

Mid-South Sampling Protocols and Action Thresholds for Tarnished Plant Bug



Fred Musser

Mississippi State University

TPB Losses

AR, LA, MS, MO, TN

Year	<u>MidSouth</u>		<u>LA</u>	
	# appl.	% yield loss	# appl.	% yield loss
1999	0.86	0.83	1.20	0.74
2001	1.80	1.93	2.31	1.45
2003	1.96	1.90	2.54	2.01
2005	2.63	1.27	3.24	1.14
2007	3.27	1.68	3.78	3.61

Recent MidSouth Regional TPB Research

- Sampling method comparisons
- Pre-bloom threshold research
- Post-bloom threshold research
- Resistance monitoring

Sampling Research

- Identify the most accurate and efficient sampling methods (5 direct and 4 indirect methods)
- Evaluate sampling method stability
 - Sampler impact
 - Time of day impact
- Results published in:
 - J. Econ. Entomol. 100(6): 1916-1923
 - LSU AgCenter Pub. 2945

Sampler Impact by Method

Method	F- value	P-value
Drop Cloth	3.08	<0.0001
Sweep Net	2.77	<0.0001
Whole Plant	3.51	<0.0001
Dirty Squares	1.69	0.0380
Dirty Blooms	2.26	0.0025
Ext. Bolls	5.63	<0.0001
Int. Bolls	3.34	<0.0001

Black vs. White Drop Cloth

TPB Stage	White	Black	% difference
Adults	1.17a	0.98a	-16
Nymphs	7.43a	9.55b	+29
Total	8.60a	10.53b	+22

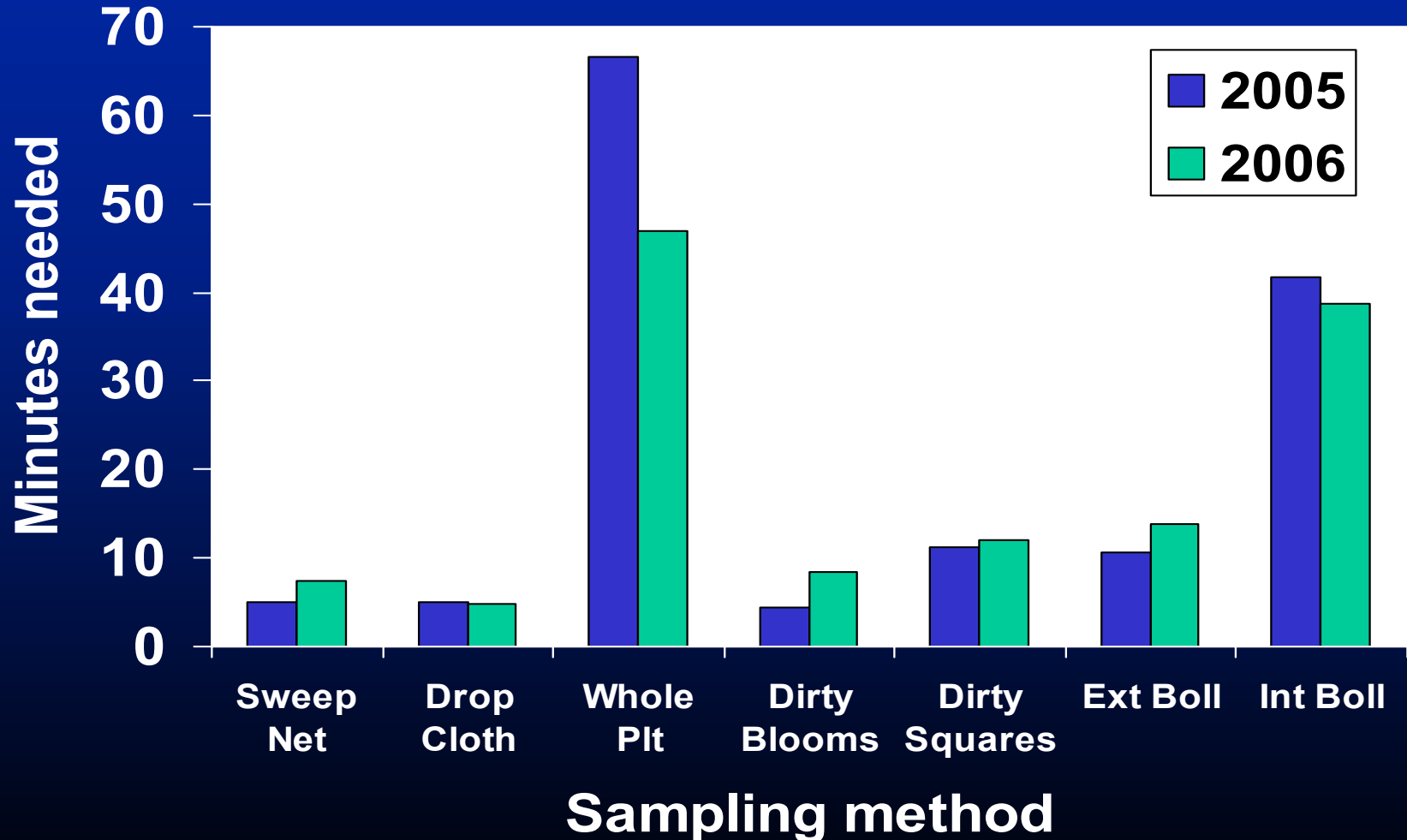
Sampling Equivalencies

1 TPB per 2 row ft on a black drop cloth equals

Method	Equivalent
Sweep Net	12 TPB/100 sweeps
Modified whole plant	9 TPB/100 plants
Dirty squares	8 /100 squares
Dirty blooms	14 /100 blooms
External bolls	12 /100 bolls
Internal bolls	9 /100 bolls

Sampling Efficiency, 2006

Minutes needed to make a correct decision 80% of the time when the actual pest density is 20% > threshold



Sampling Methods Summary

- Overall
 - Sampler variability is great in all sampling methods but dirty squares appears to be least variable
- Direct Sampling methods
 - Sweep net is most efficient for adults
 - Drop cloth most efficient for nymphs, esp. black drop cloth
 - Sweep net and drop cloth similar for total bug efficiency
- Indirect sampling methods
 - Dirty blooms most efficient

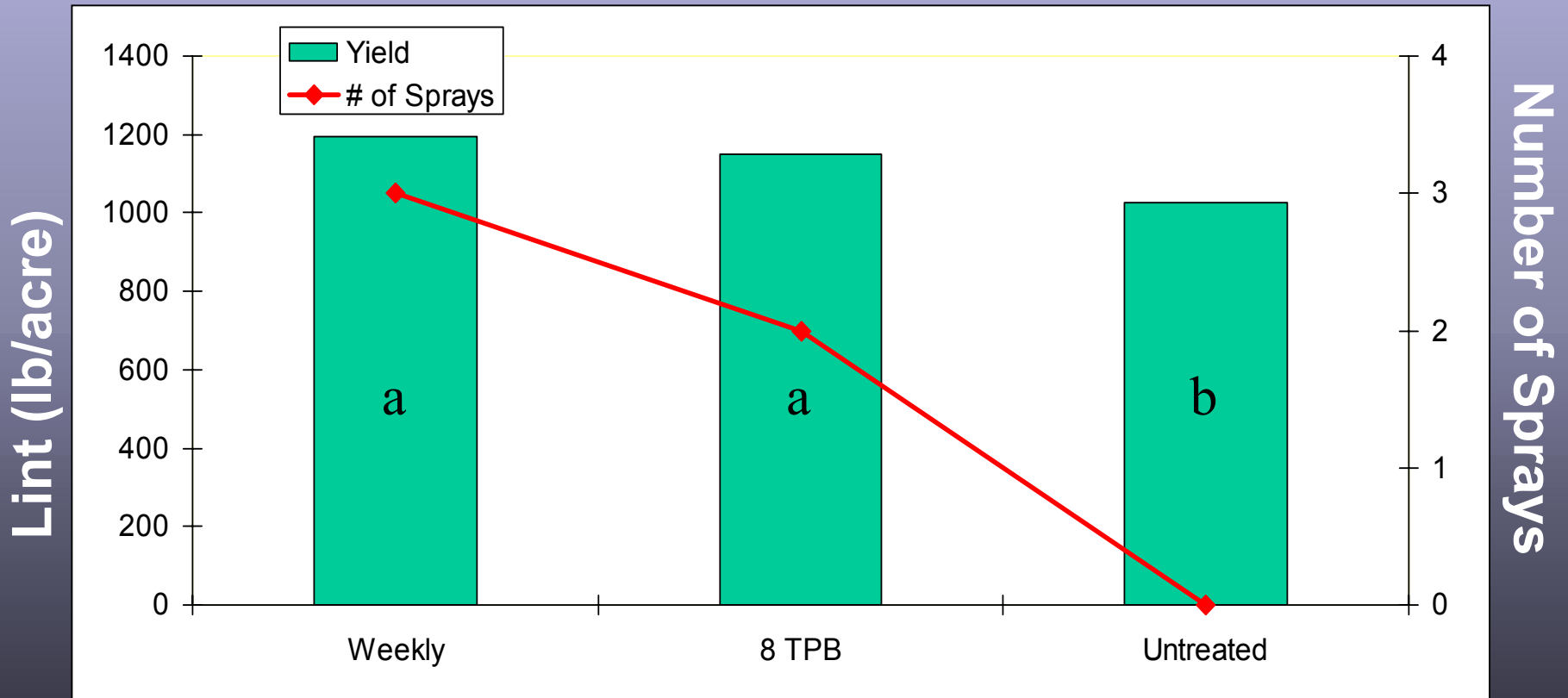
TPB Thresholds- Early Season

Trial Treatments

- Auto: Automatic insecticide application at pinhead square and 7 and 14 days later
- Low: Threshold of 8 PB / 100 sweeps or square retention below 80%
- High: Threshold of 16 PB / 100 sweeps or square retention below 60%
- UTC: No insecticide prior to first bloom

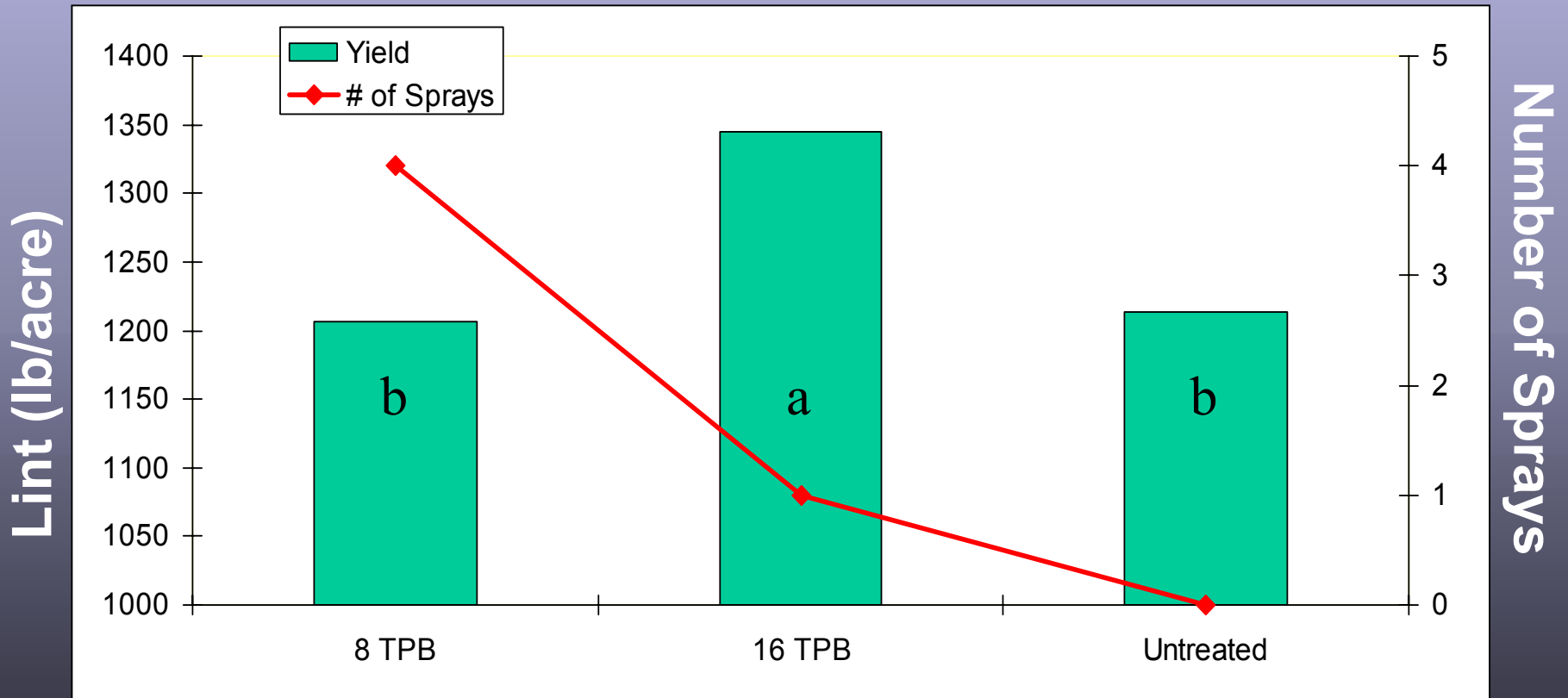
Plots at least 24 rows wide and 100 ft long

Pre-bloom TPB Thresholds LA, 2006



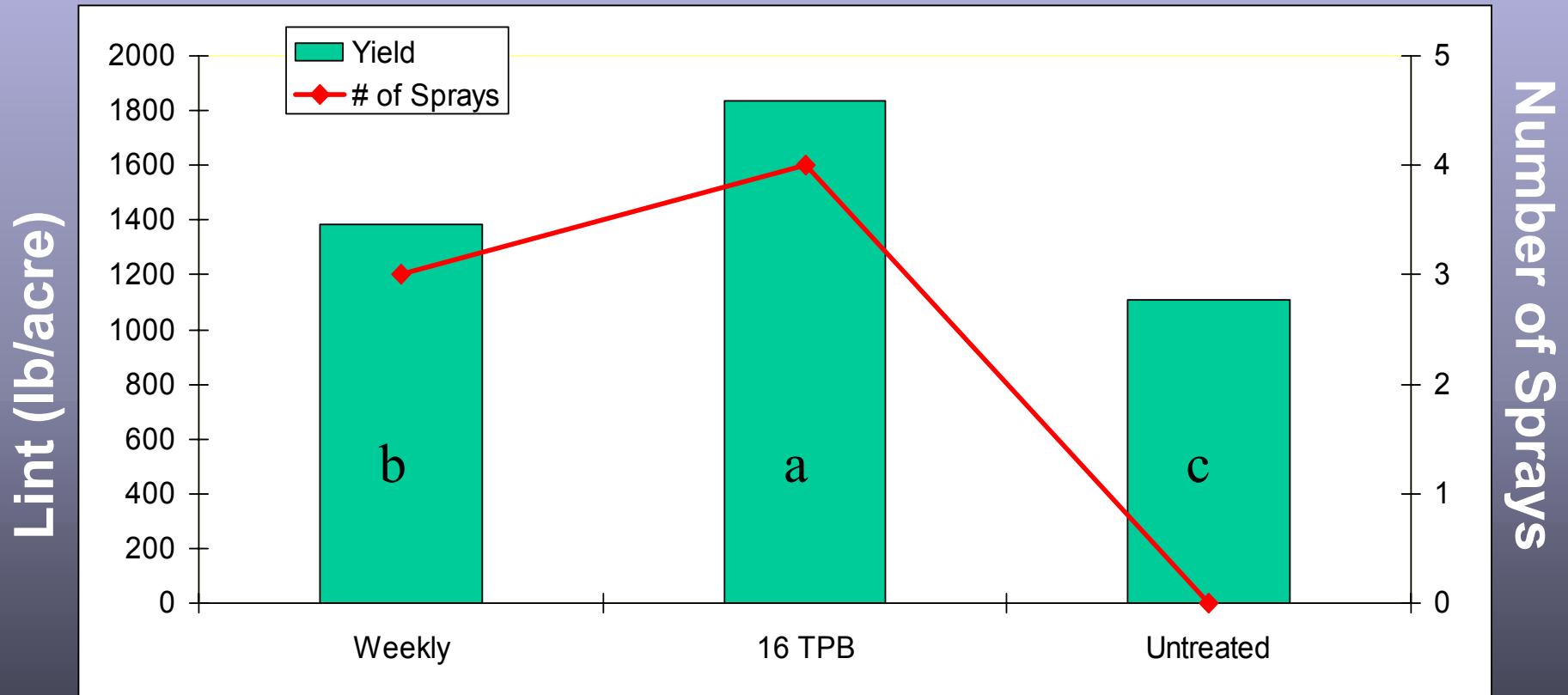
Early Season TPB Thresholds

Pre-bloom TPB Thresholds AR, 2007



Early Season TPB Thresholds

Pre-bloom TPB Thresholds MS, 2007



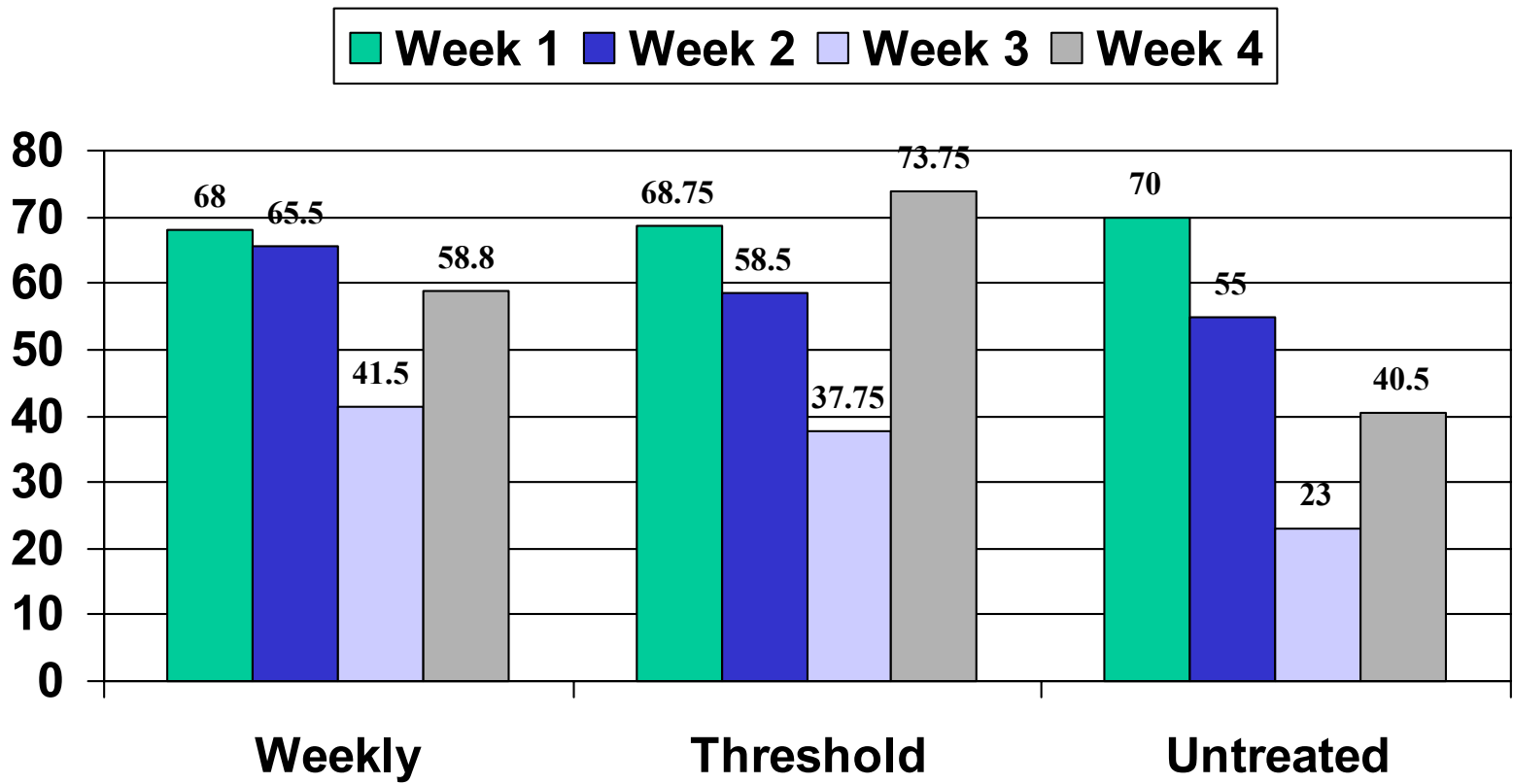
Wk 1 = 36/100 sweeps
Wk 2 = 37/100 sweeps
Wk 3 = 50/100 sweeps
Wk 3.5 = 17/100 sweeps

Wk 1 = 30/100 sweeps
Wk 2 = 33/100 sweeps
Wk 3 = 46/100 sweeps
Wk 3.5 = 20/100 sweeps

Wk 1 = 29/100 sweeps
 Wk 2 = 33/100 sweeps
 Wk 3 = 53/100 sweeps
 Wk 3.5 = 48/100 sweeps

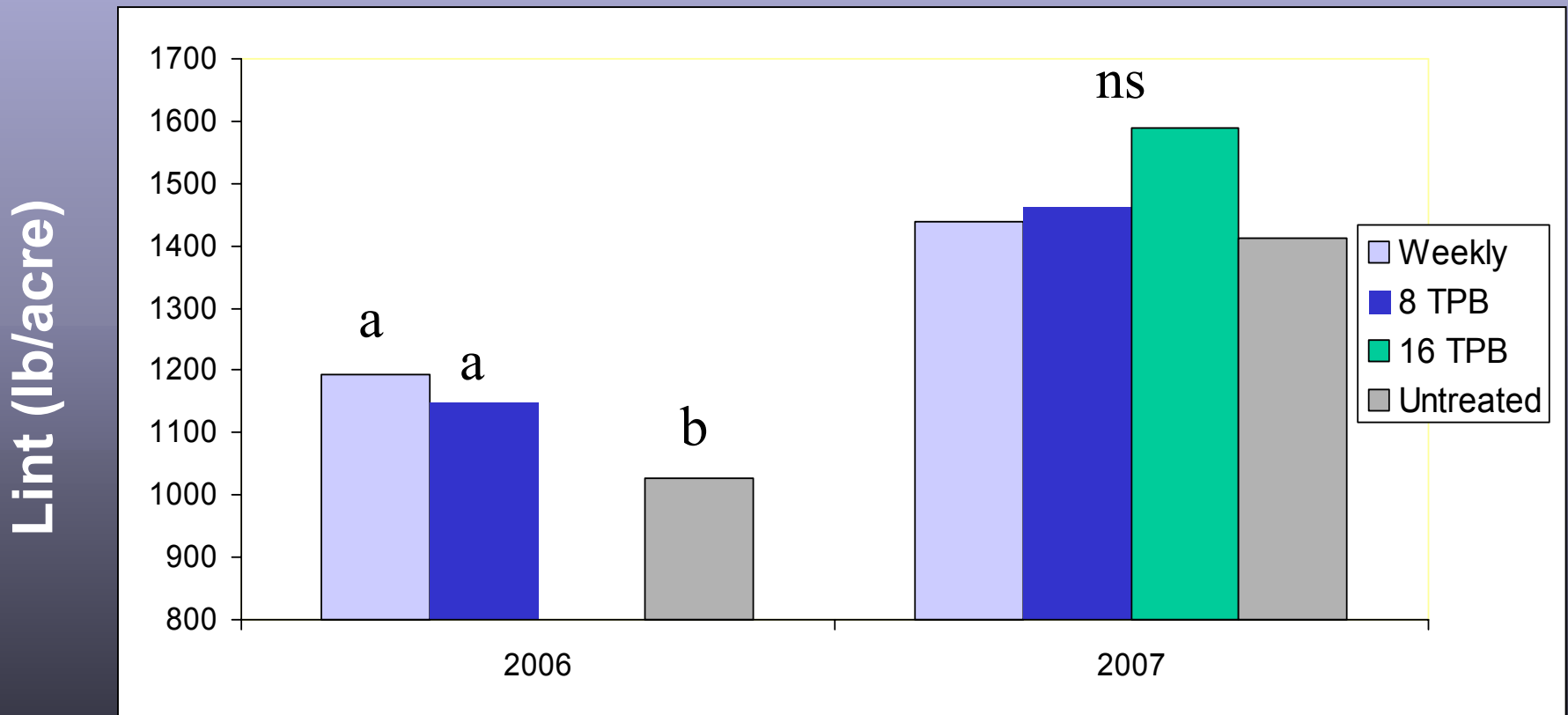
Pre-bloom TPB Thresholds MS, 2007

% square retention



Pre-bloom TPB Thresholds

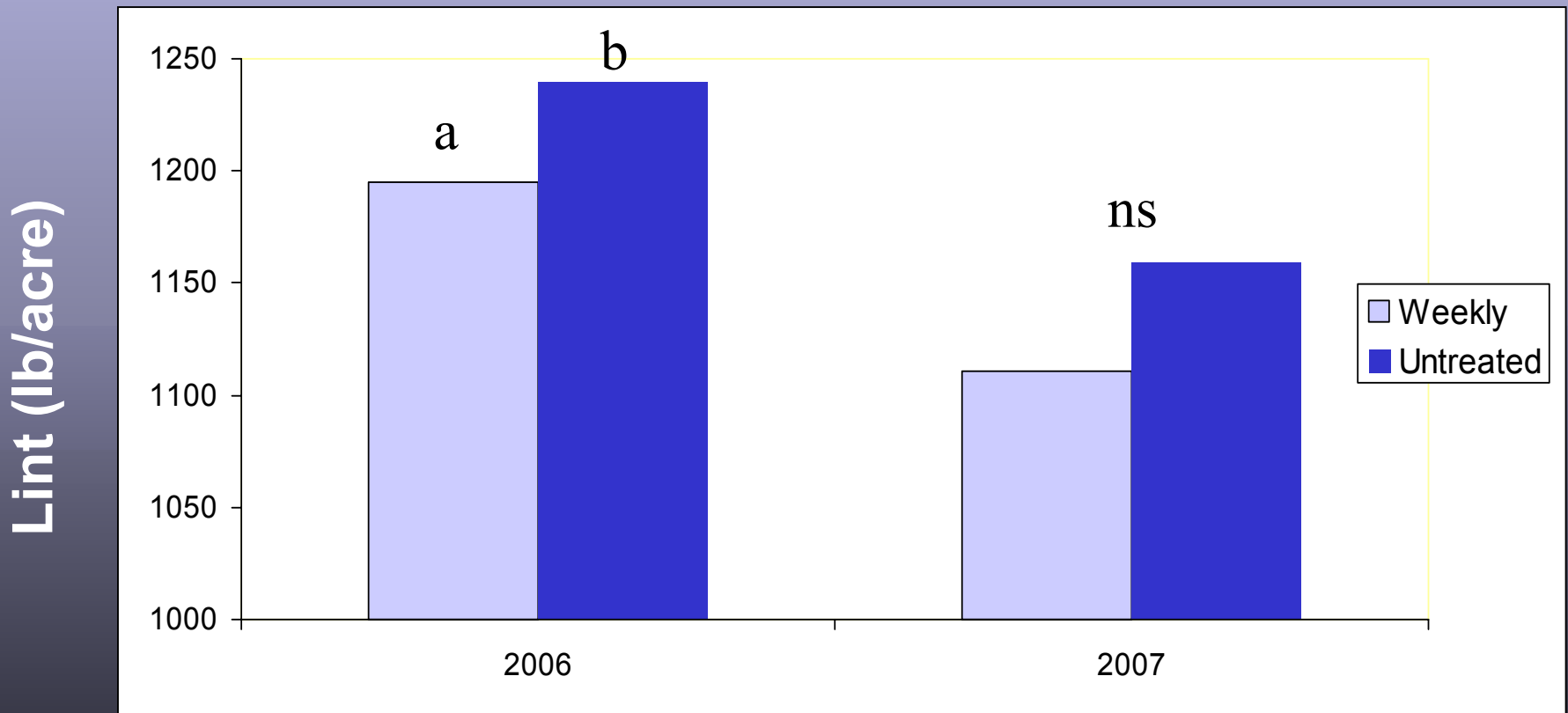
Sites with TPB > 8/100 sweeps (1 in 2006, 7 in 2007)



Early Season TPB Thresholds

Pre-bloom TPB Thresholds

Sites with few TPB (7 in 2006, 6 in 2007)



Early Season TPB Thresholds

Pre-Bloom TPB Threshold Summary

- When $TPB >$ threshold (8 TPB/100 sweeps OR square retention $< 80\%$)
 - Insecticide applications needed to preserve yield
 - Weekly applications not adequate under severe pressure
- When $TPB <$ threshold
 - Weekly insecticide applications **REDUCED** yield by 40 lb lint/ac

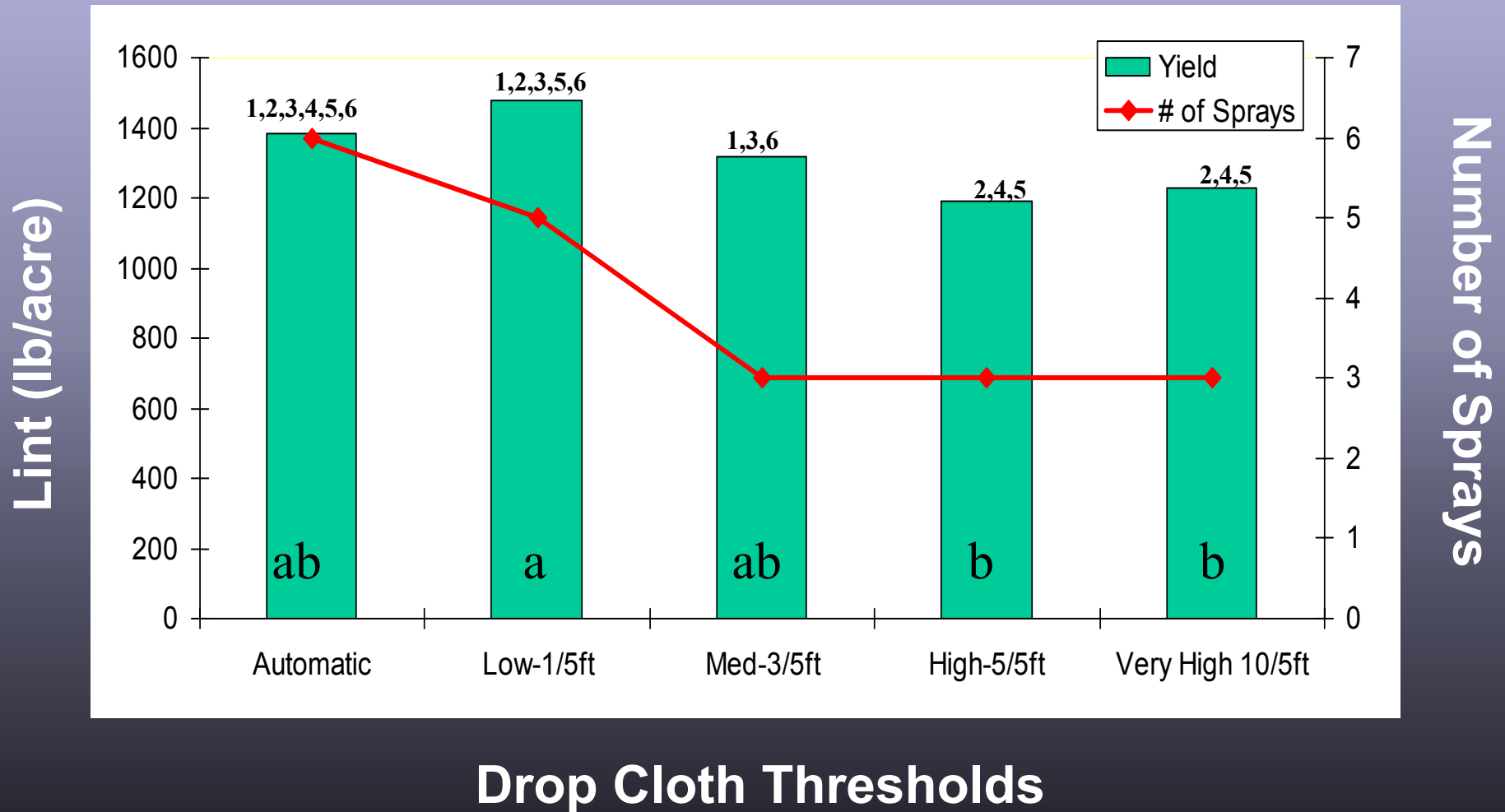
TPB Thresholds- Mid Season

Trial Treatments

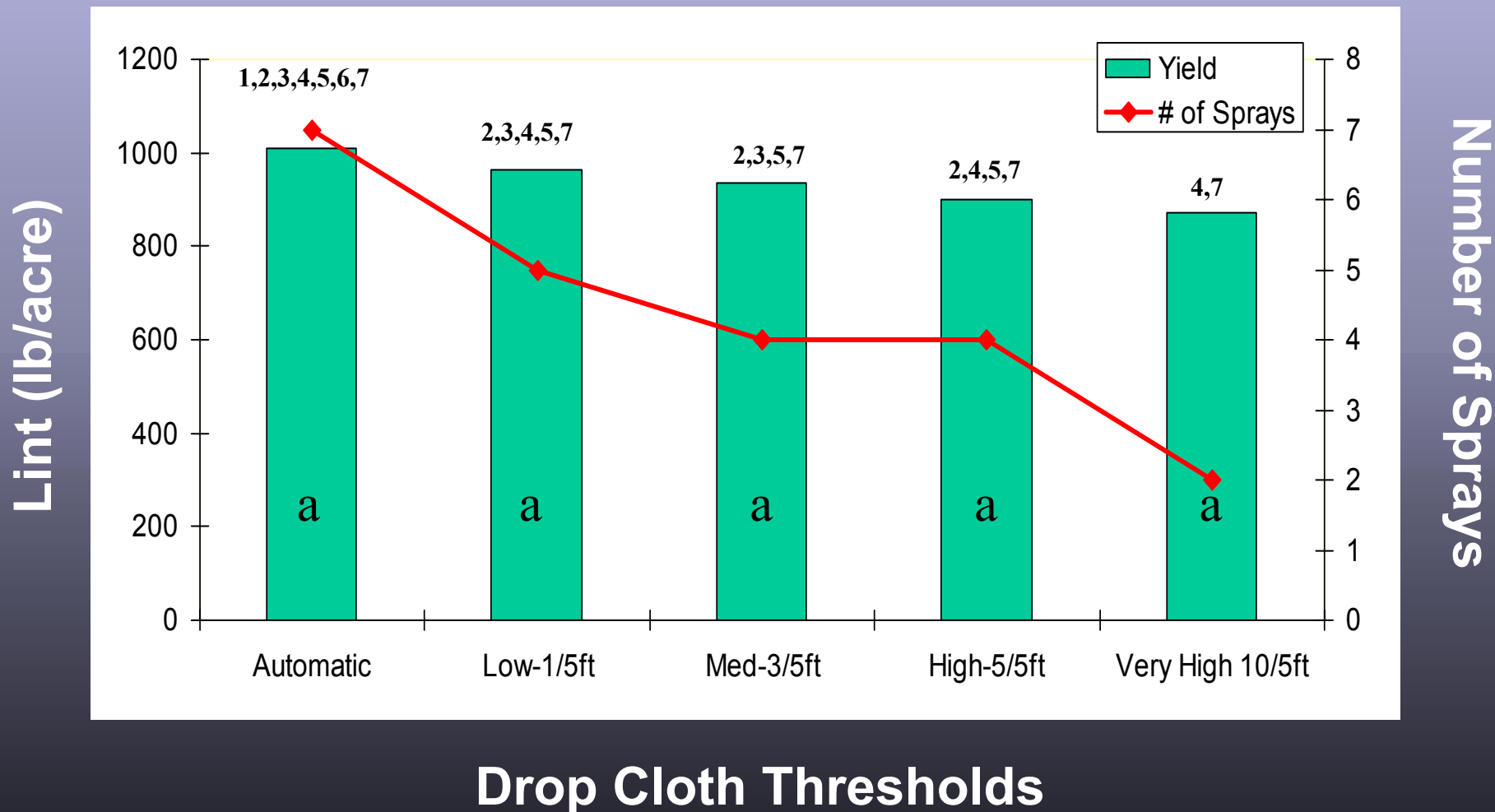
- Weekly: Insecticide application every 7 days from first bloom to cutout
- Low: Threshold of 1 PB / 5 row ft.
- Med: Threshold of 3 PB / 5 row ft.
- High: Threshold of 5 PB / 5 row ft.
- VHigh: Threshold of 10 PB / 5 row ft.

All applications made using acephate or Bidrin

Mid-Season TPB Thresholds MS, 2006

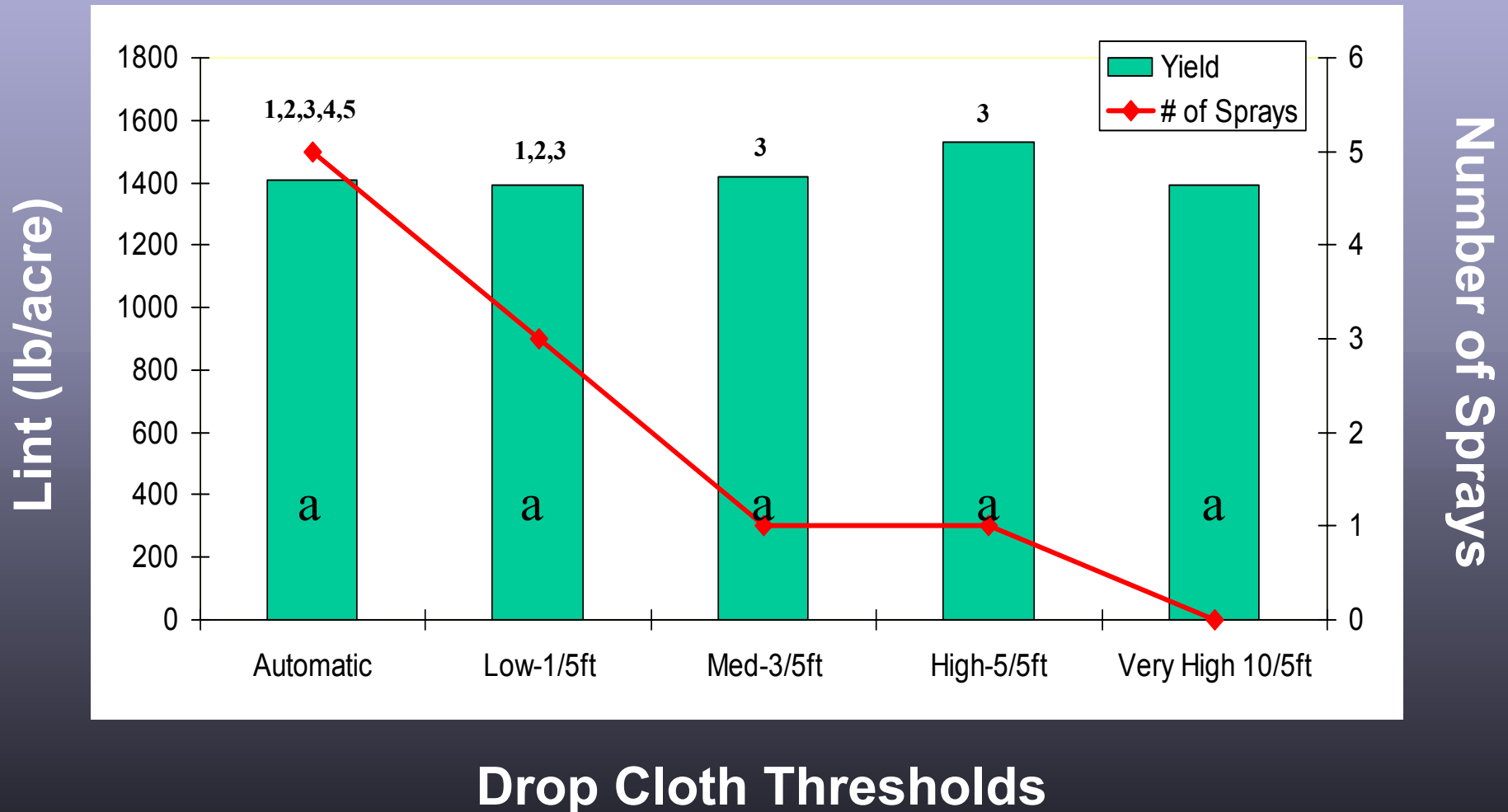


Mid-Season TPB Thresholds LA, 2006

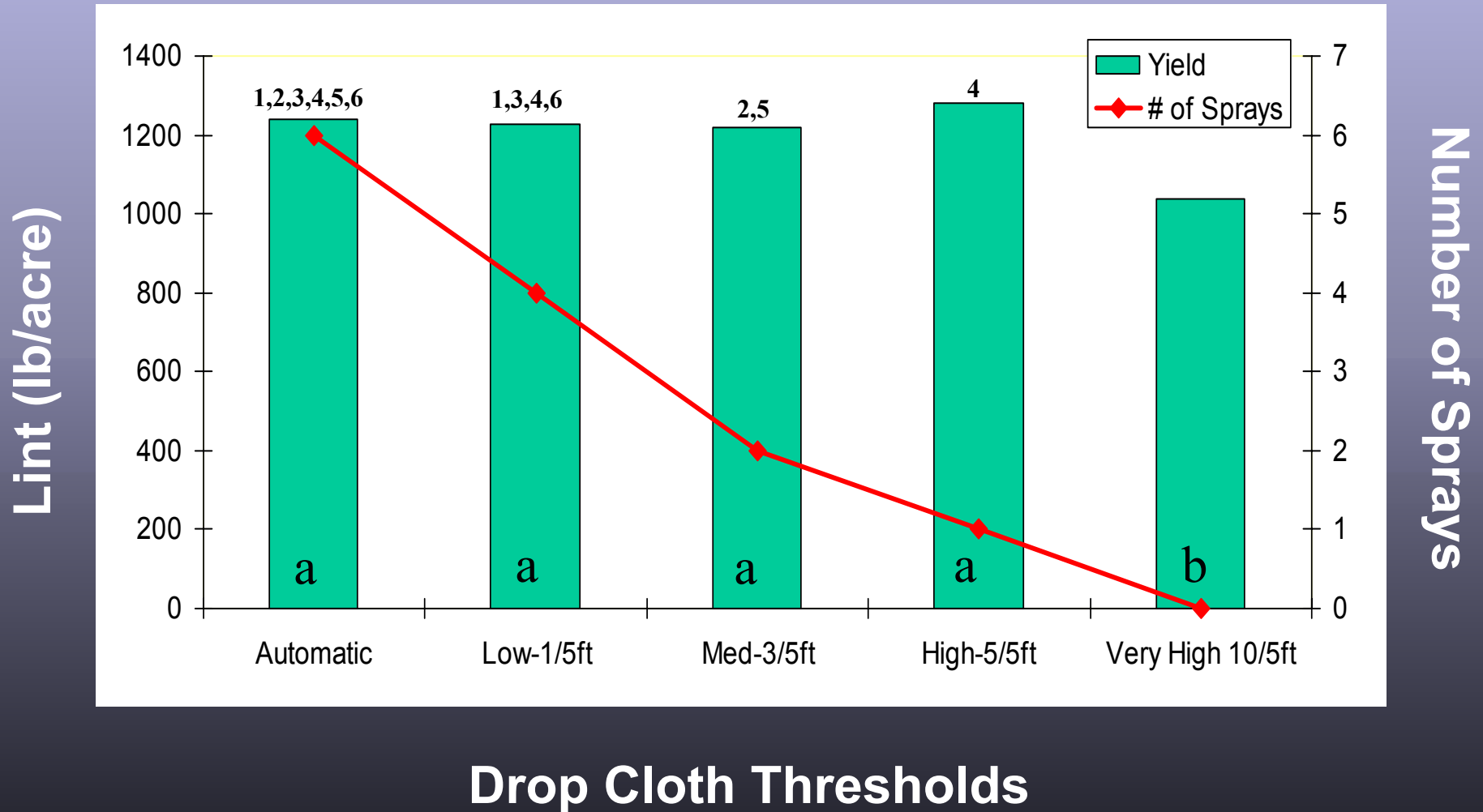


Mid-Season TPB Thresholds

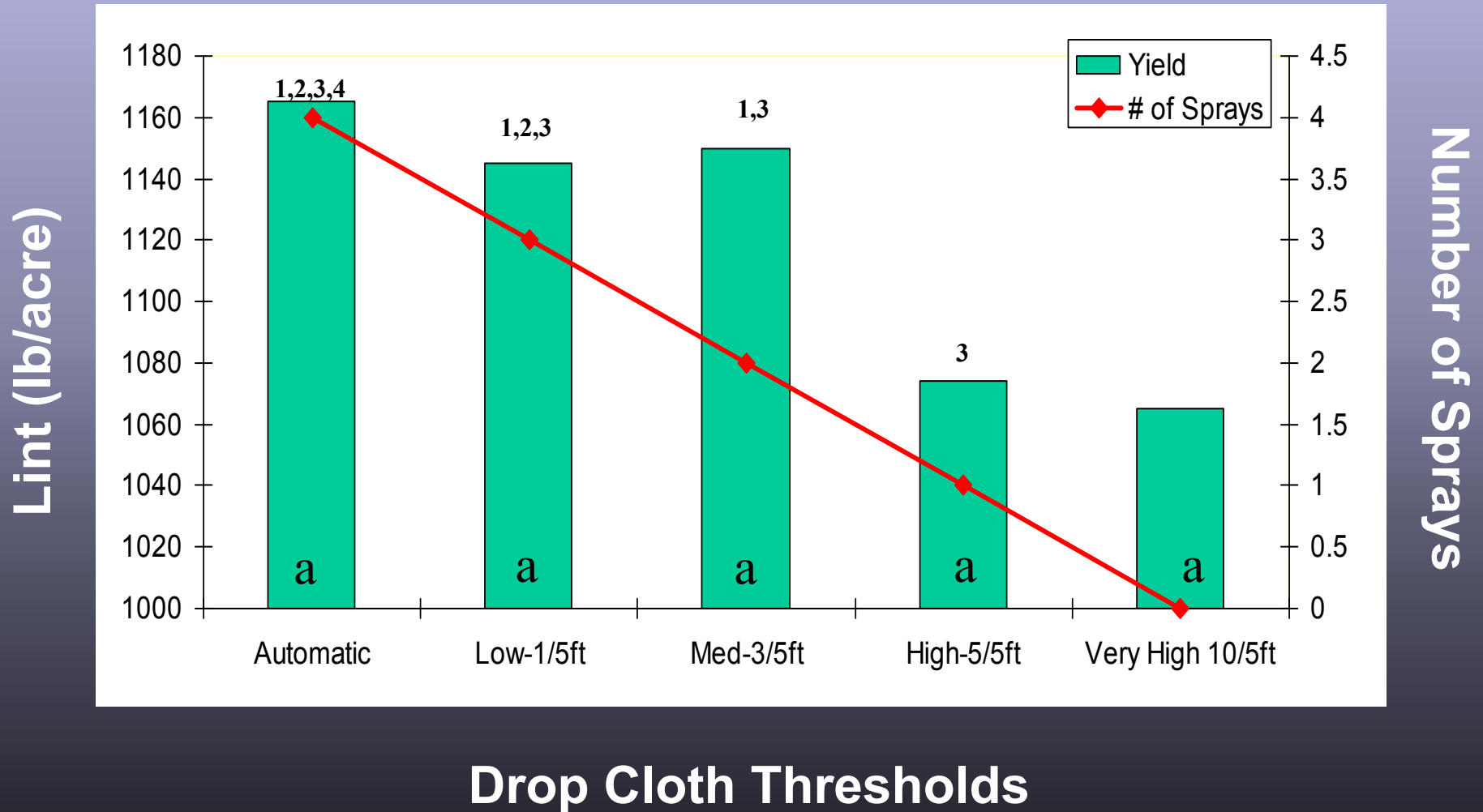
Lee Co. AR, 2006



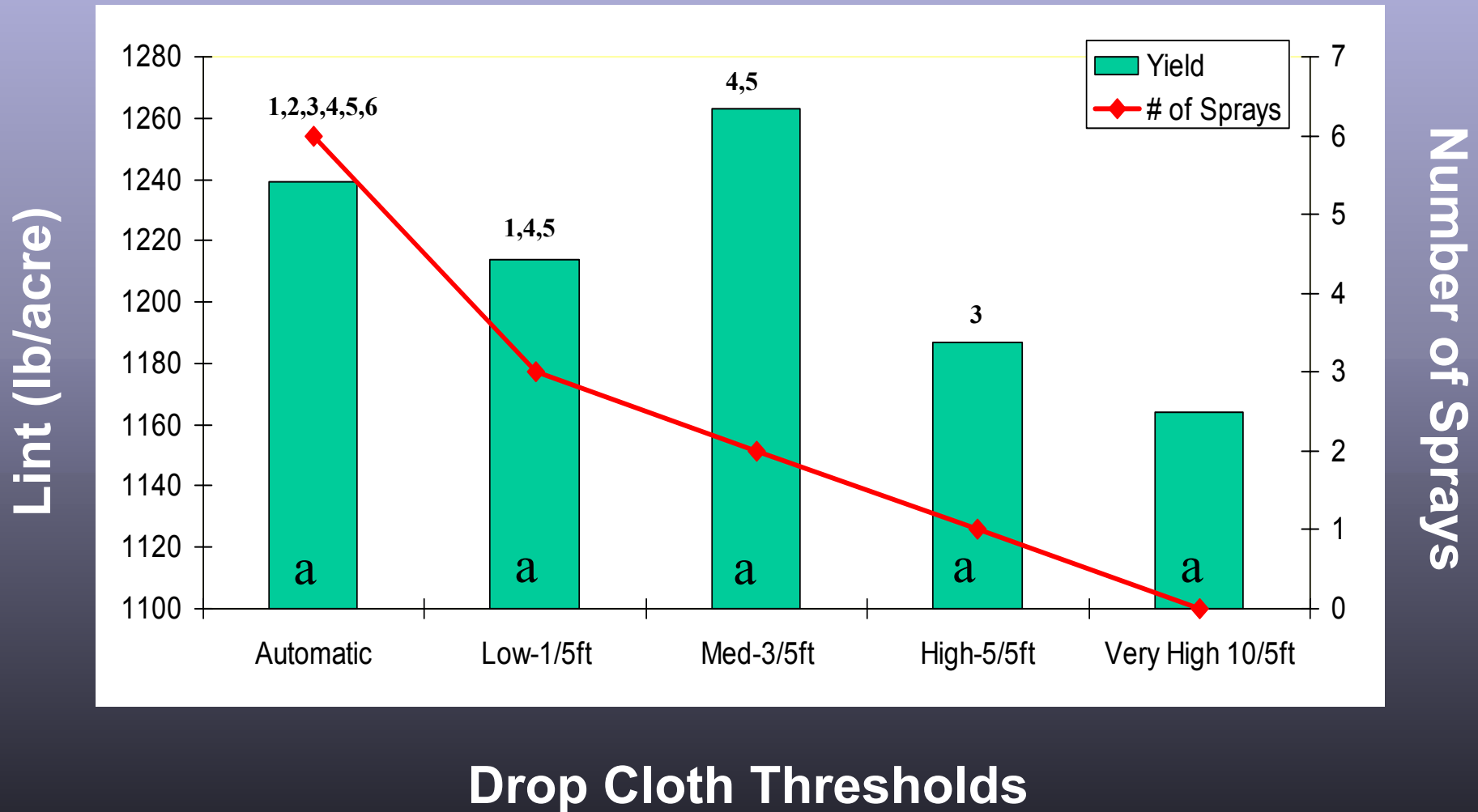
Mid-Season TPB Thresholds Lauderdale, TN, 2006



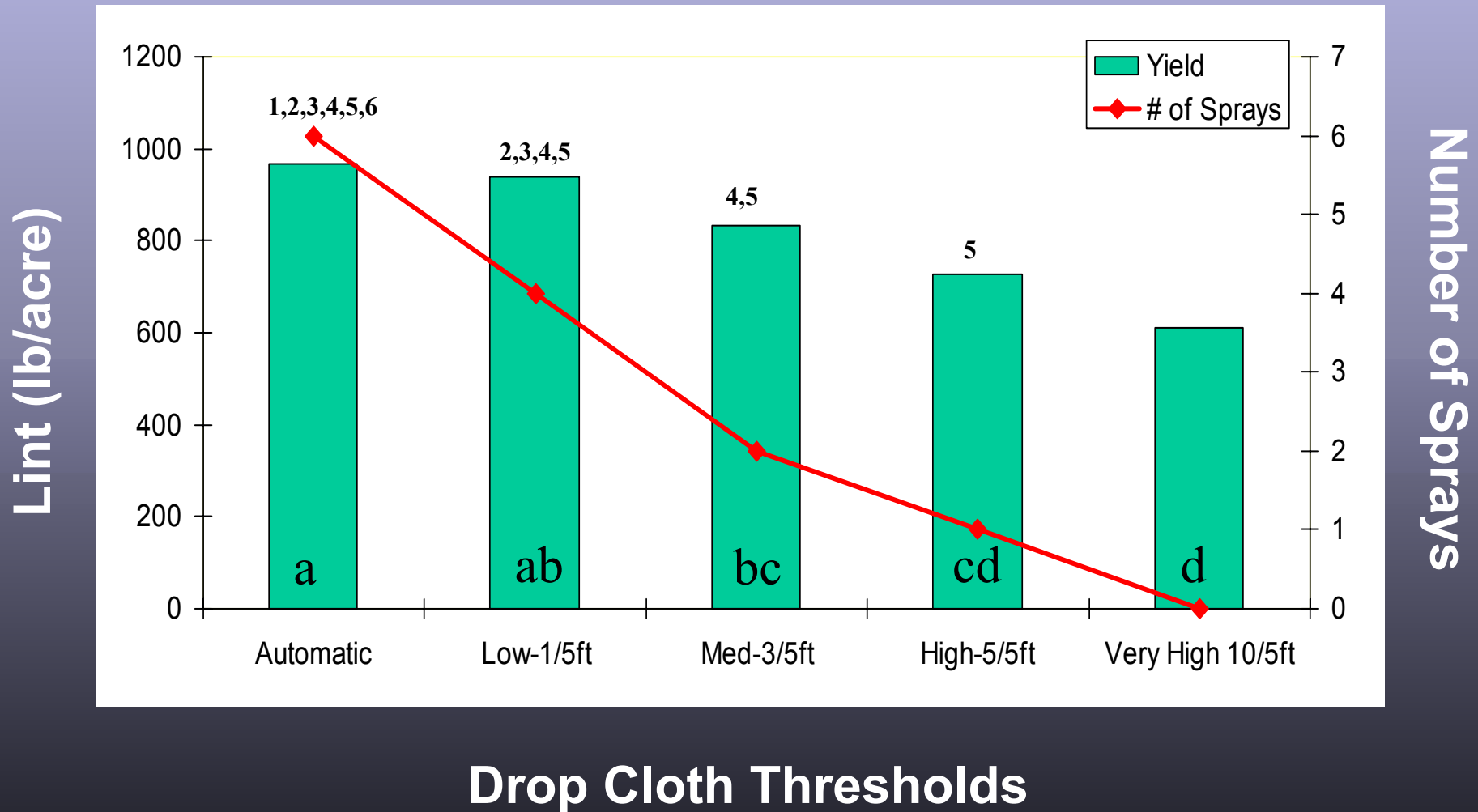
Mid-Season TPB Thresholds Angola, LA, 2007



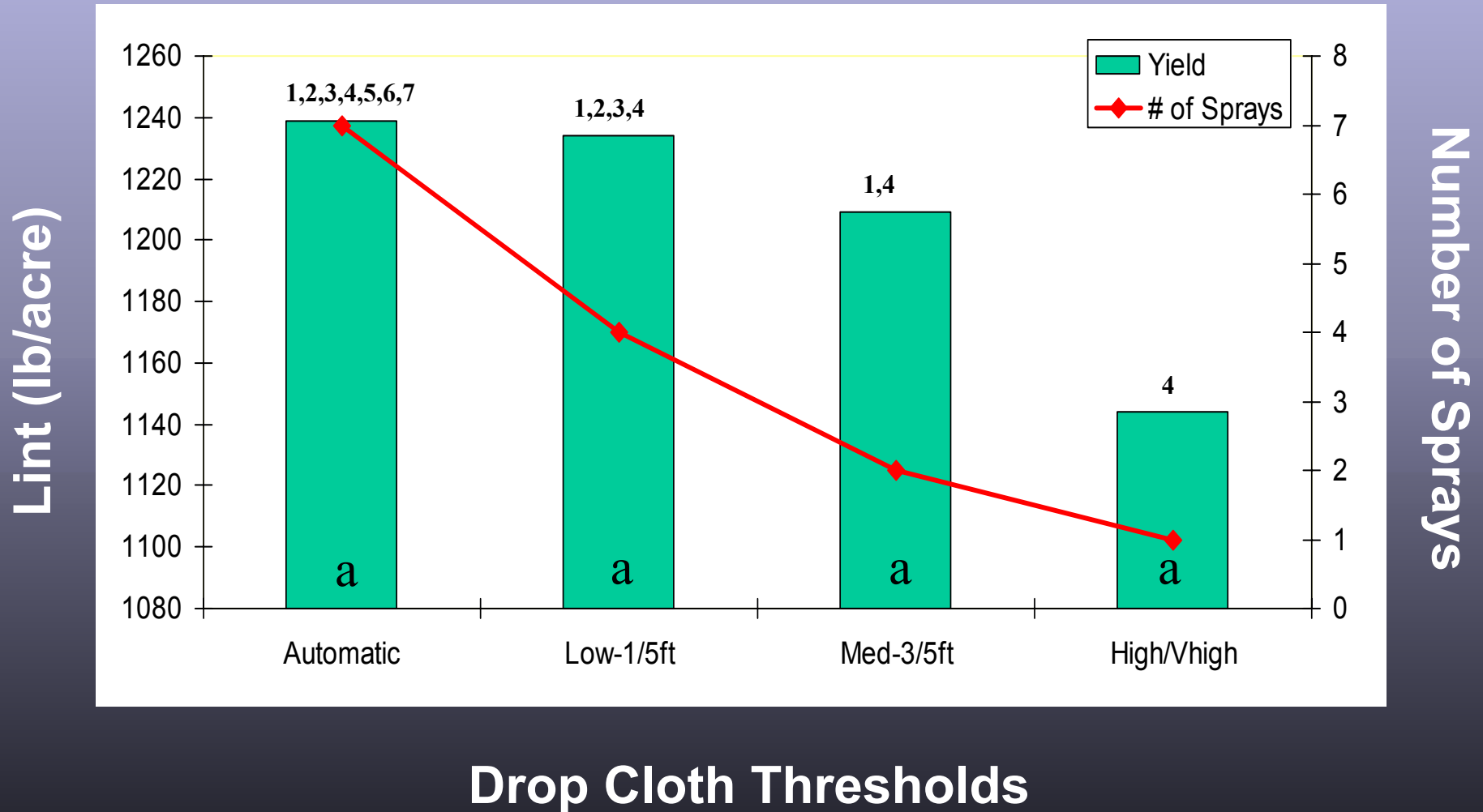
Mid-Season TPB Thresholds Fullens, TN, 2007



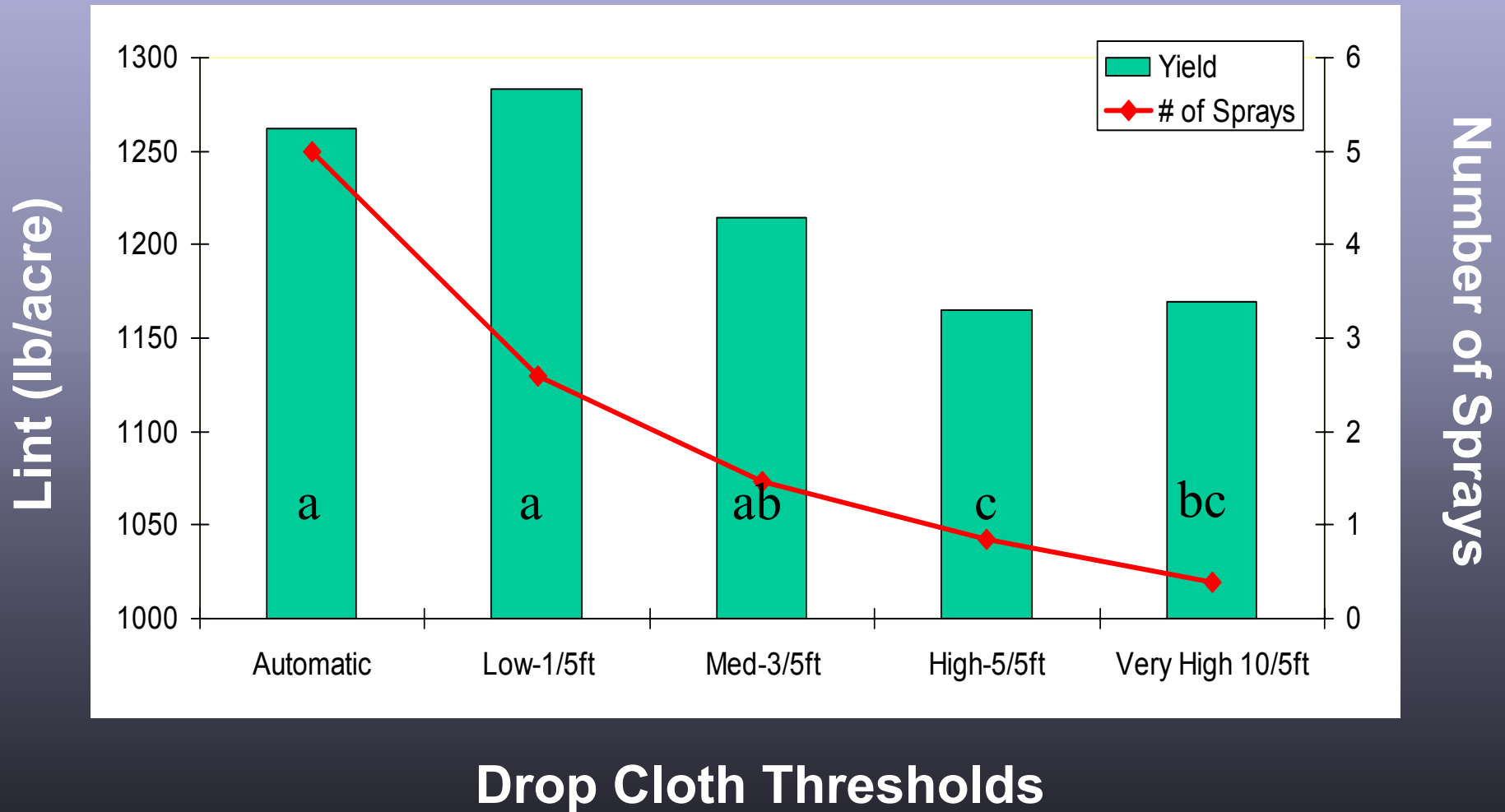
Mid-Season TPB Thresholds Macon Ridge, LA, 2007



Mid-Season TPB Thresholds Stevens, AR, 2007

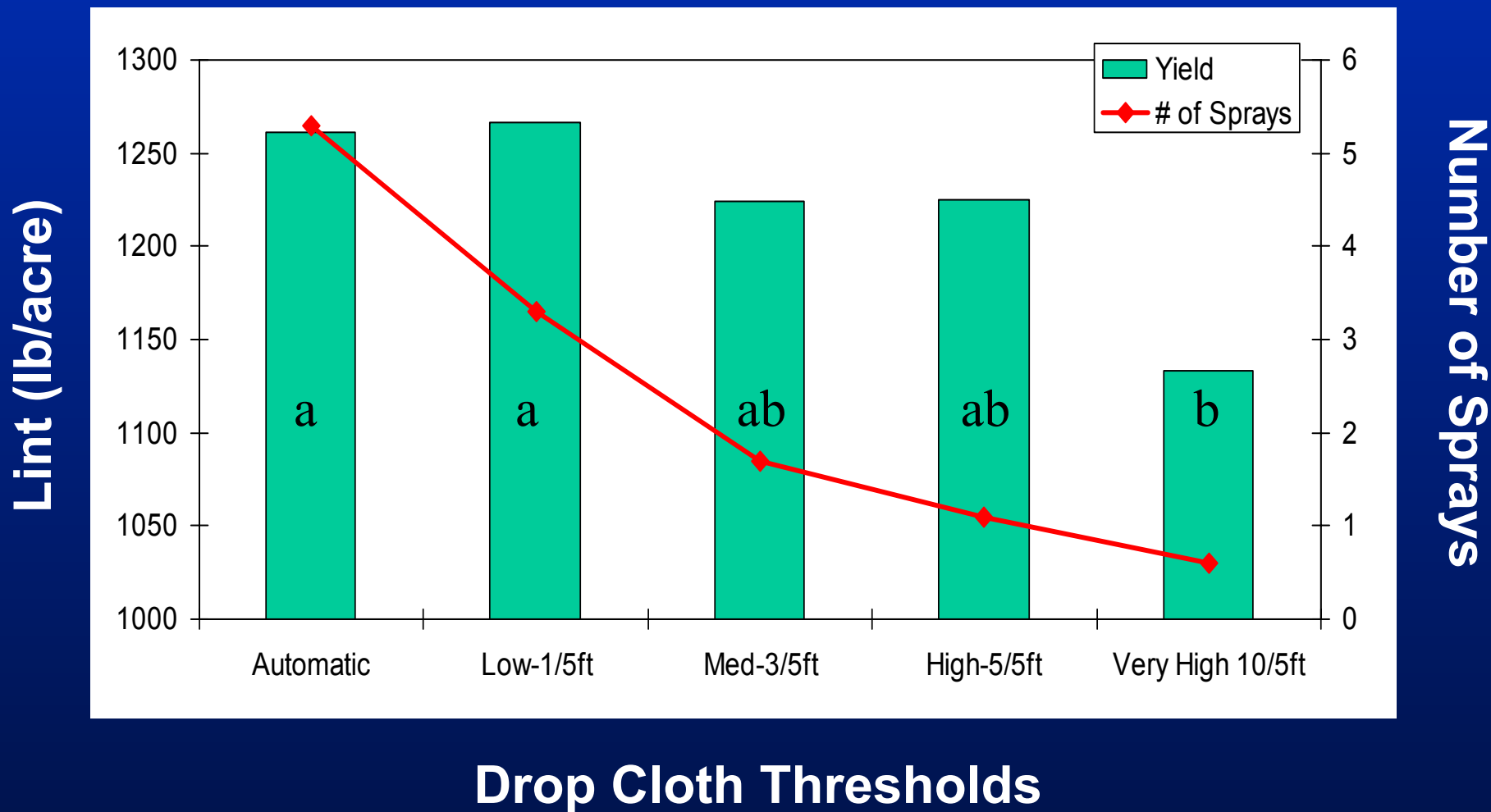


Mid-Season TPB Thresholds Mid-South (13 locations), 2007

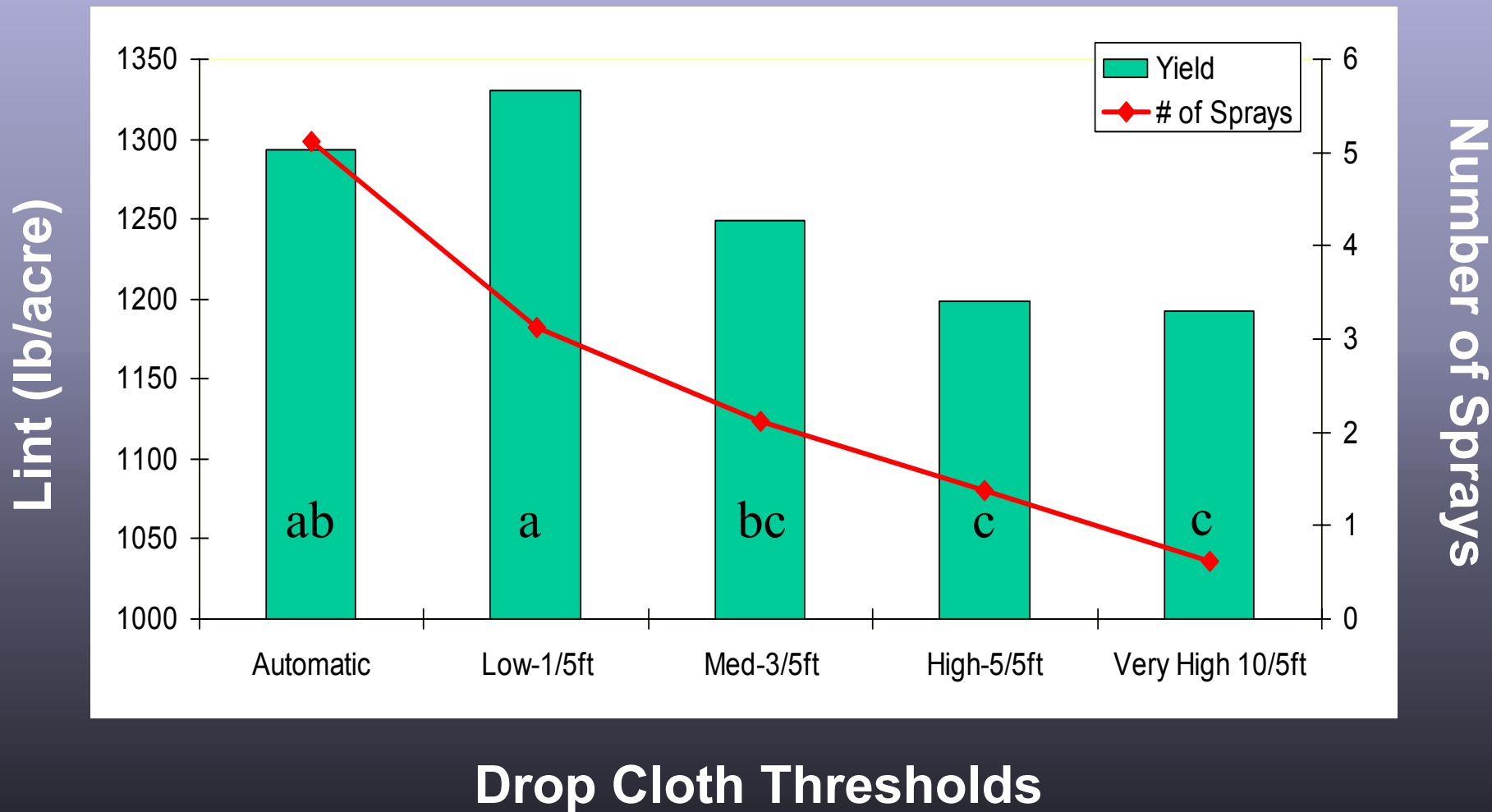


Mid-Season TPB Thresholds

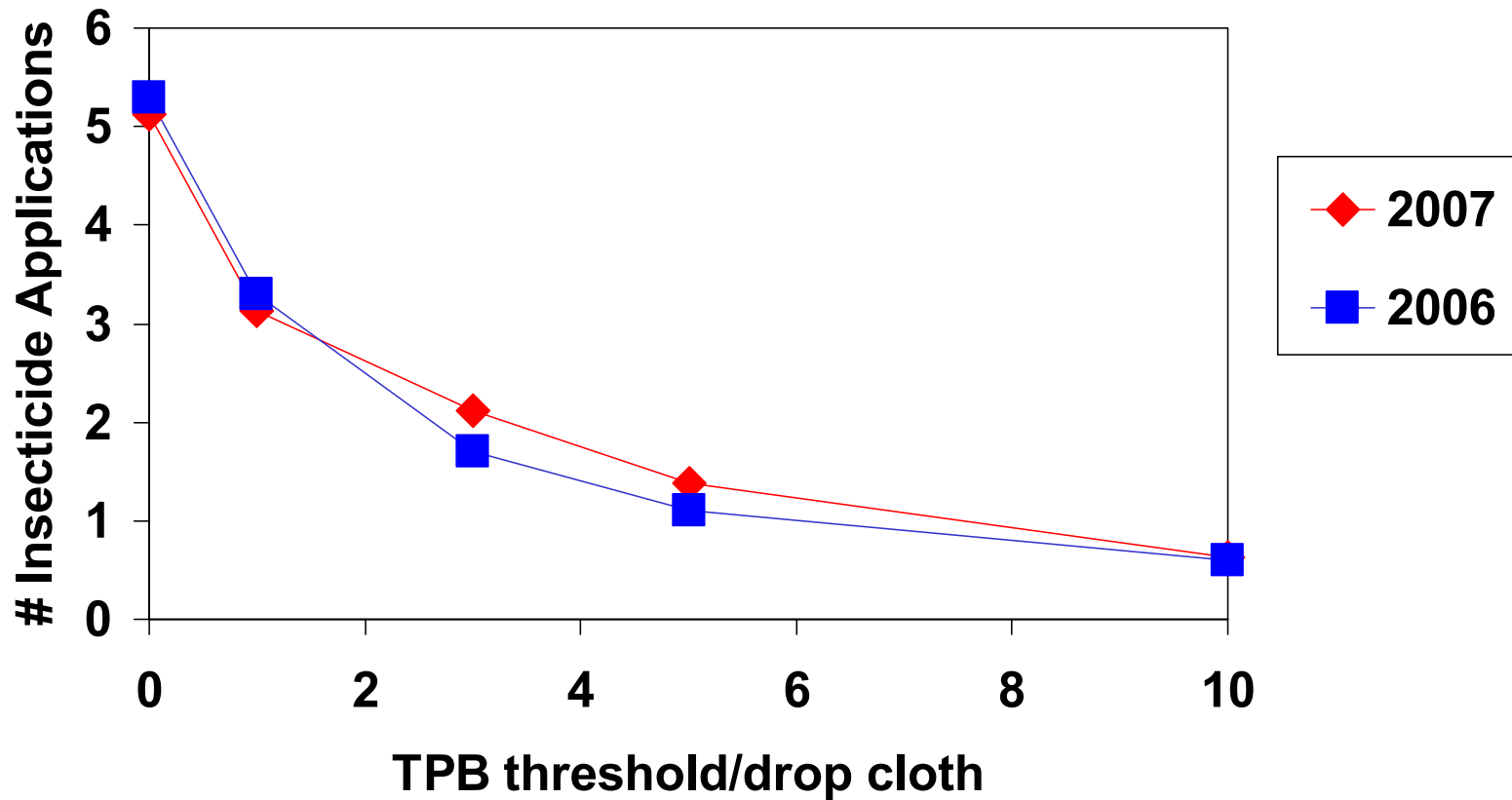
Mid-South (4 locations), 2006 where high threshold reached



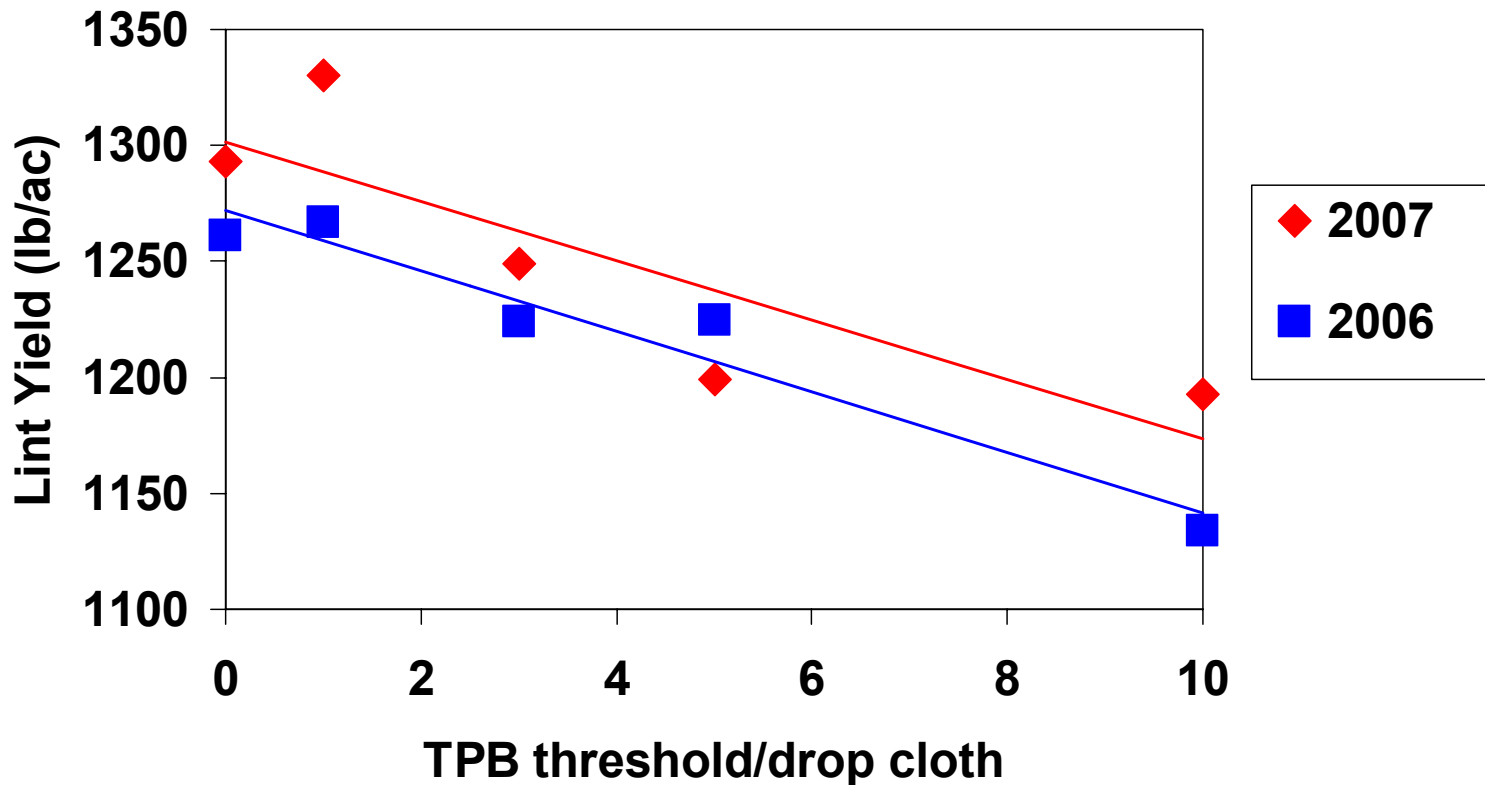
Mid-Season TPB Thresholds Mid-South (8 locations), 2007 where high threshold reached



Mid-Season TPB Insecticide Applications

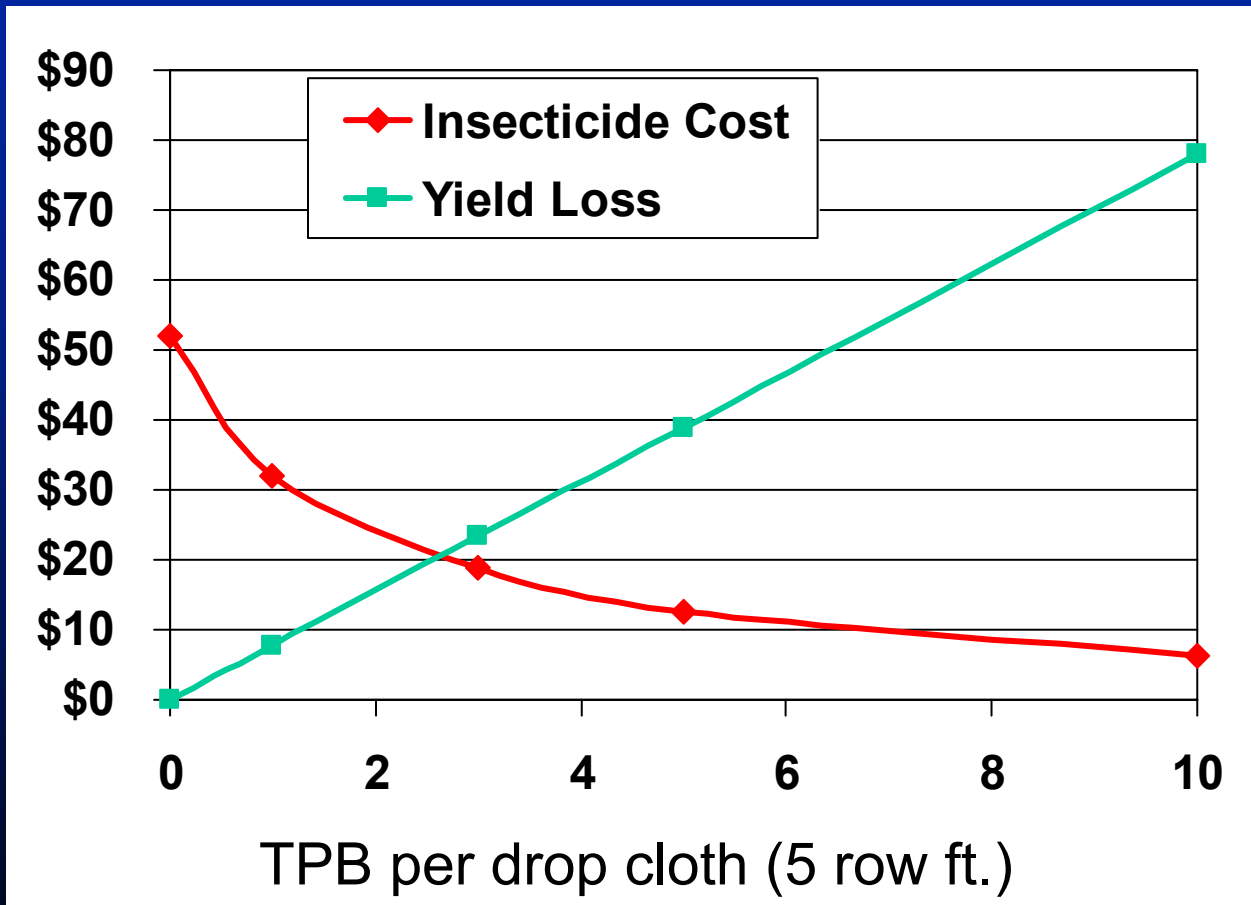


Mid-Season TPB Yield Losses



Lost 12 lb lint per acre for each 1 TPB /5 row ft. increase in threshold (2-yr average)

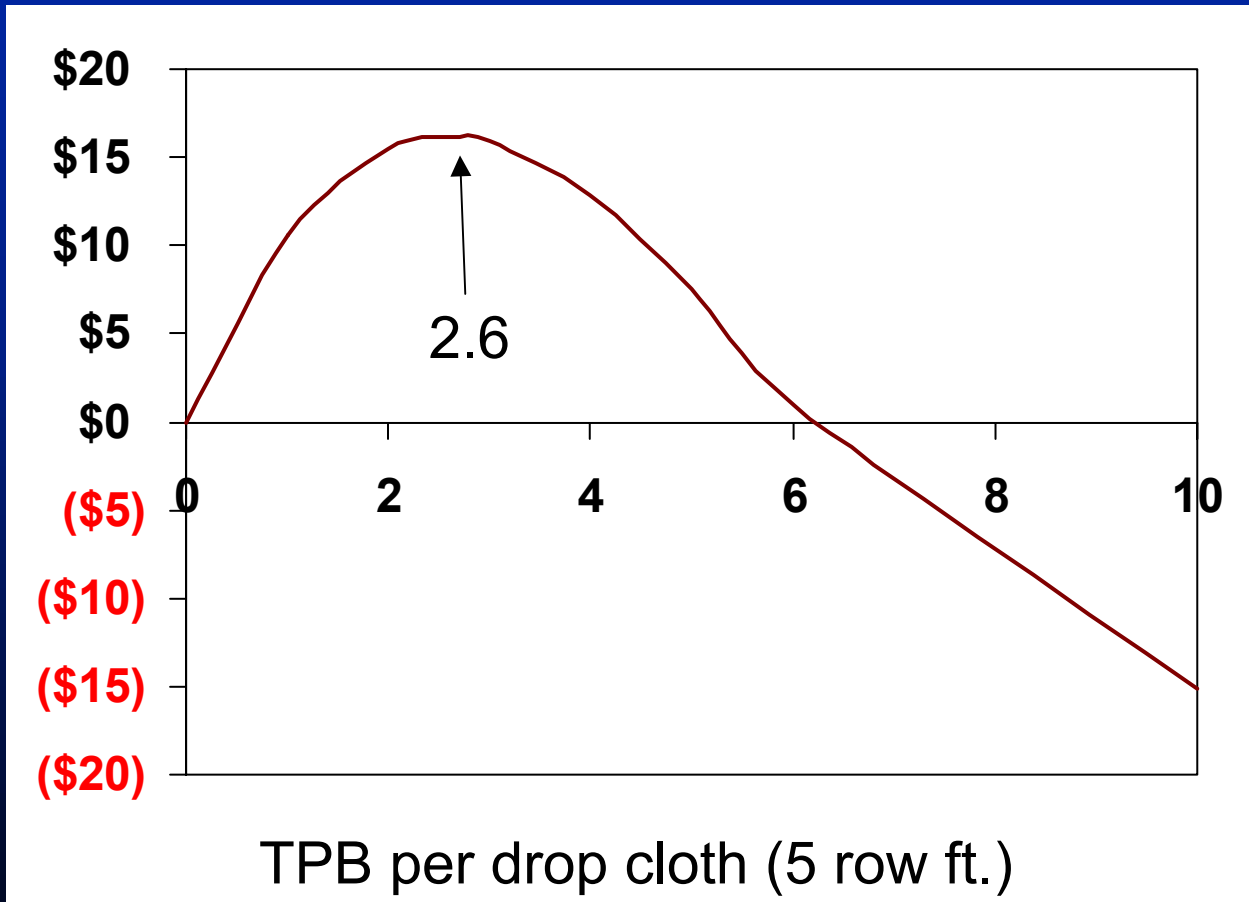
Mid-Season TPB Threshold Current Economics (Combined data)



insecticide =
\$10/application

cotton value =
\$0.65/lb

Mid-Season TPB Threshold Current Economics

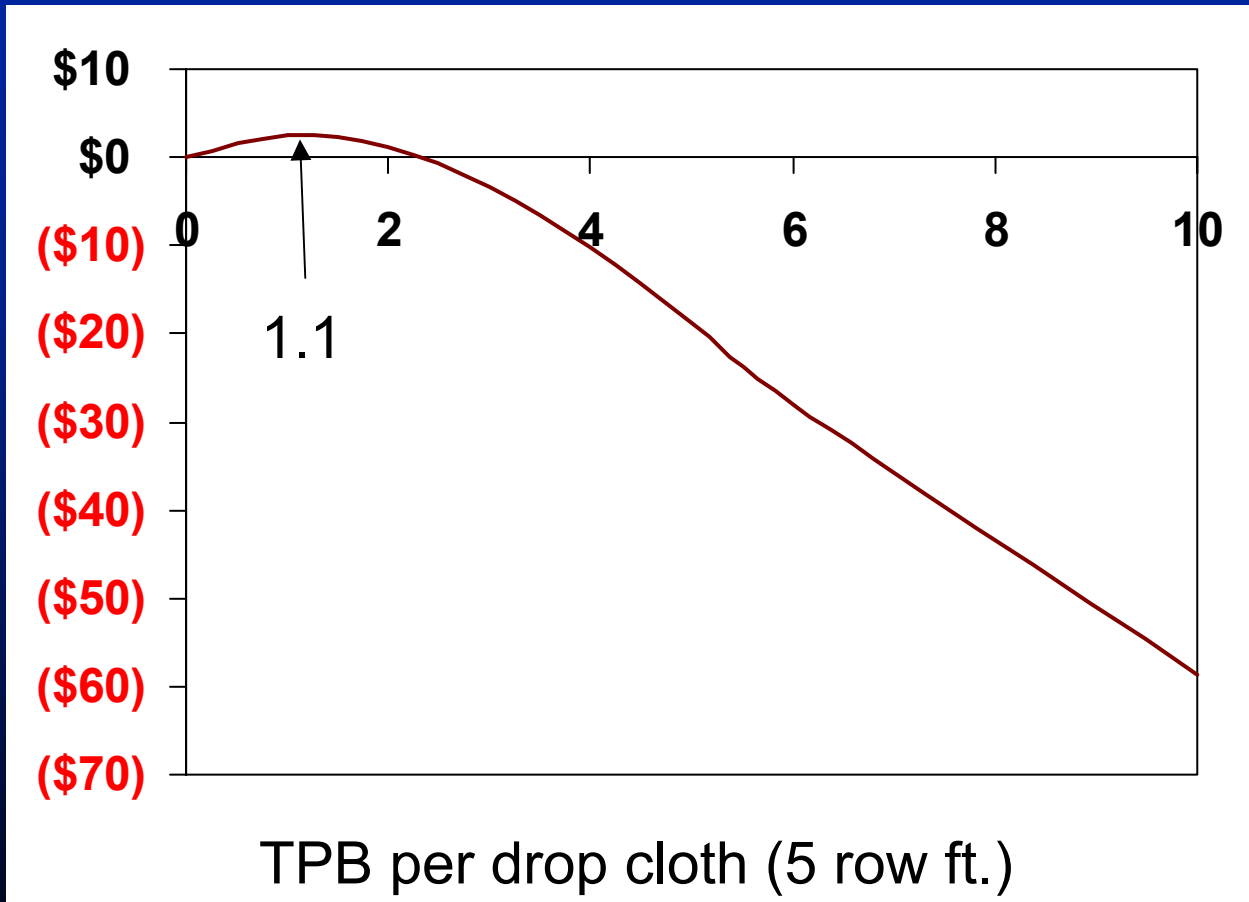


insecticide =
\$10/application

cotton value =
\$0.65/lb

Mid-Season TPB Threshold

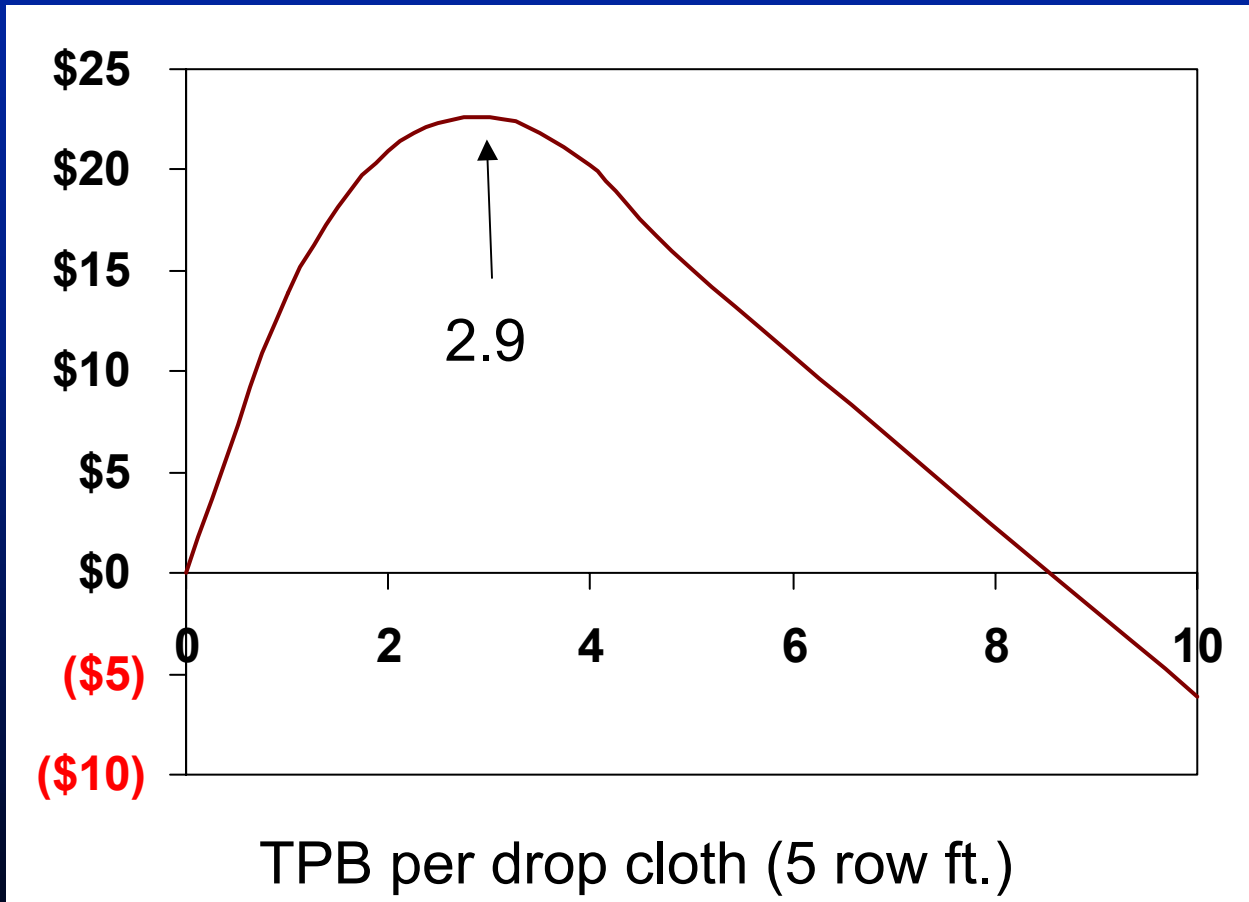
Higher value, lower cost Economics



insecticide =
\$7/application
cotton value =
\$0.75/lb

Mid-Season TPB Threshold

Low value, High cost Economics



insecticide =
\$12/application

cotton value =
\$0.50/lb

Bloom Threshold Conclusions

- Lose about 12 lb lint for each increase in threshold of 1 TPB/drop cloth
- Reduce number of sprays per season by increasing the threshold
- Threshold of 2-3 TPB per drop cloth (5 row ft) economically justified in 2 years data
- Threshold affected by efficacy and residual of insecticides available



Mississippi

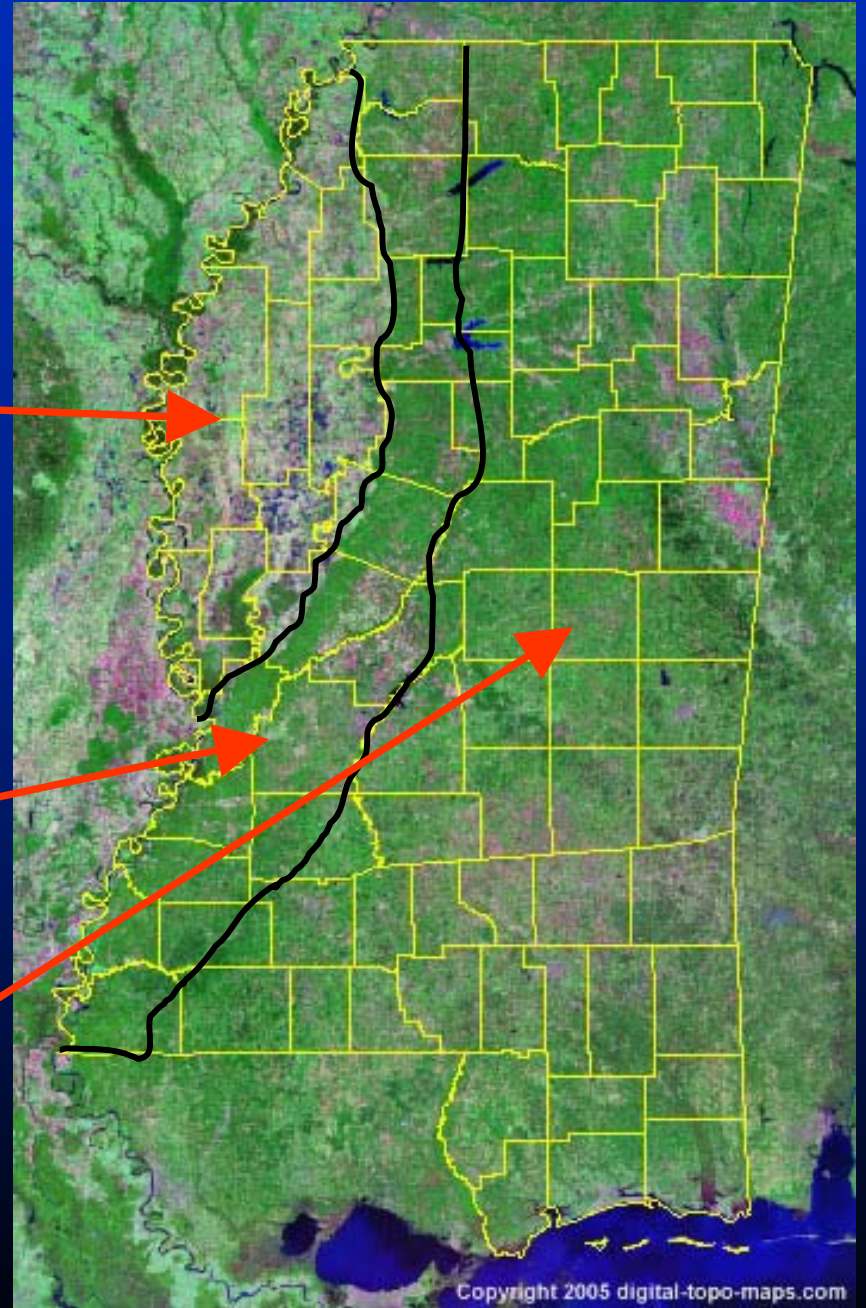
Delta



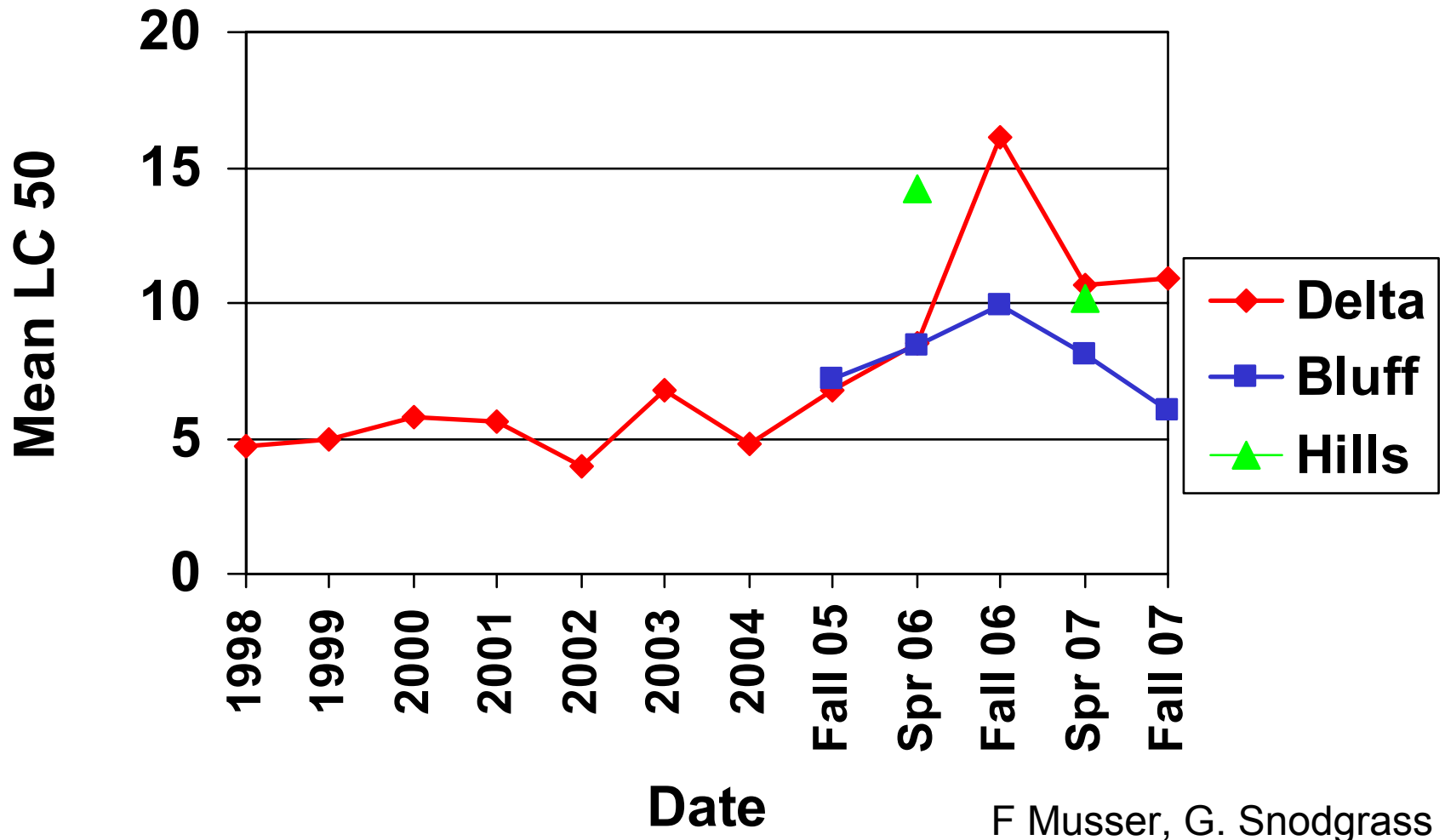
Bluff



Hills



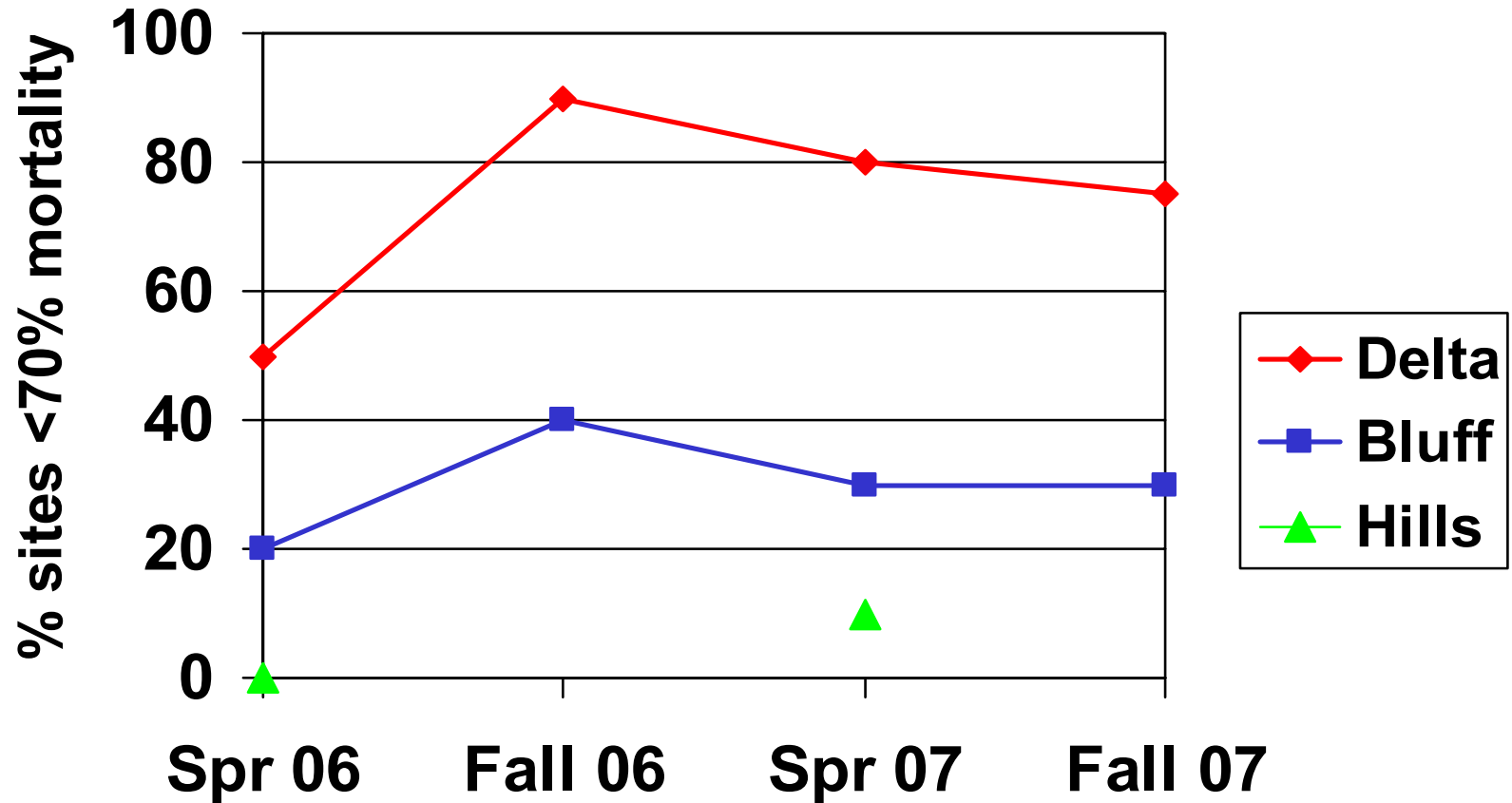
TPB Acephate Resistance



Reduced field mortality observed when LC50 > 10ppm

TPB Pyrethroid Resistance

3-h discriminating dose assay at 15 ug permethrin/ vial



Date

F Musser, G. Snodgrass

TPB Resistance Summary

- Appears to be increasing, especially in Delta
- All chemistry vulnerable
- Methods to minimize resistance
 - Use non-chemical control options
 - Rotate insecticide classes