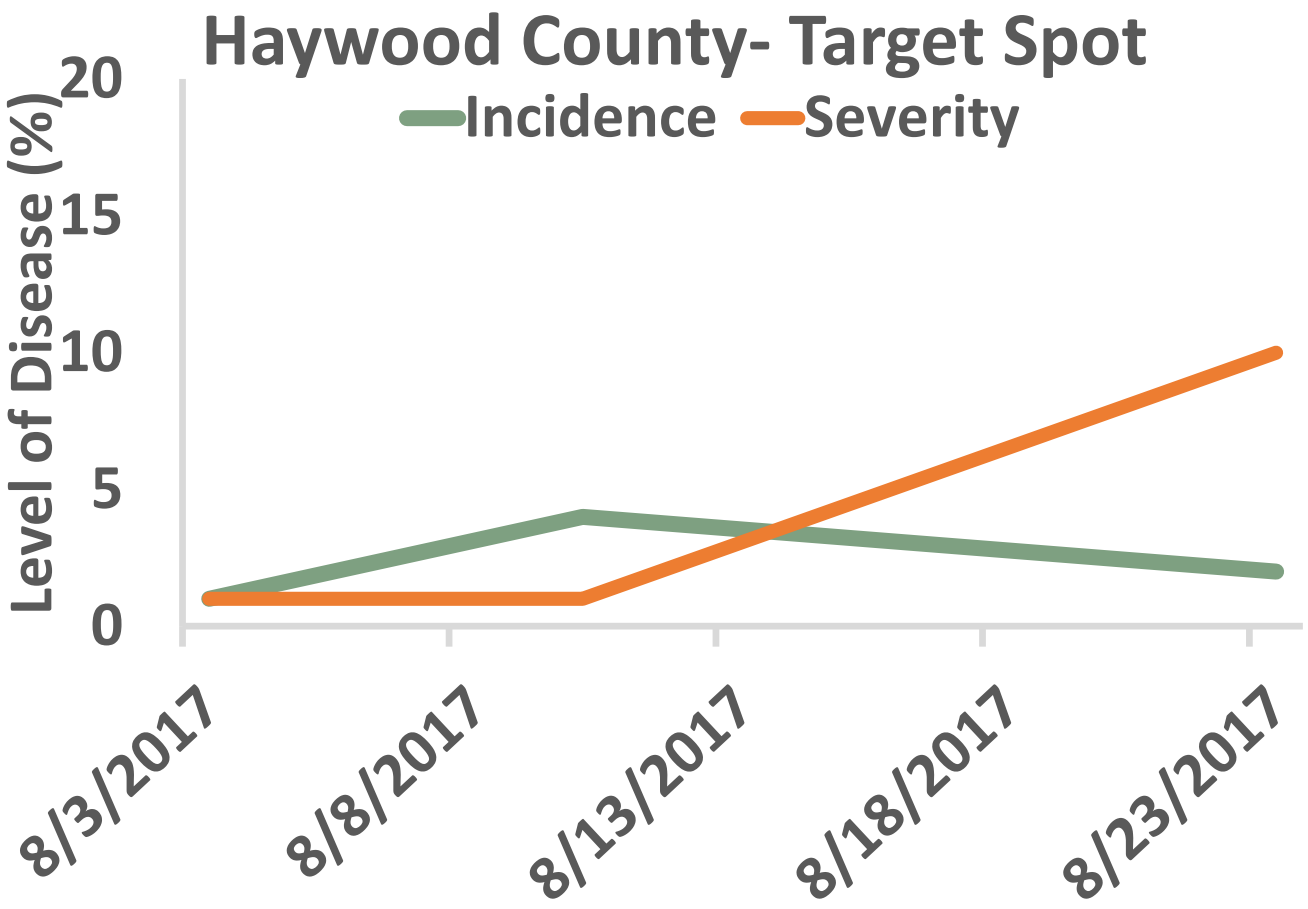
- 2014 – middle of Aug
- 2015 – end of July
- 2016 – end of July
- 2017 – end of July

May – Oct Precipitation and Temperatures (F)				
Year	Total Precipitation (in)	Mean Min Temp	Mean Max Temp	Mean Avg Temp
2014	37.4	47.8	83.4	72.1
2015	25.7	48.7	84.2	72.9
2016	22.6	49.8	**86.6**	**75.3**
2017	24.0	48.0	84.3	72.9

UTIA INSTITUTE OF AGRICULTURE THE UNIVERSITY OF TENNESSEE

2017 Cotton Sentinel Plots

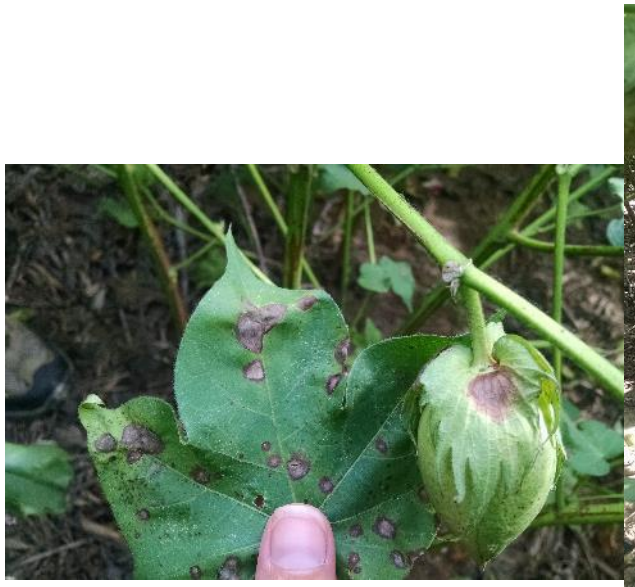




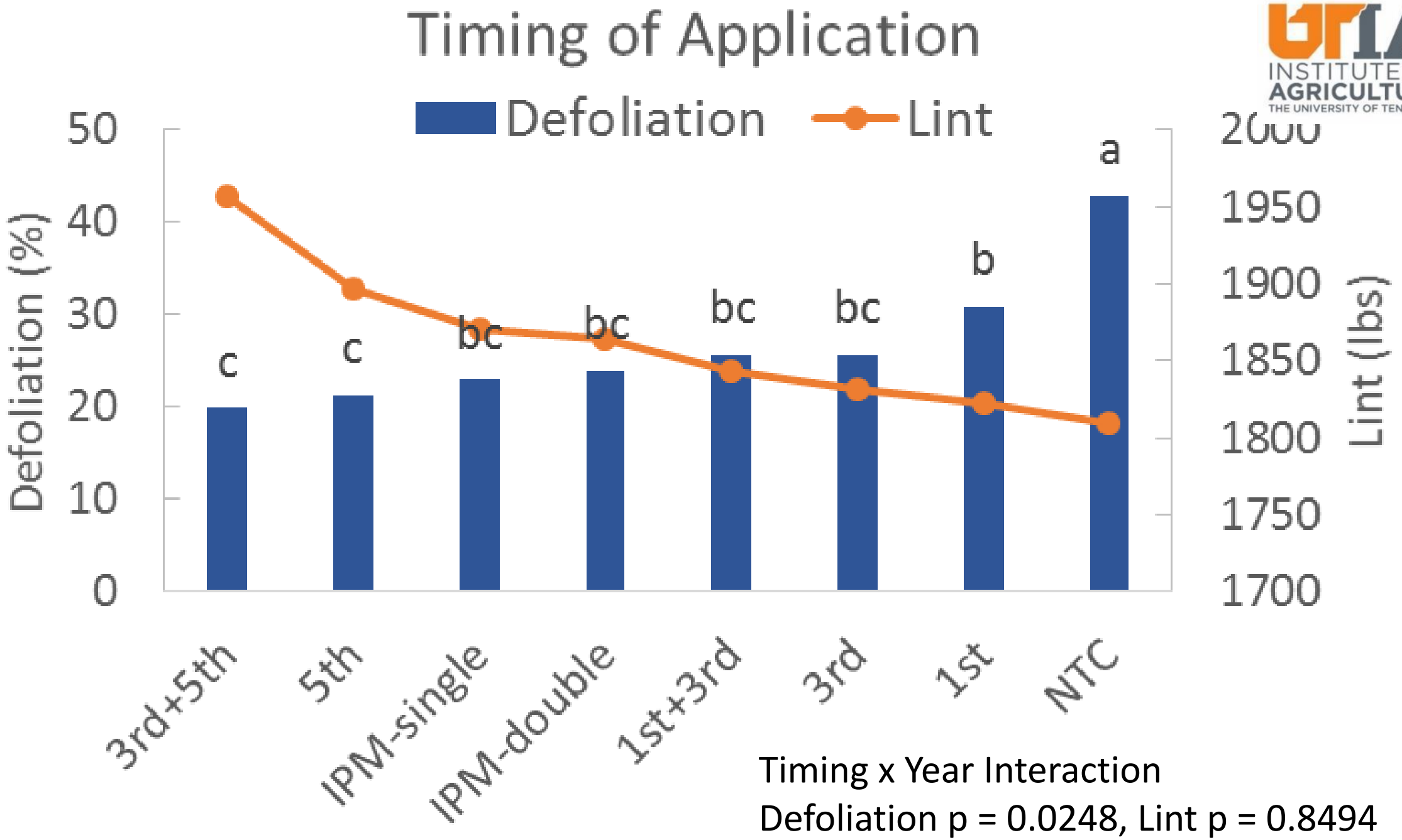
2018 Data from Cotton Sentinel Plots posted at news.utcrops.com

TN Target Spot Timing Trials

- 2014 – 2016 Fungicide application timing
  - Investigated single and double apps of Headline at 6 fl oz/a
    - Single – 1st, 3rd, or 5th week of bloom
    - Double – 1st + 3rd, 3rd + 5th week of bloom
    - IPM – single and double, applied at first lesion

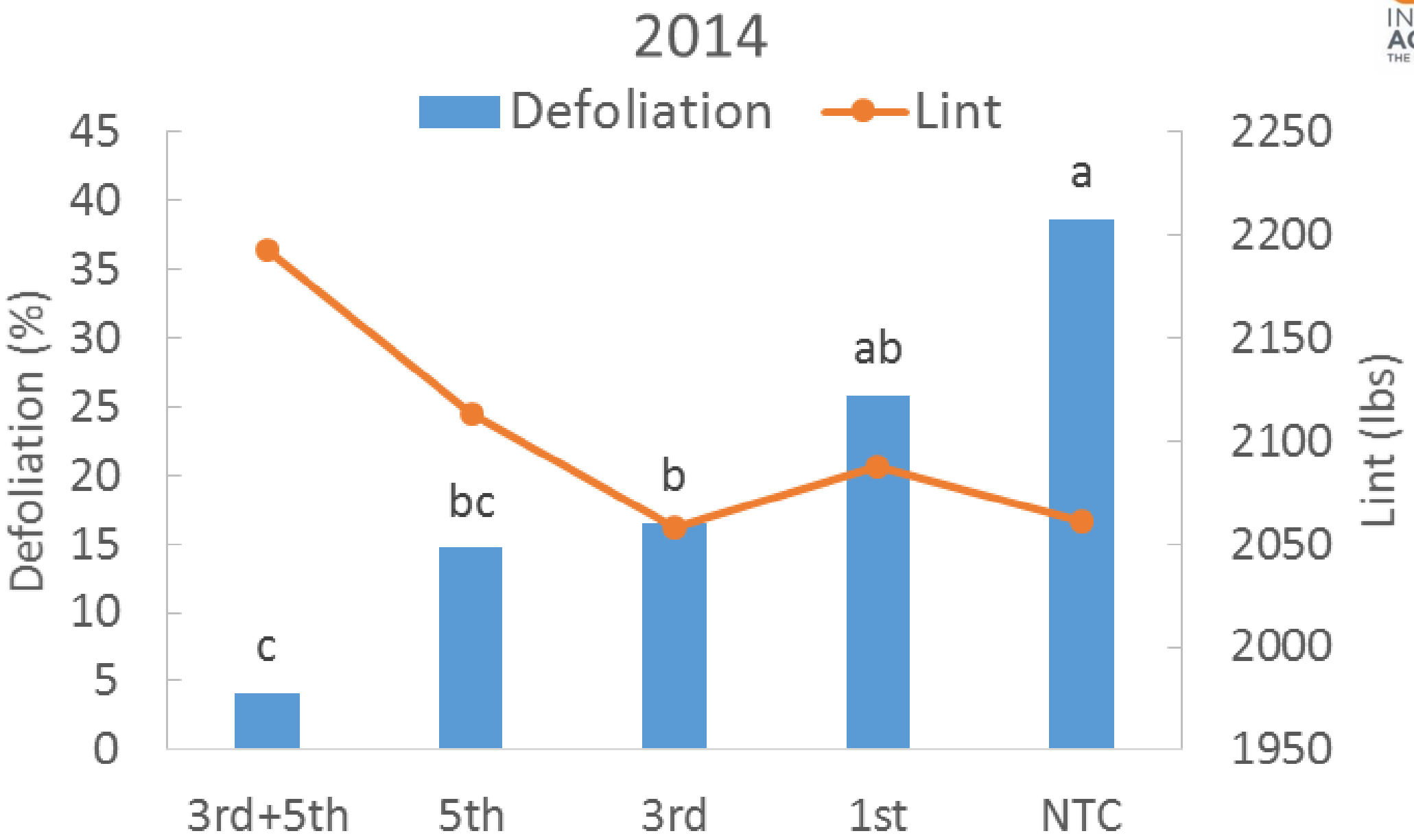


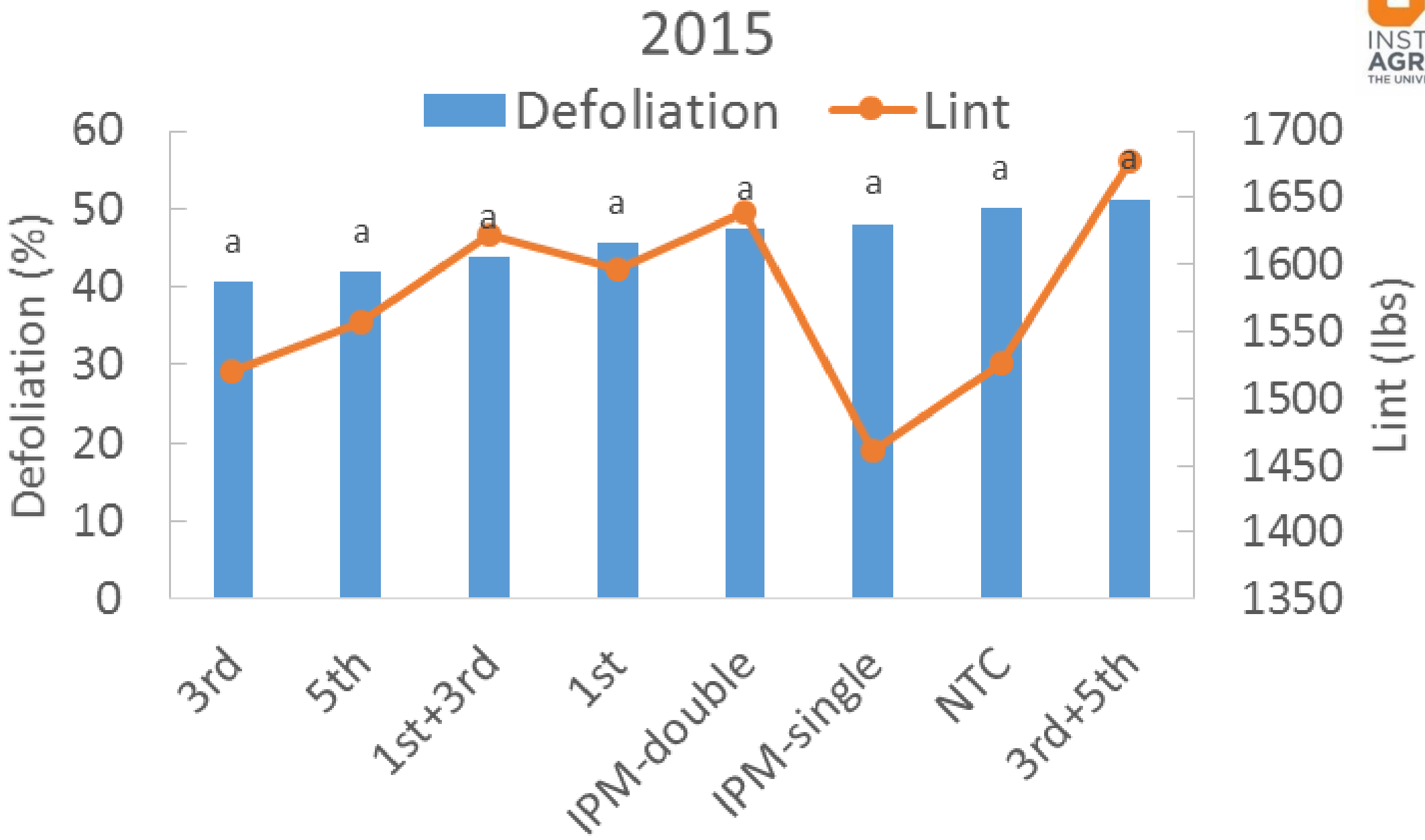
INSTITUTE OF AGRICULTURE
THE UNIVERSITY OF TENNESSEE

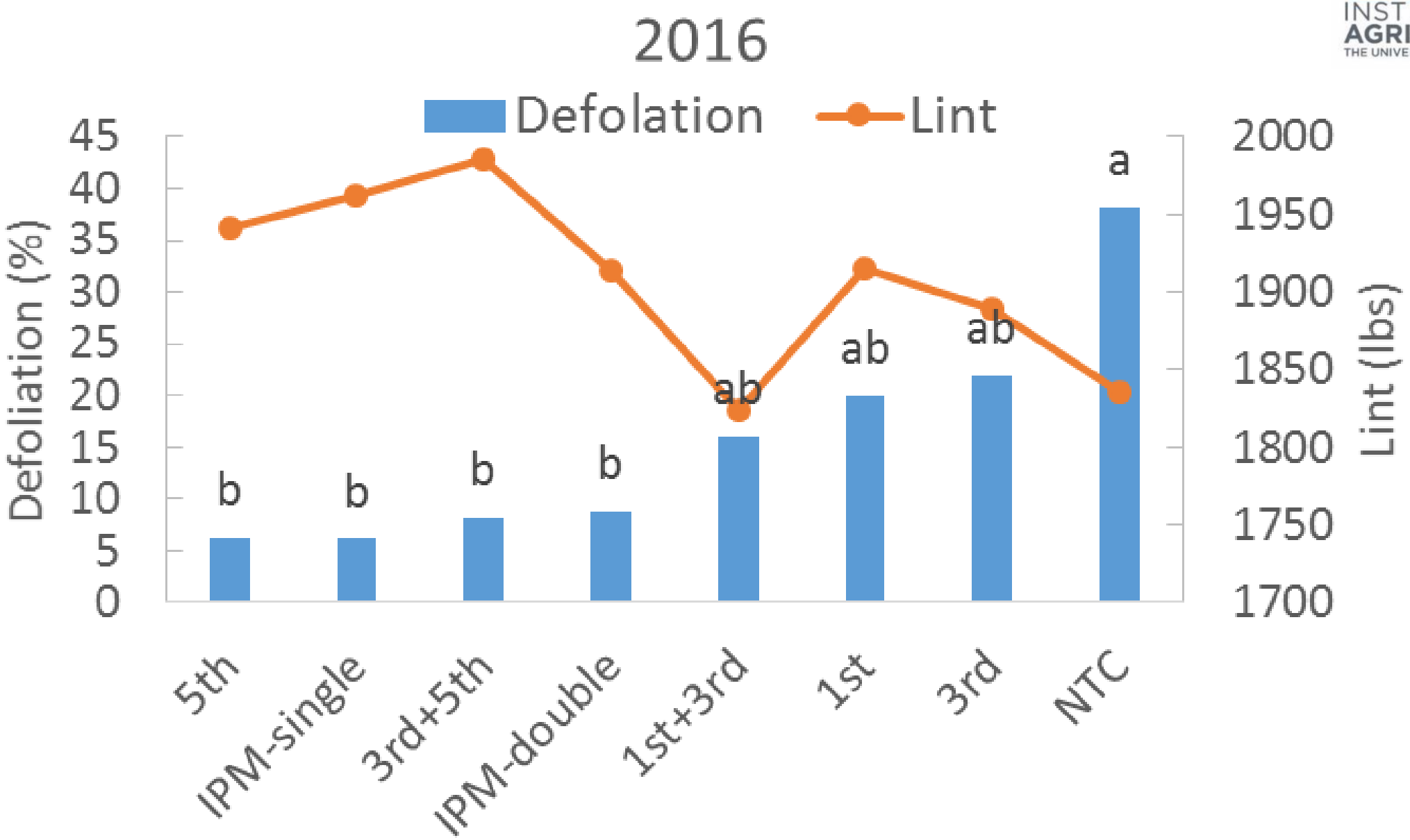


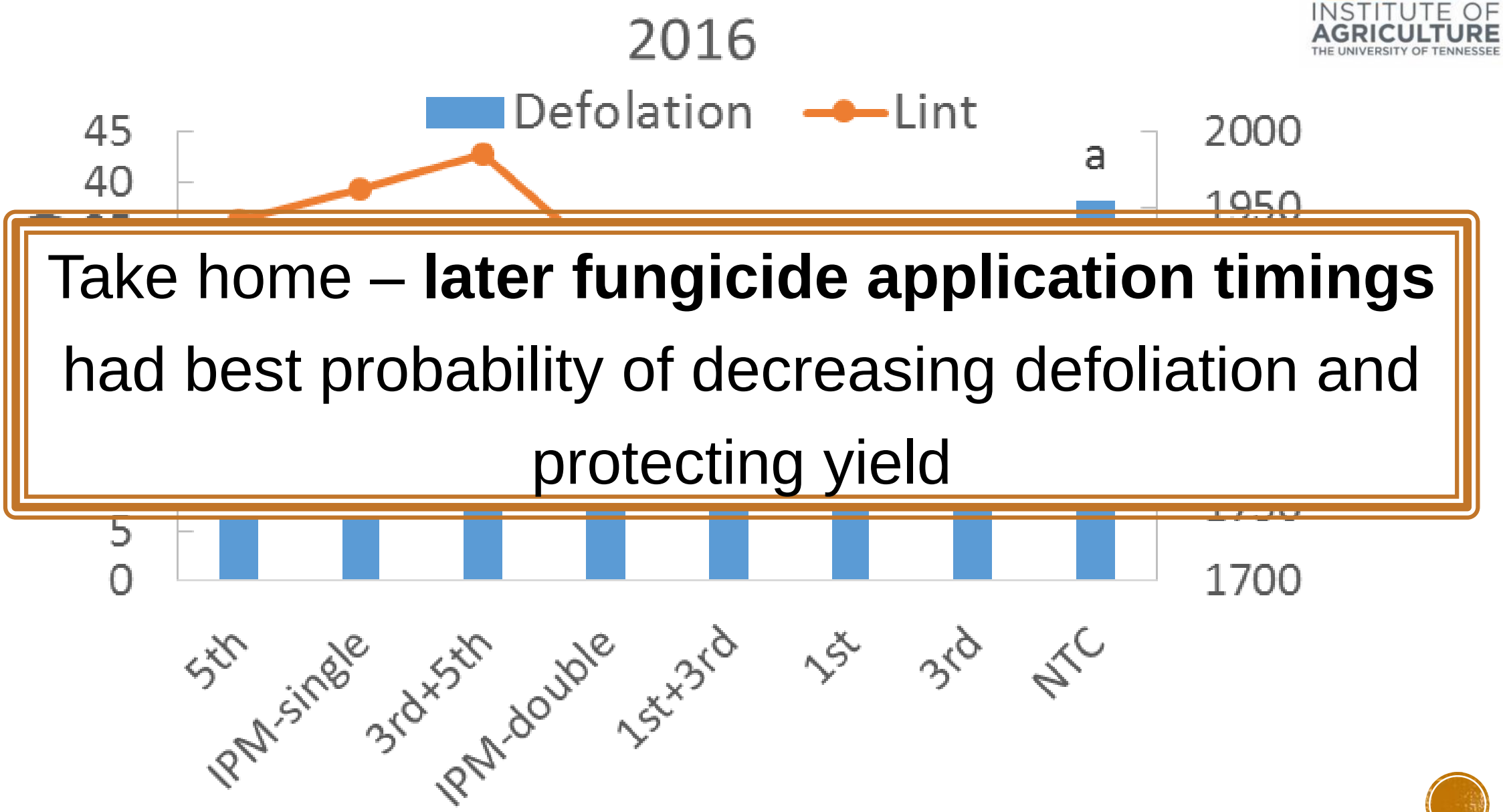
Timing x Year Interaction

Defoliation p = 0.0248, Lint p = 0.8494


2014
Defoliation
Lint
Defoliation (%)
Lint (lbs)
45
40
35
30
25
20
15
10
5
0
2250
2200
2150
2100
2050
2000
1950
c
bc
b
ab
a
3rd+5th
5th
3rd
1st
NTC


2015
Defoliation
Lint
Defoliation (%)
Lint (lbs)
60
50
40
30
20
10
0
1700
1650
1600
1550
1500
1450
1400
1350
a
a
a
a
a
a
a
a
3rd
5th
1st+3rd
1st
IPM-double
IPM-single
NTC
3rd+5th


2016
Defolation
Lint
Defoliation (%)
Lint (lbs)
45
40
35
30
25
20
15
10
5
0
2000
1950
1900
1850
1800
1750
1700
b
b
b
b
ab
ab
ab
a
5th
IPM-single
3rd+5th
IPM-double
1st+3rd
1st
3rd
NTC

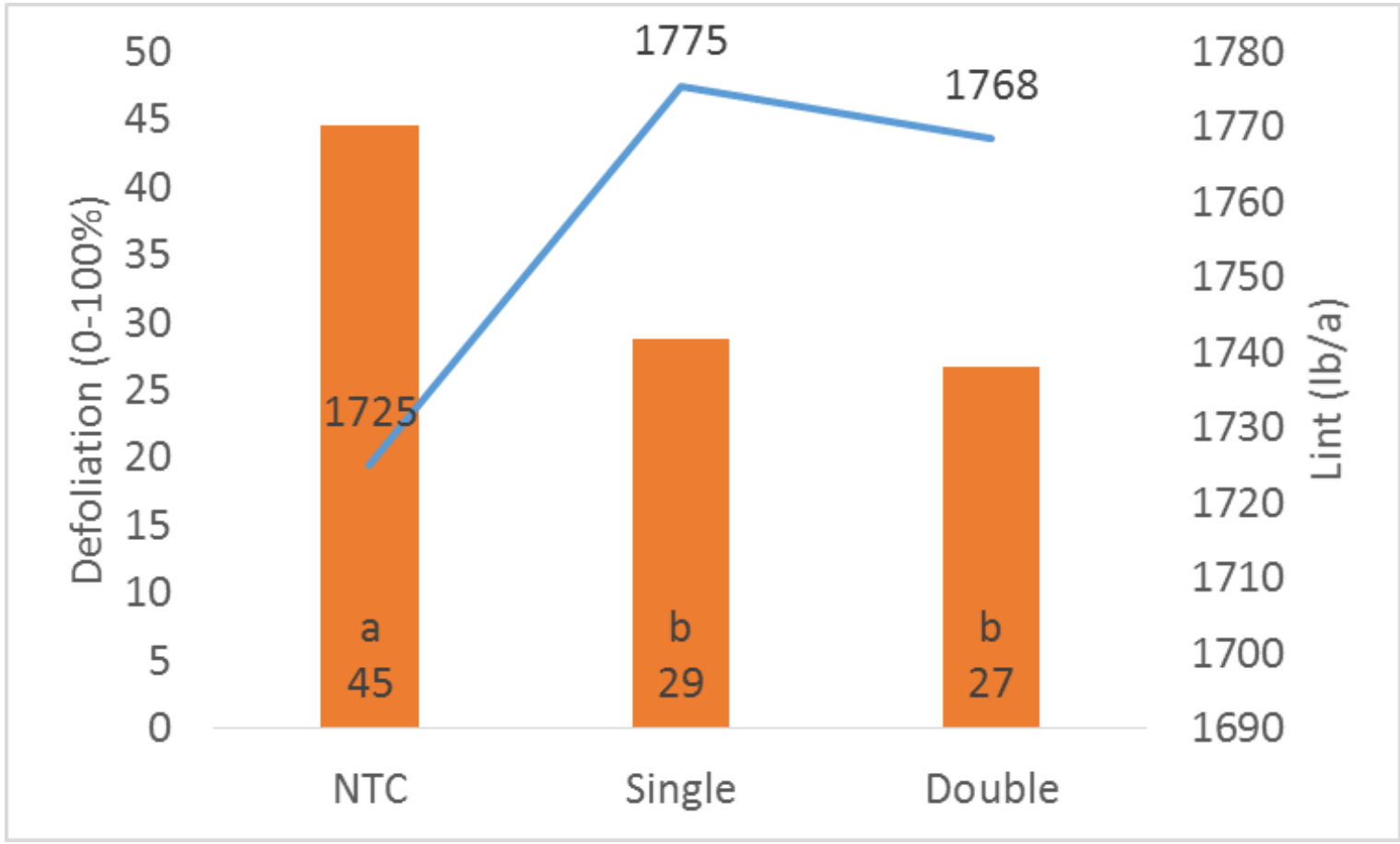


Take home – **later fungicide application timings** had best probability of decreasing defoliation and protecting yield

Fungicide application timing

2014 – 2016 data

- Across all timings
  - Single protected 50 lbs/a lint
  - Double protected 43 lbs/a lint



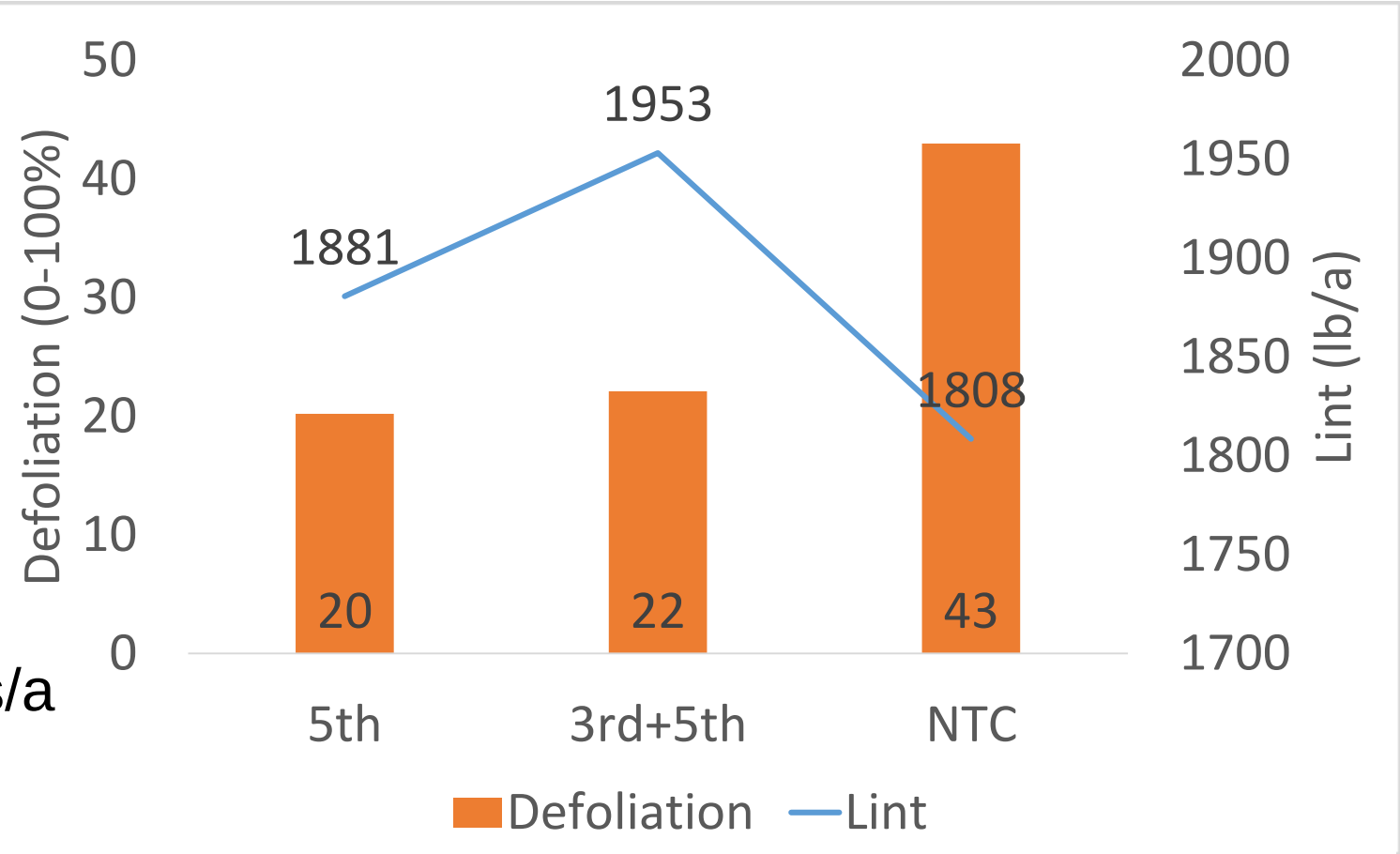
INSTITUTE OF AGRICULTURE
THE UNIVERSITY OF TENNESSEE

Fungicide application timing

2014 – 2016 data

- Across all timings
  - Single protected 50 lbs/a lint
  - Double protected 43 lbs/a lint

- Pulling out just 5th and 3rd+5th
  - 5th week of bloom – 72 lbs/a
  - 3rd+5th week of bloom – 145 lbs/a



INSTITUTE OF AGRICULTURE
THE UNIVERSITY OF TENNESSEE

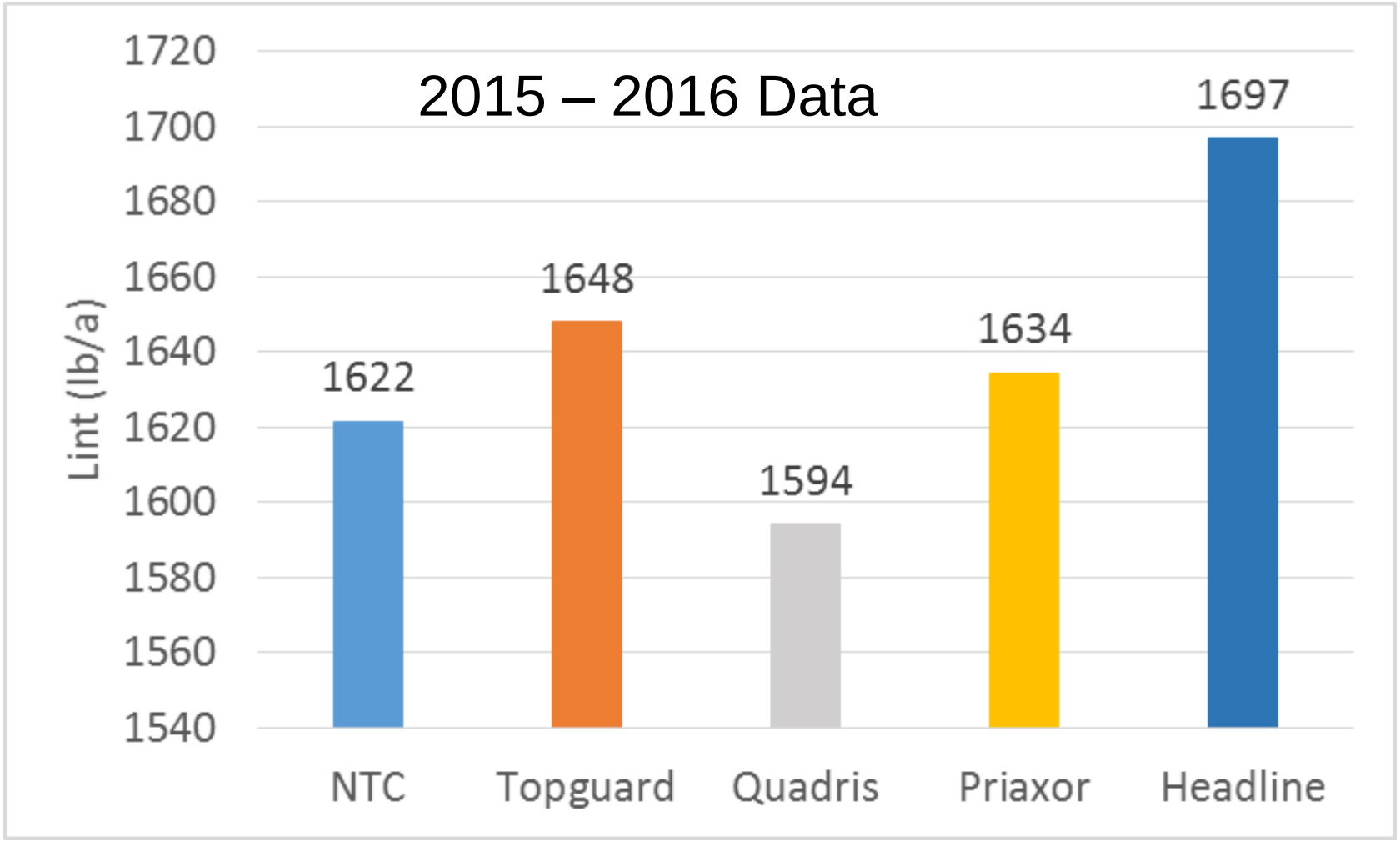
Break-even Scenarios for Cotton									
Cotton price	Application cost ($/A)								
($/lb.)	$8	$10	$12	$14	$16	$18	$20	$22	$24
$0.65	12.3	15.4	18.5	21.5	24.6	27.7	30.8	33.8	36.9
$0.66	12.1	15.2	18.2	21.2	24.2	27.3	30.3	33.3	36.4
$0.67	11.9	14.9	17.9	20.9	23.9	26.9	29.9	32.8	35.8
$0.68	11.8	14.7	17.6	20.6	23.5	26.5	29.4	32.4	35.3
$0.69	11.6	14.5	17.4	20.3	23.2	26.1	29.0	31.9	34.8
$0.70	11.4	14.3	17.1	20.0	22.9	25.7	28.6	31.4	34.3
$0.71	11.3	14.1	16.9	19.7	22.5	25.4	28.2	31.0	33.8
$0.72	11.1	13.9	16.7	19.4	22.2	25.0	27.8	30.6	33.3
$0.73	11.0	13.7	16.4	19.2	21.9	24.7	27.4	30.1	32.9
$0.74	10.8	13.5	16.2	18.9	21.6	24.3	27.0	29.7	32.4
$0.75	10.7	13.3	16.0	18.7	21.3	24.0	26.7	29.3	32.0

Consistancy of yield impact

- Based on regional data from 2014 – 2016 **only 20% of the time fungicide significantly protected yield**
  - That probability will decrease with incorporation of 2017 data
- Based on TN trial data from 2014 – 2017 **only 15% of the time fungicide significantly protected yield**
  - On average ~174 lb/a of lint protected

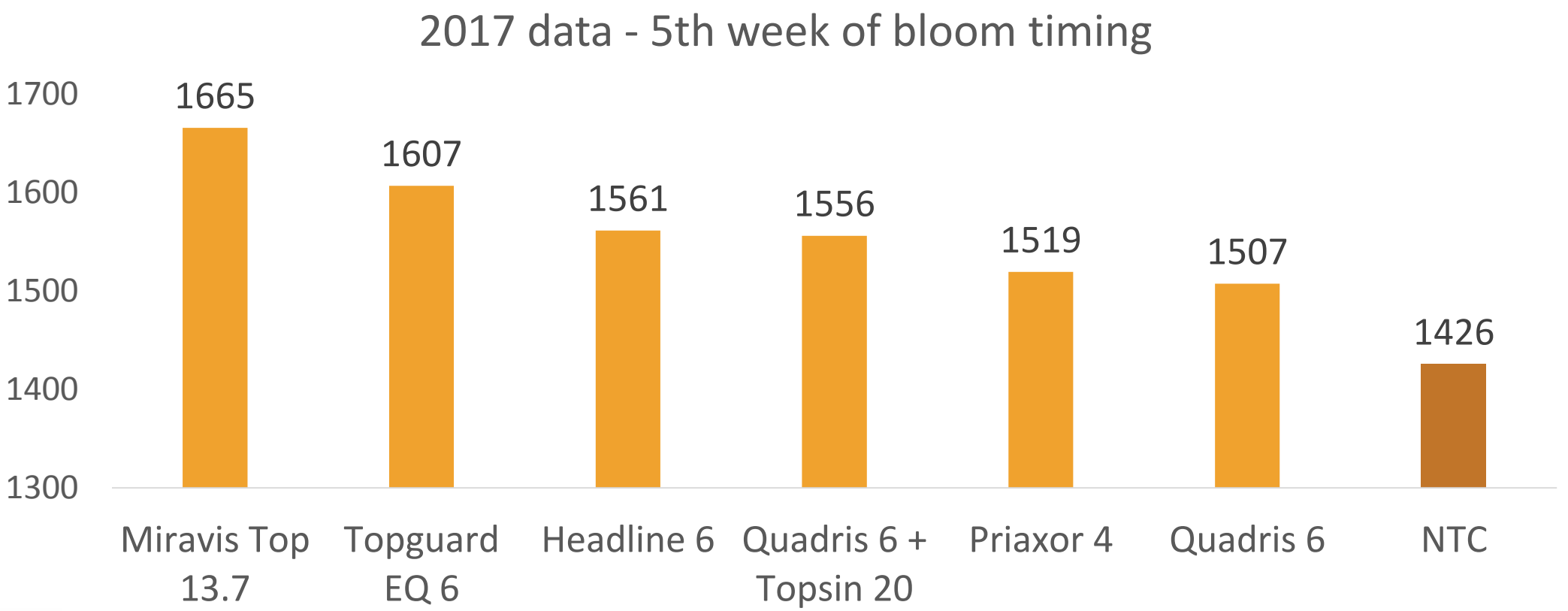
INSTITUTE OF AGRICULTURE
THE UNIVERSITY OF TENNESSEE

Fungicide Efficacy Data



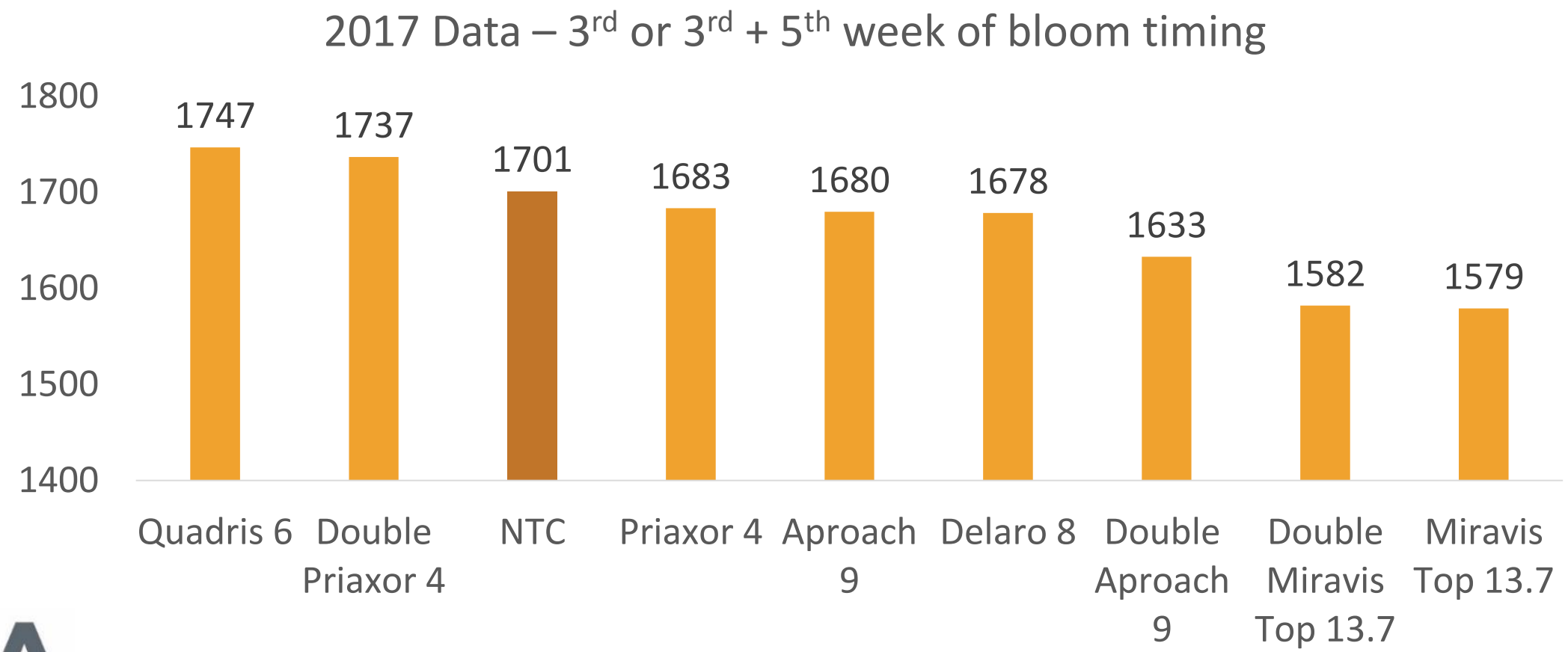
UTIA INSTITUTE OF AGRICULTURE THE UNIVERSITY OF TENNESSEE

Fungicide Efficacy Data



INSTITUTE OF AGRICULTURE
THE UNIVERSITY OF TENNESSEE

Fungicide Efficacy Data



INSTITUTE OF AGRICULTURE
THE UNIVERSITY OF TENNESSEE

Additional Management Strategies that are being investigated

- 2017 regional trials investigating

Trial 1

- Varieties (Phytogen 490, DeltaPine 1646, and DeltaPine 1725)
- Fungicides (single and double applications of Priaxor)
- Canopy Management (low vs. aggressive PGR)

Trial 2

- Fungicide
- Nitrogen Rate (0, 80, 160 lbs/a)
- Canopy Management (passive, moderate, and aggressive PGR)

UTIA INSTITUTE OF AGRICULTURE THE UNIVERSITY OF TENNESSEE

Summary – Management Options

- **Bacterial Blight**
  - Variety selection
  - Crop rotation and tillage
  - Minimal impact on yield, boll rot main concern

- **Target Spot**
  - Scout starting around first flower
  - Examine risk factors
  - Consider fungicide on a field by field basis

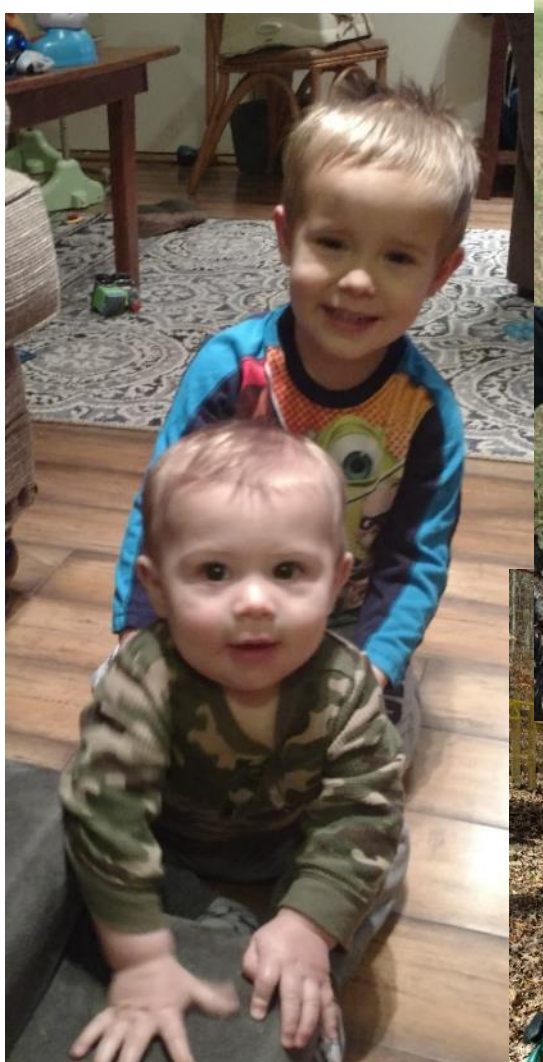
Thank you for your attention!

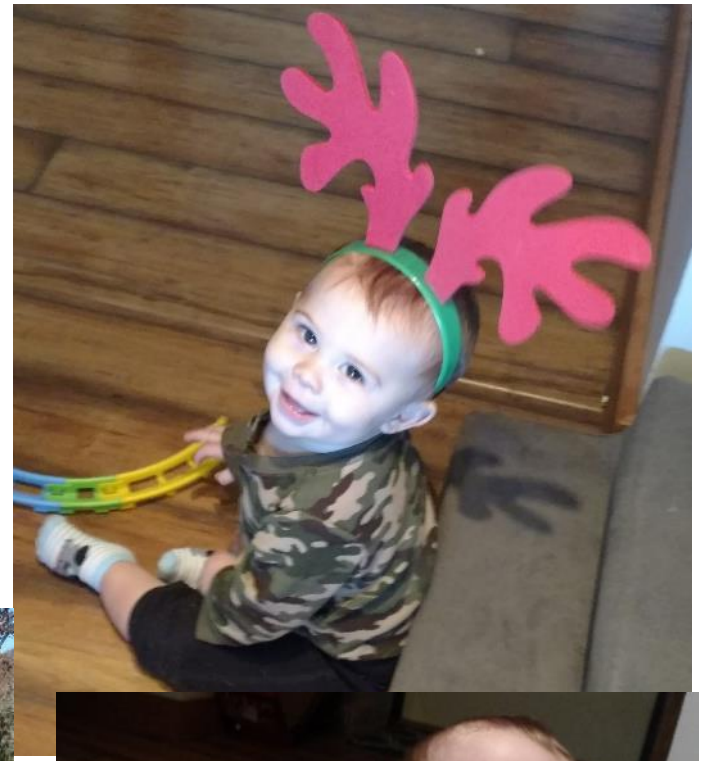
Questions or Comments?

Heather Kelly

youngkelly@utk.edu

731-425-4713





INSTITUTE OF AGRICULTURE
THE UNIVERSITY OF TENNESSEE