

Disease Management

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- I. Survey**
- II. Chemical Options**
- III. 2004 Fungicide Trials**
 - A. DMI Sensitivity**
 - B. Stratego timing**
 - C. Orbit/Super Tin co-pack**
- IV. Tim Brenneman's Research**

I. Fungicide Survey

2004 PECAN FUNGICIDE SURVEY

COUNTY: _____ ACRES: _____

SPRAYER: _____

- | | | |
|-------------------|----------------------------|--------------|
| A) Abound | F) Enable | K) Stratego |
| B) Agri Tin | G) Enable/AgriTin co-pack | L) Sulfur |
| C) Elast (Dodine) | H) Headline | M) Super Tin |
| D) Elast & TPTH | I) Orbit/Super Tin co-pack | N) Topsin-M |
| E) Elast & Enable | J) Propimax | |

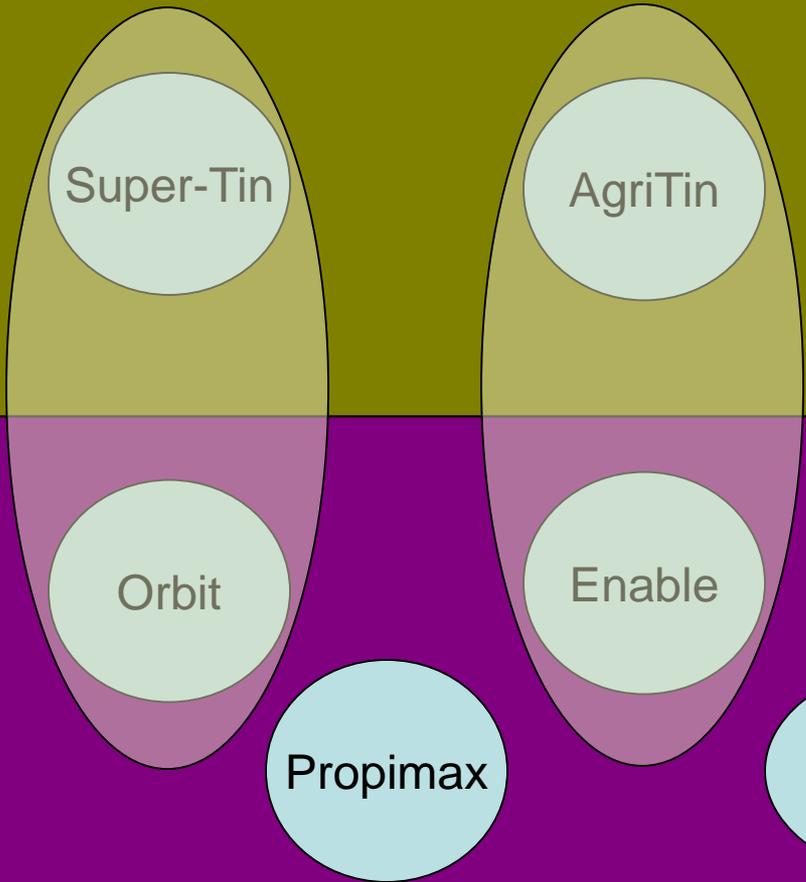
	SPRAY 1	SPRAY2	SPRAY3	SPRAY 4	SPRAY5
Pre-pollination: <i>(Bud break through nut set)</i>	_____	_____	_____	_____	_____
Post-pollination: <i>(Nut set to shell hardening)</i>	_____	_____	_____	_____	_____
After shell hardening:	_____	_____	_____	_____	_____

- | | | | | | |
|--|-----|----|--|-----|-------|
| <ul style="list-style-type: none"> • Did you use aerial application of fungicides? <ul style="list-style-type: none"> ○ If yes, what volume of water was used? _____ • What is your preferred timing for fungicide sprays? | YES | NO | | DAY | NIGHT |
|--|-----|----|--|-----|-------|

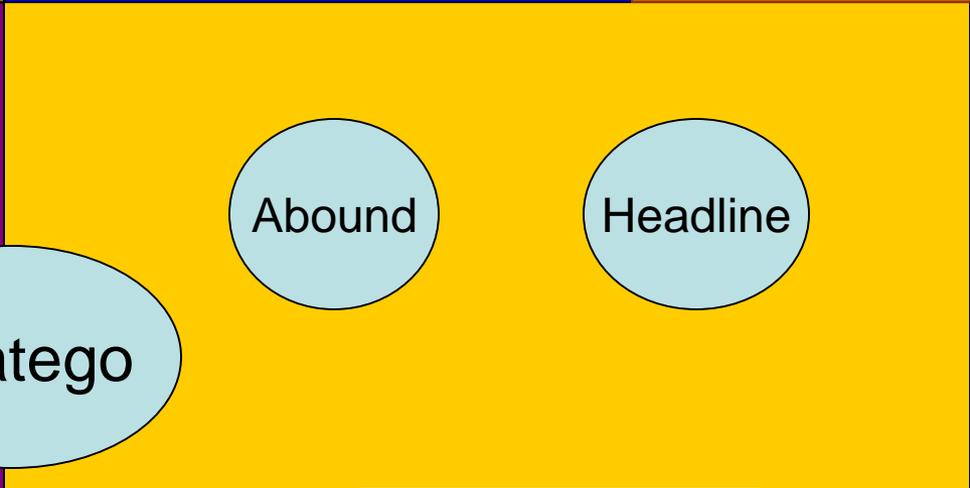
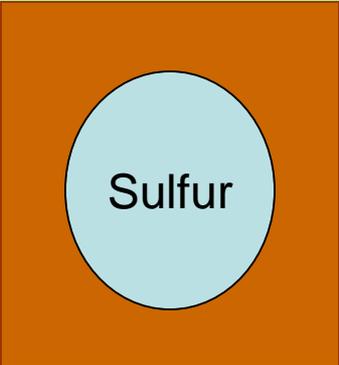
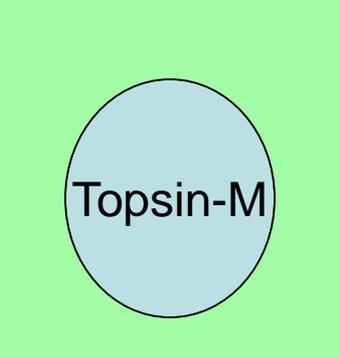
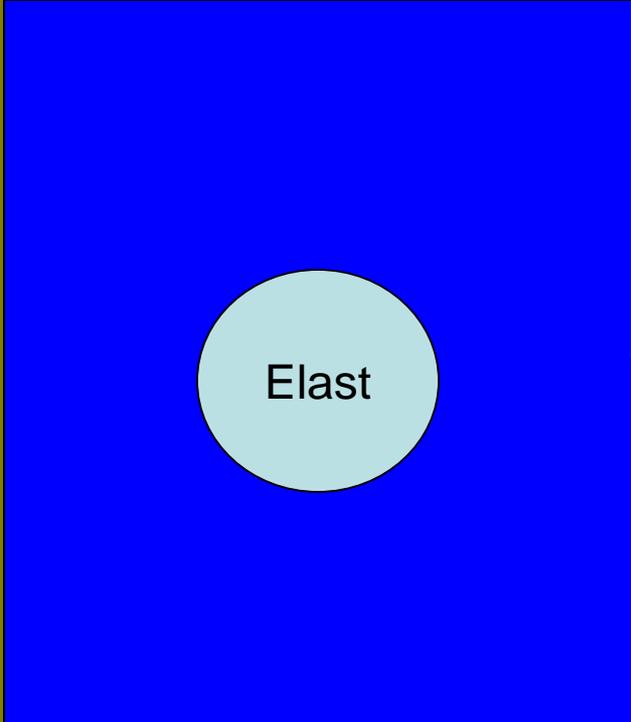
Comments:

II. Chemical Options

Triphenyltin hydroxide (TPTH)



Sterol Inhibitors (DMI's)



Strobilurins

Triphenyltin hydroxide (TPTH)

- Low risk for resistance.
- Good on nut scab
- Weaker on leaf scab and other foliar diseases.

Elast (Dodine)

- Less risk for resistance than DMI's and Strobilurins.
- Best suited for June-July sprays.
- Works well tank mixed with TPTH or Enable.

Sterol Inhibitors (DMI's)

- Moderate risk for resistance.
- Very good for leaf scab and other foliar diseases.
- Switch to other chemistry OR use reduced rate full season.

Strobilurins

- Moderate/High risk of resistance.
- Very good for leaf scab and other foliar diseases.

Resistance Management

- Sterol Inhibitors (DMIs)
 - Use reduced rate full season
 - If used alone, switch to different chemistry
- Strobilurins
 - Do not make more than 3 total applications.
- Elast (dodine)
 - Do not use full season

Management of Pecan Scab

Orbit/Super Tin co-pack | Enable/Agri Tin co-pack

Agri Tin / Super Tin

Elast

TPTH + Elast

Enable + Elast

Stratego

Stratego

Enable / Propimax

Abound / Headline

Pre-pollination

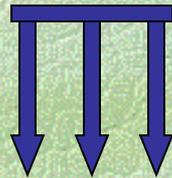
Post-pollination

After shell
hardening

III. Fungicide Trials

Stratego Timing Trials

Where does Stratego fit best?



April	May	June	July	August	Sept.
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Pre-pollination

Post-pollination

After 15 August

Stratego 10.0 oz/A

Orbit/Super Tin co-pack

Orbit/Super Tin co-pack

Stratego 10.0 oz/A

Orbit/Super Tin co-pack

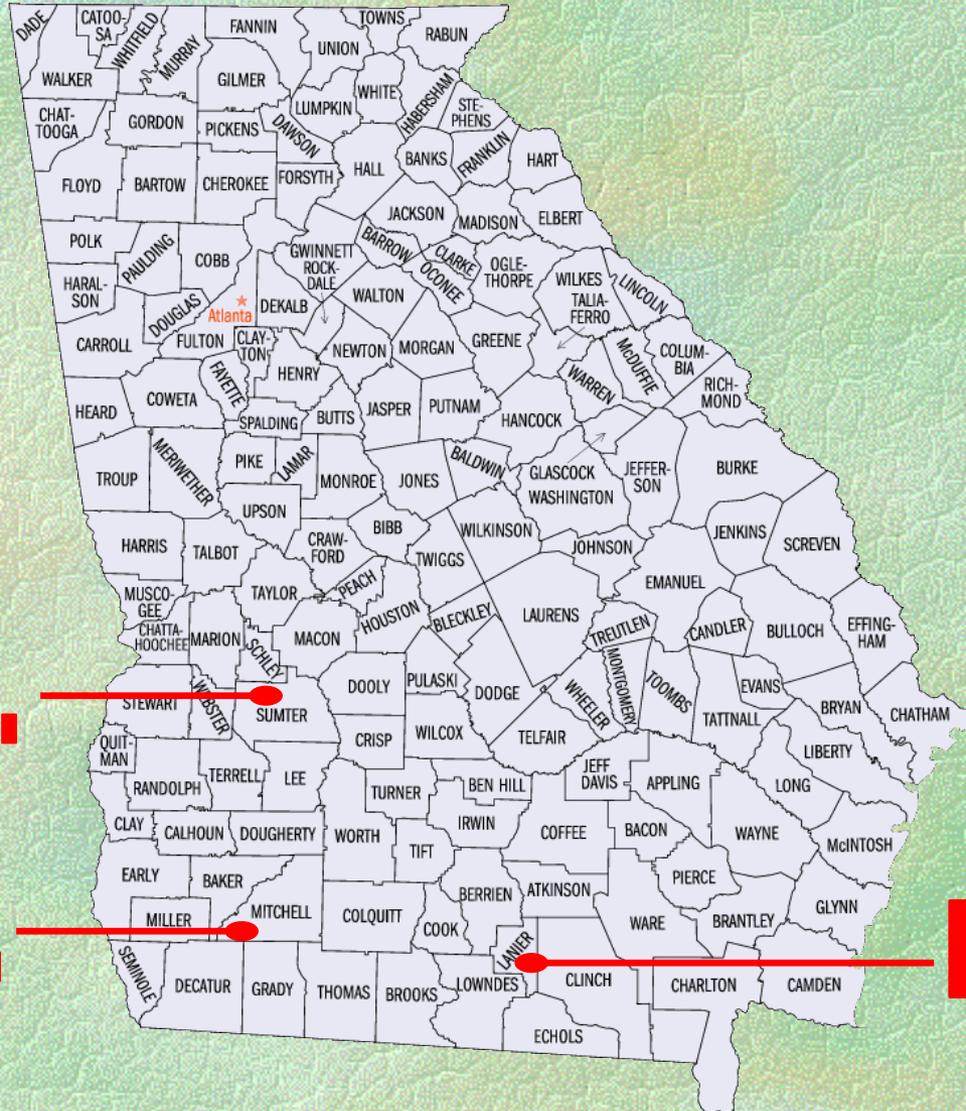
Orbit/Super Tin co-pack

Stratego 10.0 oz/A

Stratego applied in blocks of 3 sprays.

Randomized Complete Block with 4 reps.

Locations



Sumter Co.

Mitchell Co.

Lanier Co.

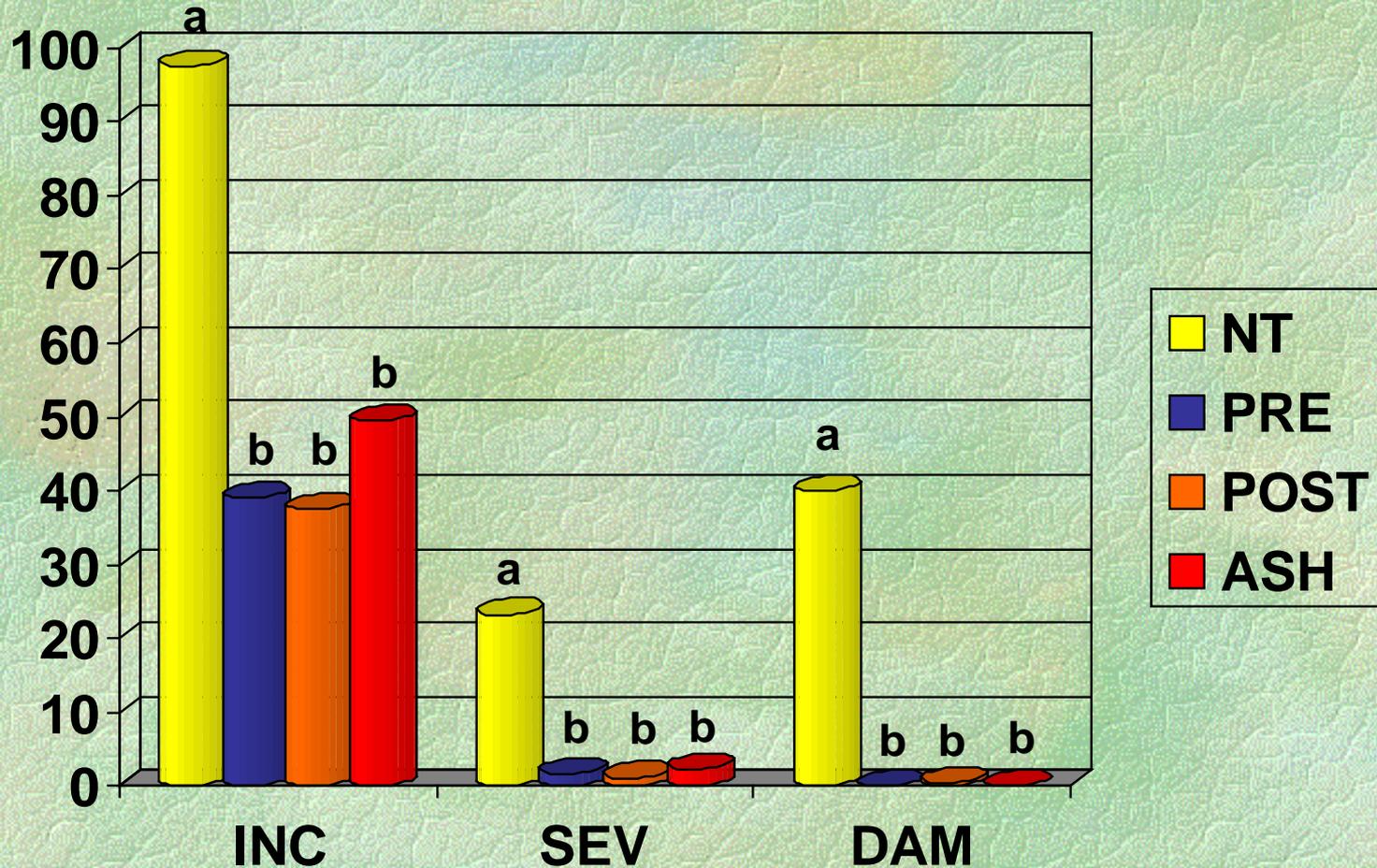
Nut Scab Data

- Incidence = % nuts with any scab.
- Severity = mean % of shuck surface covered with scab
- Damage = % of nuts with 25% or more of the shuck covered with scab

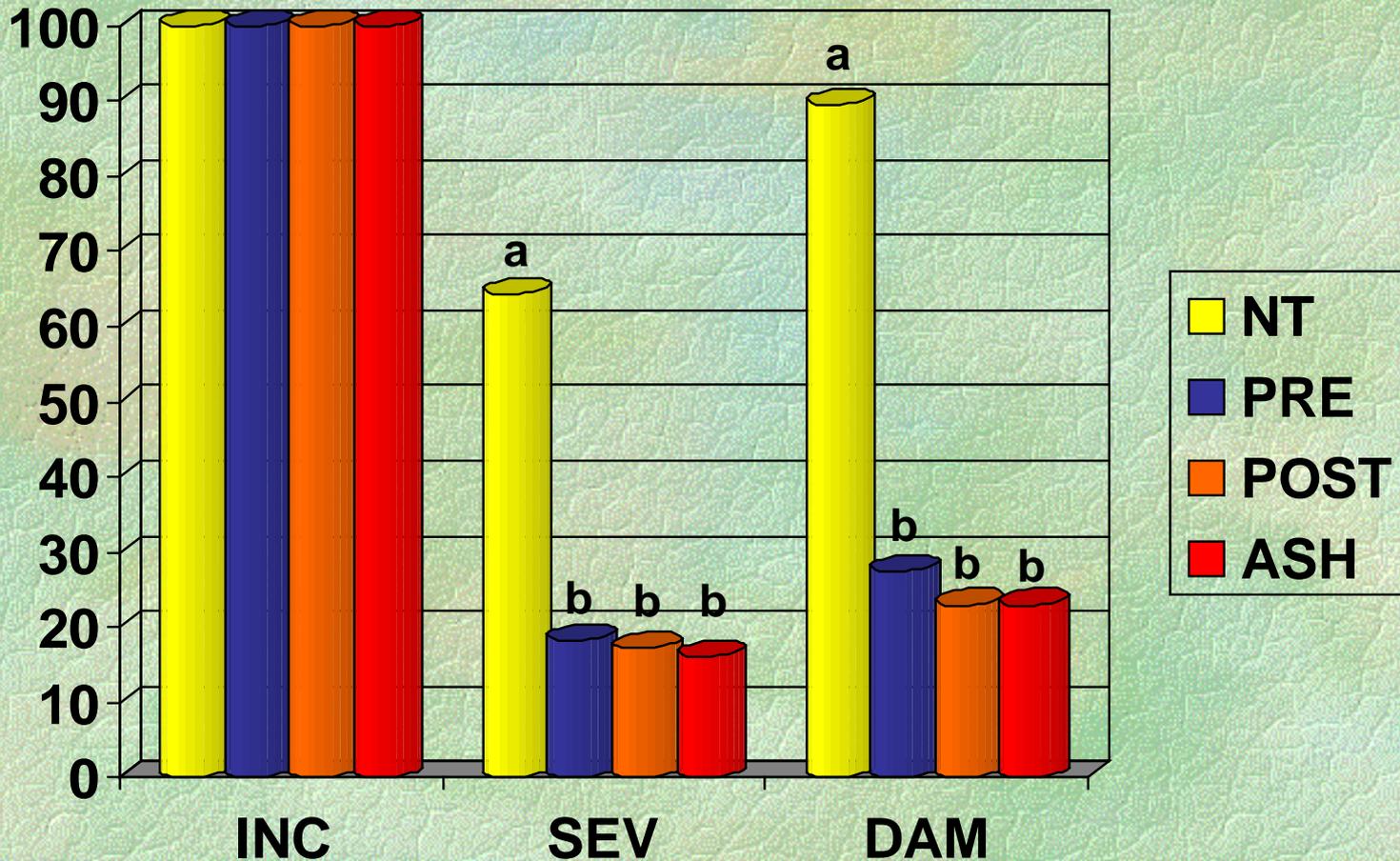
Nut Quality Data

- Length
- Nuts per pound
- Percent Kernel

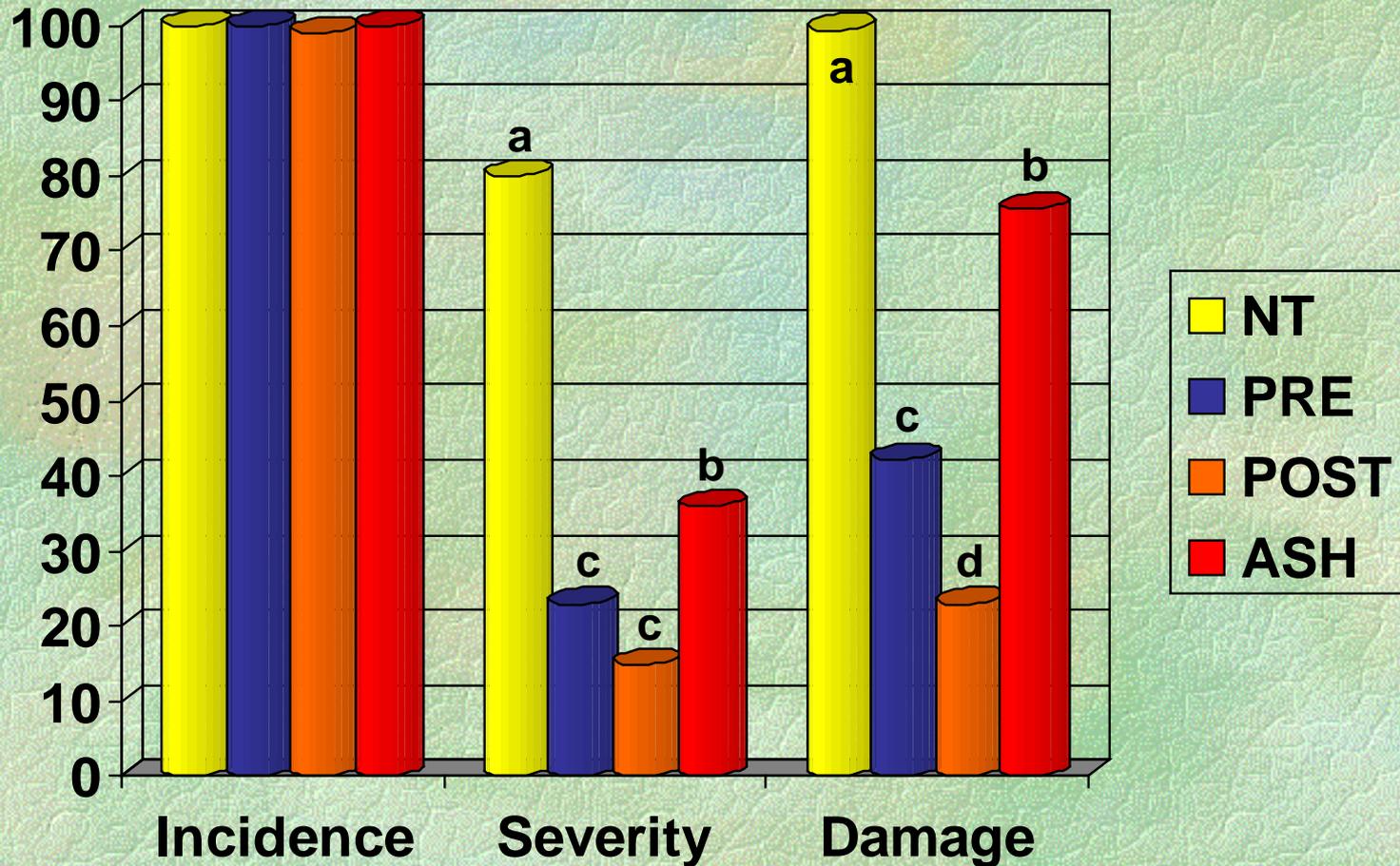
Sumter County Nut Scab Data



Lanier County Nut Scab Data



Mitchell County Nut Scab Data



Nut Quality (Stratego Trials)

Length
Nuts/lb
% Kernel

- All spray programs significantly improved nut quality compared to the non-treated trees.
- There were no significant differences between spray programs.

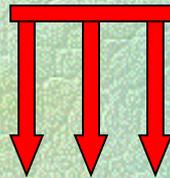
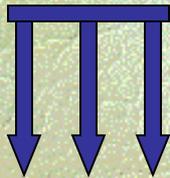
No Fungicide	A
Pre-pollination	B
Post-pollination	B
After shell hardening	B

Summary

- Late season applications of Stratego did not improve nut quality.
- In Mitchell Co., pre-pollination and post-pollination applications of Stratego resulted in lower nut scab than after shell hardening applications.

Where does Stratego fit best?

- A. Great for control of leaf scab.
- B. Other options exist for nut scab.



Post-pollination application was the best option at one location.

DMI Sensitivity Trials

DMI Chemicals

- Propiconazole
 - Orbit
 - Propimax
 - ½ of Stratego
- Fenbuconazole
 - Enable

DMI Products

- Propimax
- Enable
- Enable/Agri Tin
- Orbit/Super Tin
- Stratego

Potential Problem

- DMI's have a narrow mode of action.
- There are documented cases where fungi have become resistant.
- Resistance will develop gradually over time.

Where do we stand?

- DMI's used on pecan in Georgia since 1988.
- Isolates collected and assayed in 1995, 2002, and 2003.
 - Commercial and research orchards
 - With and without DMI history

Where do we stand?

- Since 1995, sensitivity (in laboratory) to DMI's has declined in a majority of the orchards.
- Wide-spread control failures have not been reported.

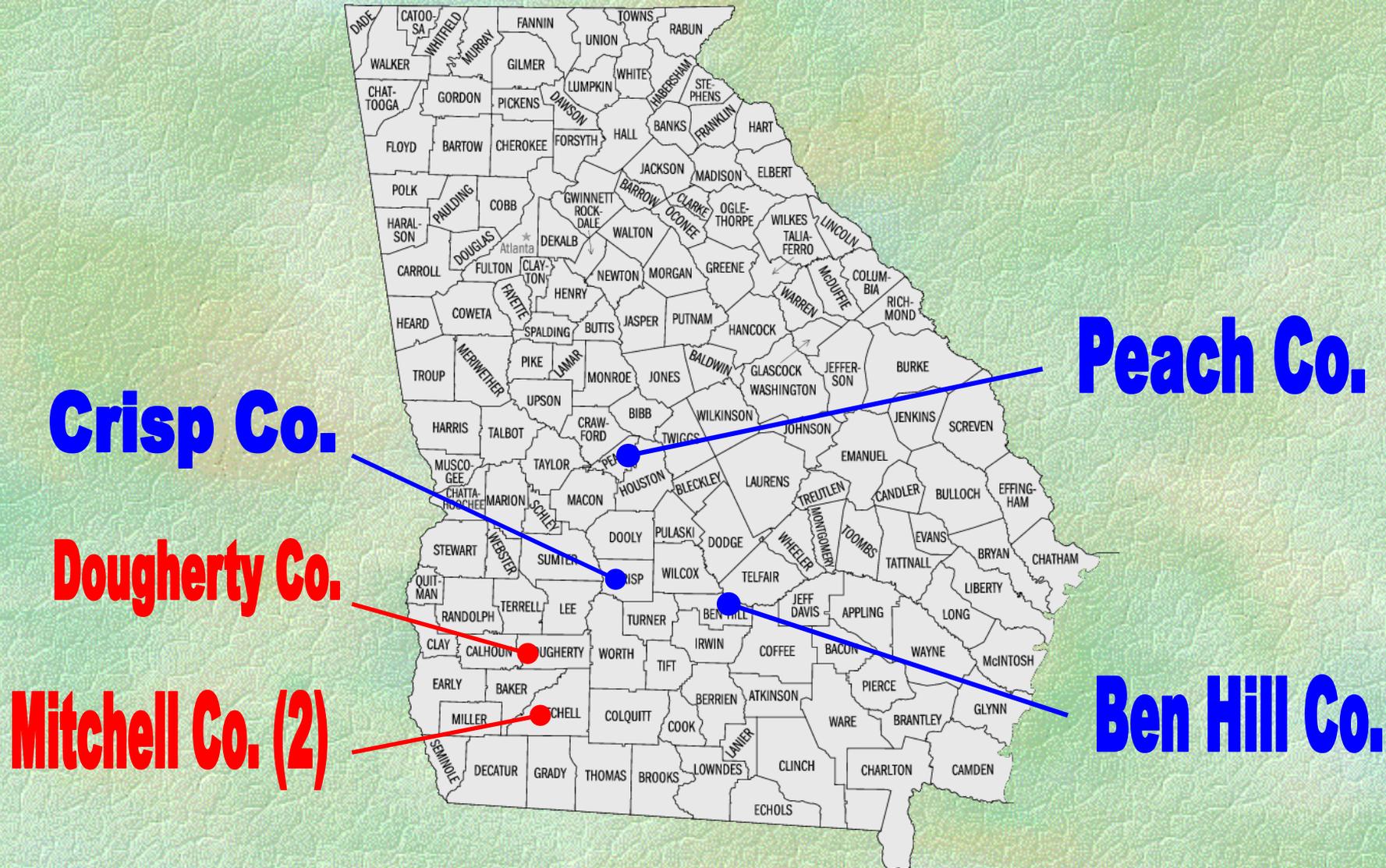
Questions Raised

- What is the impact on reduced-rate DMI programs?
- What is the best use of DMI's?
- What is the long-term future of DMI's?

2004 Trials

- The objective was to examine the effectiveness of full and reduced rates compared in orchards with 'high' and 'low' sensitivities.

DMI Trial Locations



Crisp Co.

Peach Co.

Dougherty Co.

Mitchell Co. (2)

Ben Hill Co.

Spray Program*

Bud break – 1 June

- 1st spray: Agri Tin (2.34 lb per 500 gal)
- 2nd spray: Headline (30 oz per 500 gal)
- 3rd spray: Headline (30 oz per 500 gal)
- 4th spray^{**}: Agri Tin (2.34 lb per 500 gal)

* Not recommended. A non-DMI program was needed.

** If needed

Spray Program

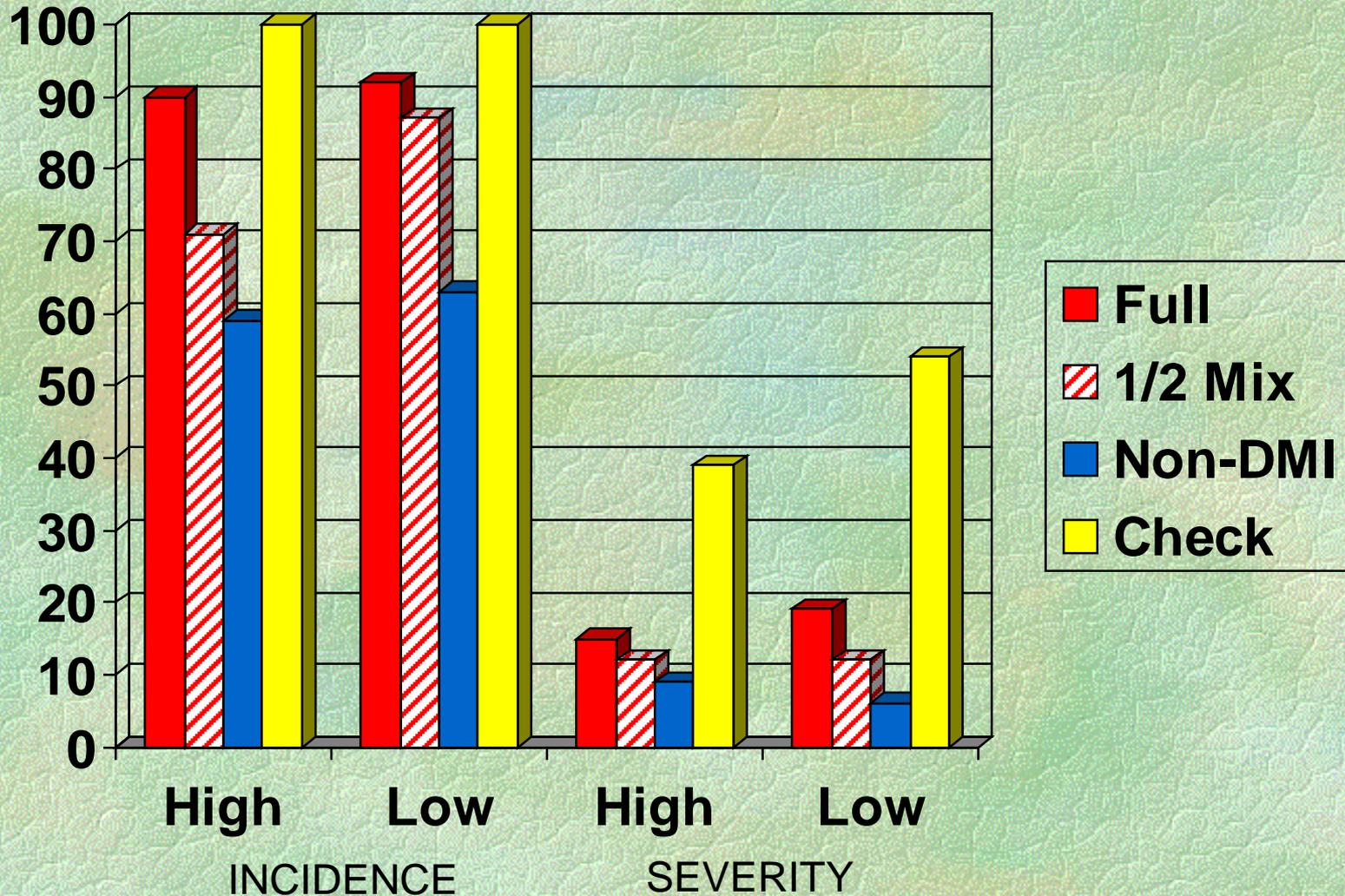
June – July (4 Sprays)

- Full-rate DMI
 - Enable (40 oz/500 gal) + 80/20 surfactant
- ½ Rate Mix DMI
 - Agri Tin/Enable co-pack (1 pack/500 gal)
- Non-DMI
 - Elast 400 (1 gal/500 gal) +
Agri Tin (1 single pack/500 gal)

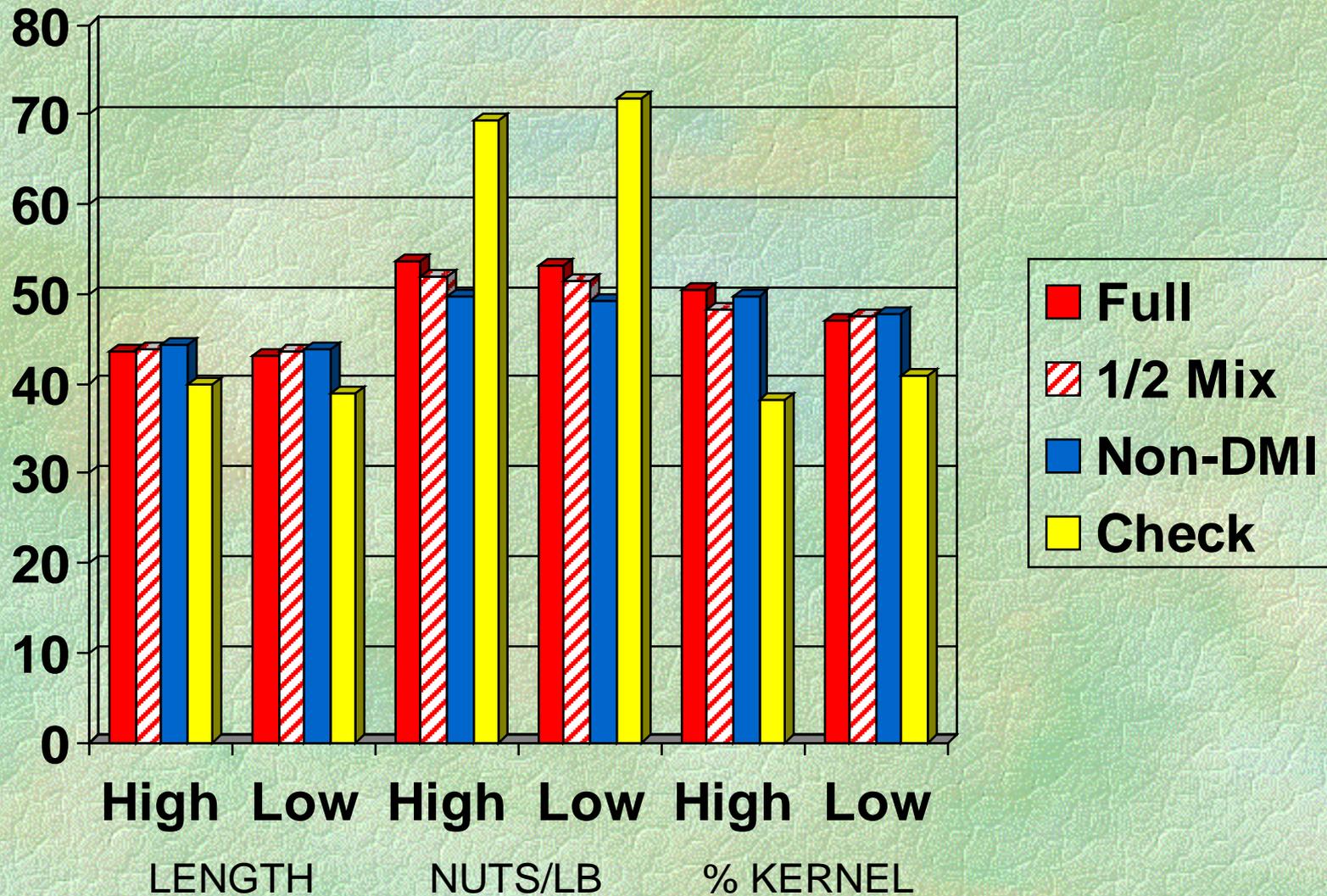
Rest of season – All treatments

- Agri Tin (1 double pack per 500 gal)

Nut Scab Summary



Nut Quality Summary



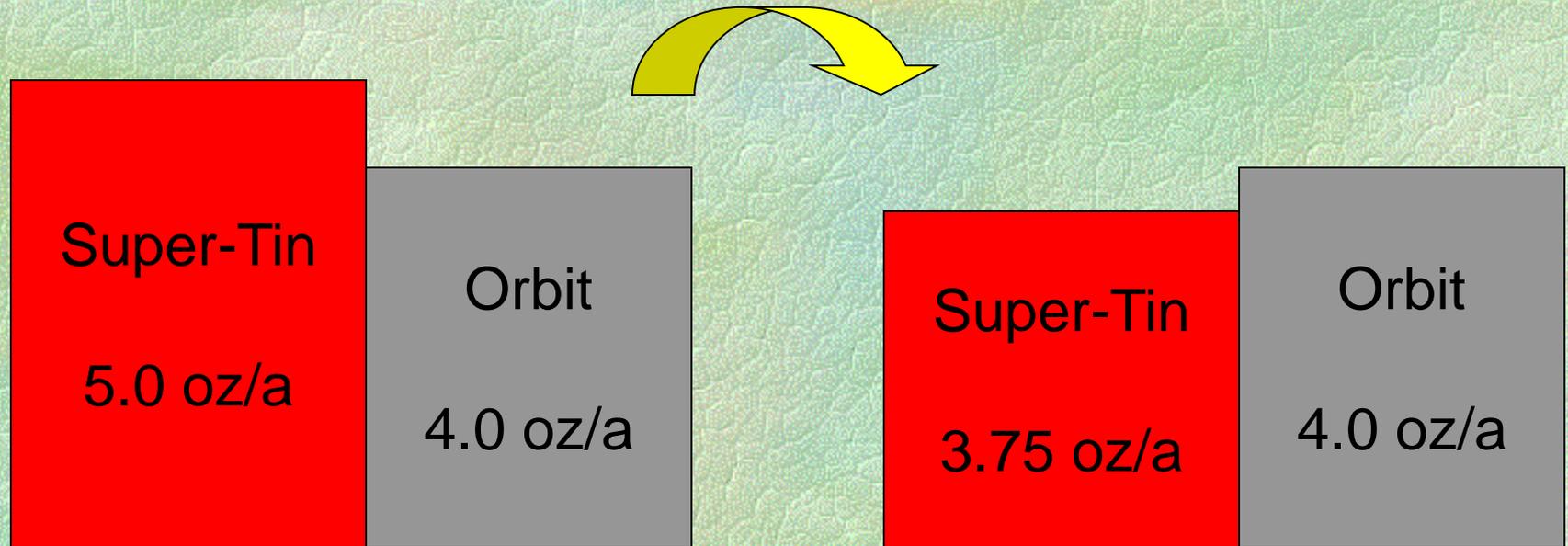
2004 DMI Trials

- Differences in treatments seem do not appear to be due to failure of DMI chemistry.
- Similar separations in high and low sensitivity locations.
 - Full-rate DMI
 - Enable (40 oz/500 gal) + 80/20 surfactant
 - ½ Rate Mix DMI
 - Agri Tin/Enable co-pack (1 pack/500 gal)
 - Non-DMI
 - Elast 400 (1 gal/500 gal) + Agri Tin (1 single pack/500 gal)

- Reduced sensitivity to DMI's is a concern.
 - Reduction in sensitivity has been documented in the laboratory.
 - Has been documented with other crops.
- Data from field trials does not indicate a failure of DMIs in disease management.
- Resistance management will be important to preserve the use of DMI's.

Orbit/Super-Tin Co-pack Trial

Change in Orbit/Super-Tin Co-pack



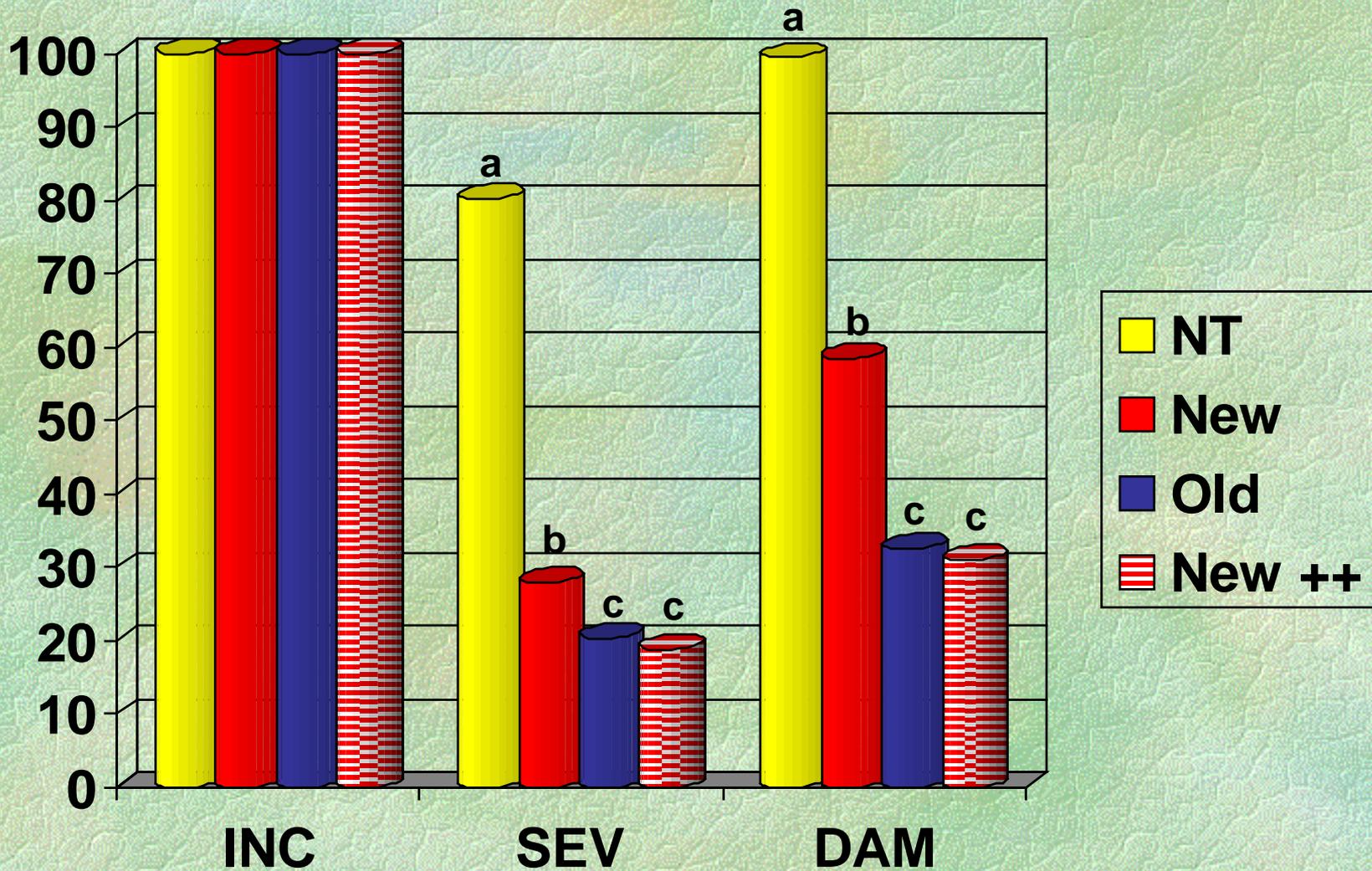
Propiconazole less effective than fenbuconazole on nut scab.

Needed?	
Super-Tin	Orbit
3.75oz/a	4.0 oz/a

AgriTin	Enable
3.75oz/a	4.0 oz/a

- Location – Dougherty Co.
- All replications received the same pre-pollination sprays.
- Test treatments began in June.
 - I. New co-pack [Orbit 4.0 oz + Super-Tin 3.75]*
 - II. Old co-pack [Orbit 4.0 oz + Super-Tin 5.00]
 - III. New co-pack + [Orbit 4.0 oz + Super-Tin 5.63]

* Rate per acre



- For optimal control of nut scab, spike the Orbit/Super-Tin co-pack up to a minimum of 5.0 oz per acre.
- New packages of Super-Tin available.
- Cost backed out of product.
- 'New' Orbit/Super-Tin co-pack will be fine for control of leaf scab.

Acres @ 100 gals/A	Orbit/Super - Tin co-pack	Super Tin 2.34 lb package	'New' Super Tin 1.172 lb package	Final Tank Mix Acre Rates
10 Acres (1000 gals water)	2 packets			4 oz Orbit + 3.75 oz Super Tin
10 Acres (1000 gals water)	2 packets	1 packet		4 oz Orbit + 7.5 oz Super Tin
10 Acres (1000 gals water)	2 packets		1 packet	4 oz Orbit + 5.63 oz Super Tin
10 Acres (1000 gals water)	2 packets		2 packets	4 oz Orbit + 7.5 oz Super Tin
5 Acres (500 gals water)	1 packets			4 oz Orbit + 3.75 oz Super Tin
5 Acres (500 gals water)	1 packets		1 packet	4 oz Orbit + 7.5 oz Super Tin

Dupont Table

IV. Tim Brenneman Research

1. Desirable Fungicide Test
2. Wichita Test

Desirable Fungicide Trial

Treatment	Rate/A	INC	SEV
Enable 2F + Elast 400F	4.0 fl oz 25.0 fl oz	67 b	3 e
Enable 2F + Super Tin 80 WP	4.0 fl oz 5.0 oz	80 b	9 cd
Exp A + Elast 400F	9.0 fl oz 25.0 fl oz	92 a	10 cd
Exp A + Super Tin 80 WP	9.0 fl oz 5.0 oz	100 a	15 b
Exp B + Elast 400F	9.0 fl oz 25.0 fl oz	87 a	7 de
Exp B + Super Tin 80 WP	9.0 fl oz 5.0 oz	92 a	12 bc
Nontreated	---	100 a	60 a

Desirable Fungicide Trial

Treatment	Rate/A	INC	SEV
Enable 2F + Elast 400F	4.0 fl oz 25.0 fl oz	67.2 b	3.0 b
Enable 2F + Elast 400F	6.0 fl oz 25.0 fl oz	42.2 c	1.9 b
Enable 2F + Elast 400F	4.0 fl oz 37.5 fl oz	42.2 c	2.3 b
Enable 2F + Elast 400F	6.0 fl oz 37.5 fl oz	45.3 c	2.9 b
Nontreated	----	100 a	59.8 a

Desirable Fungicide Test

- Moderate leaf scab
 - All treatments worked well.
- Moderate nut scab
 - Elast 25 oz was a little stronger partner than Super Tin 5.0 oz
 - No real gain from ‘spiked’ tank mixes (Enable/Elast)

Wichita Fungicide Trial

Treatment	Rate/A	INC	SEV
Exp A + Elast 400F	9.0 fl oz 25.0 fl oz	100	31 d
Exp A + Super Tin 80 WP	9.0 fl oz 5.0 oz	100	37 cd
Exp B + Elast 400F	9.0 fl oz 25.0 fl oz	100	47 c
Exp B + Super Tin 80 WP	9.0 fl oz 5.0 oz	100	62 b
Nontreated	---	100	98 a

Wichita Fungicide Trial

Treatment	Rate/A	INC	SEV
Enable 2F + Elast 400F	4.0 fl oz 25.0 fl oz	100	46 b
Enable 2F + Elast 400F	6.0 fl oz 25.0 fl oz	100	36 b
Enable 2F + Elast 400F	4.0 fl oz 37.5 fl oz	100	19 c
Enable 2F + Elast 400F	6.0 fl oz 37.5 fl oz	100	22 c
Nontreated	----	100	98 a

Wichita Fungicide Test

- Moderate leaf scab
 - All treatments worked well.
- Heavy nut scab
 - Stratego looked great
 - Elast 25 oz was a little stronger partner than Super Tin 5.0 oz
 - ‘Spiking’ with extra Elast gave more benefit than with extra Enable

No matter what fungicides you choose, remember that good coverage is critical.

- Speed
- Sprayer calibration
 - Misdirected
 - Weak air blast
- Overcrowding

Management of Pecan Scab



Orbit/Super Tin co-pack | Enable/Agri Tin co-pack

Agri Tin / Super Tin

Elast

TPTH + Elast



Enable + Elast



Stratego

Stratego



Enable / Propimax

Abound / Headline

Pre-pollination

Post-pollination

After shell
hardening