Causes and Control of Diplodia Stem-end Rot and Other Fruit Decays

Mark A. Ritenour
University of Florida
Indian River Research and Education Center

UF UNIVERSITY of FLORIDA
The Foundation for The Gator Nation

The Importance of Satisfied Markets

- Claims or rejected loads at destination markets are EXTREMELY COSTLY!

The Need

Diplodia stem-end rot

- Control of fruit decay is always a top concern
- Many factors influence the potential for decay development:
  - **Preharvest field conditions and tree health**
  - **Harvesting & handling practices**
  - **Postharvest temperatures, relative humidity, exposure to ethylene, etc.**

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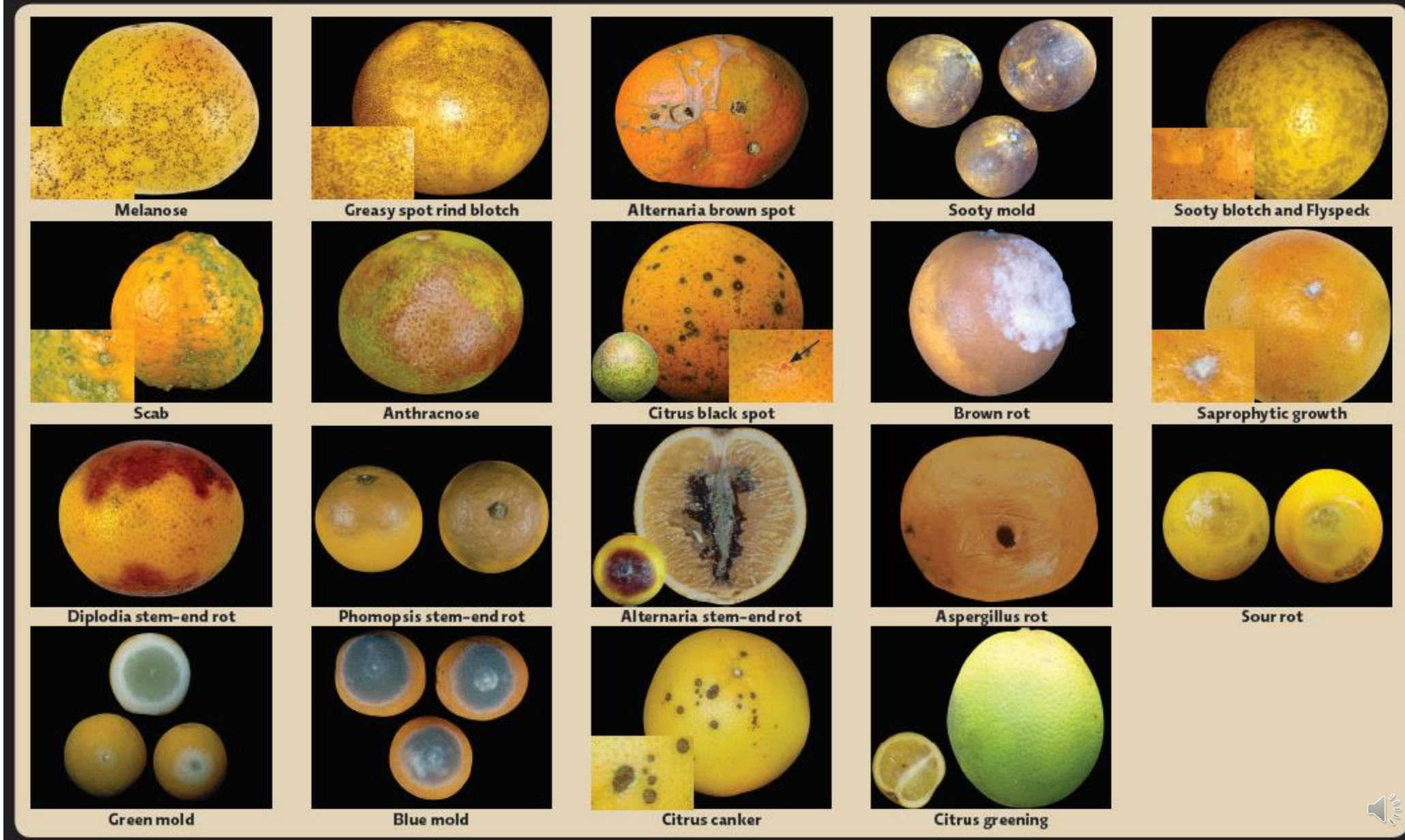
Citrus Fruit Blemishes and Decay Caused by Fungi and Bacteria[1]

HS1291

Mark A. Ritenour, Jamie D. Burrow, Megan M. Dewdney, and John Zhang



Control Options

- Preharvest – Looking for a reliable replacement for Benlate or Topsin
  - **However, copper, Aliette, and phosphorous acid products to reduce Brown rot**

Preharvest Materials Tested

- **Benlate** (Benomyl) – 2 lb/acre
- **Topsin M** (Thiophanate-methyl) – 2 lb/acre
- **Topsin F** (Thiophanate-methyl) – 16 oz/acre (liquid)
- **Headline** (Pyraclostrobin) – 16 oz/acre
- **Kocide DF** (Copper) – 4 lb/acre
- **Abound** (Azoxystrobin) – 16 oz/acre
- **Enable** (Fenbuconazole) – 8 oz/acre
- **Aliette** (Fosetyl-Al) – 5 lb/acre

Preharvest Materials Tested

- **Phosphorous acid** (Nutriphite or Phostrol) – 4 pints/acre
- **Pristine** (Pyraclostrobin + Boscalid) - 18.5 oz/acre
- **Actigard** (Acibenzolar-S-methyl) – 100ppm + 0.025% Silwet
- **Scholar** (Fludioxonil) – 8oz/acre
- **Switch** (cyprodinil & fludioxonil) – 14 oz./A
- **Bravo** (chlorothalonil) – 6 pts./A
- **OxiDate or HDH Peroxy** (H_2O_2) – 1%
- **PAA** (15%) – 85 ppm

Percent Total Decay

	'Sunburst' 4 Nov. 1999[z]	'Fallglo' 18 Sept. 2000		'Sunburst' 11 Dec. 2000		'Marsh' 16 Mar. 2001	
	23 Nov.[y]	20 Sept.	9 Oct.	13 Dec.	21 Dec.	19 Mar.	2 Apr.
Compound	58 d[x]	34 d	78 d	77 d	41 d	86 d	79 d
Control	42.5 a[w]	48.2	79.9	18.8 a	21.2 a	34.1 ab	37.8 ab
Ferbam	43.7 a	---	---	---	---	---	---
Acibenzolar-S-Methyl	---	65.5	78.8	16.2 a	15.6 a	51.2 a	45.1 a
Fenbuconazole	51.6 a	50.6	76.2	18.7 a	24.3 a	37.0 ab	46.0 a
Fosetyl AL	59.9 a	50.2	77.6	16.4 a	14.1 ab	30.0 b	34.1 abc
Phosphorous acid	29.3 ab	44.7	84.8	20.9 a	36.4 a	51.6 a	22.0 bc
Copper hydroxide	39.6 a	48.2	78.7	13.3 a	37.9 a	40.6 ab	26.0 bc
Azoxystrobin	---	39.7	70.2	13.5 a	25.5 a	37.2 ab	38.0 ab
Benomyl	6.2 b	40.1	74.0	3.0 b	1.4 b	2.9 c	18.2 c
Significance	*[v]	NS	NS	**	*	***	**

Percent Total Decay

	'Sunburst'		'Marsh'		'Valencia'	
	4 Dec. 2001[z]		25 Feb. 2002		23 April 2002	
	6 Dec.[y]	18 Dec.	27 Feb.	11 Mar.	25 Apr.	6 May.
Compound	81 d[x]	84 d	118 d	123 d	133 d	122 d
Control	60.0	71.8 a[y]	41.7 a	31.8 a	30.5	60.2 a
Pyraclostrobin	51.8	50.8 b	36.5 ab	17.7 ab	28.3	48.2 a
Phosphorous acid	46.4	45.9 b	29.1 ab	16.7 ab	29.9	47.2 a
Thiophanate methyl	45.1	47.2 b	14.1 c	6.1 b	17.2	15.0 b
Benomyl	42.4	41.3 b	22.5 bc	14.2 ab	12.3	14.0 b
Significance	NS[w]	*	*	*	NS	**

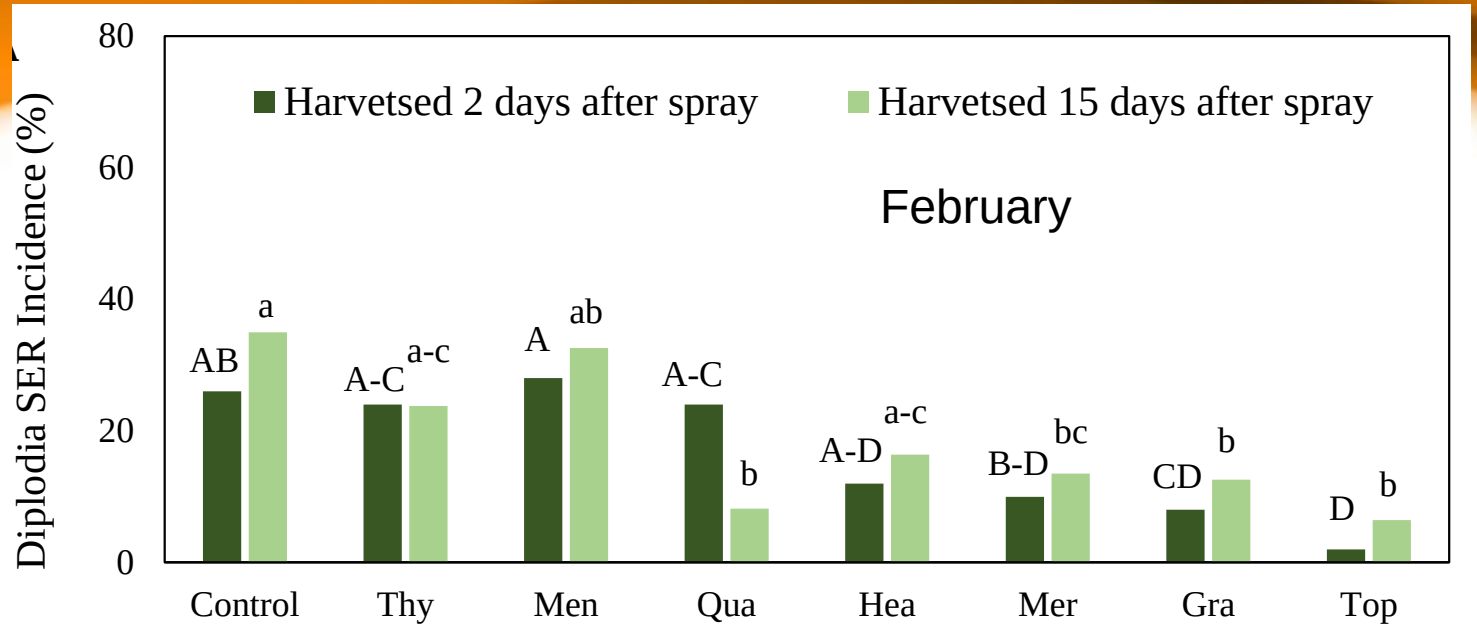
Preharvest application

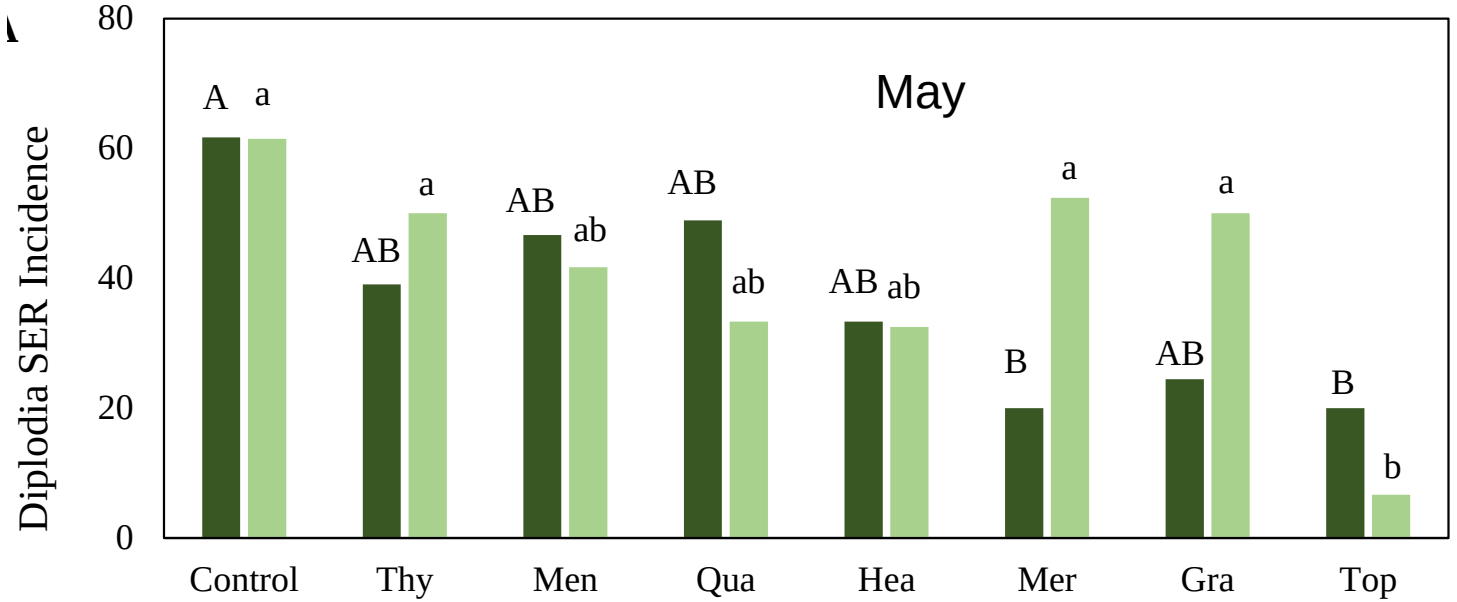
Summary of Experiments

Healthy fruit 1999-2005			
Treatment	Tangerine	Orange	Grapefruit
Benomyl	$4^z/6^y$	1/2	5/6
Thiophanate-methyl (WSB)	2/3	1/2	3/5
Thiophanate-methyl (FL)			1/1
Pyraclostrobin	1/1	0/1	1/3
Phosphorus Acid	1/4	0/1	0/4
Pyraclostrobin + Boscalid			0/2
Copper hydroxide	0/3		0/1
Azoxystrobin	0/2		0/2
Fenbuconazole	0/3		0/1
Fosetyl AL	0/3		0/1
Acibenzolar-S-methyl	0/2		0/1

[z]Number of trials the treatment resulted in significantly ($p \leq 0.05$) more healthy fruit than the control in at least one of the two harvests.

[y]Total number of trials the material was tested.





Treatments:

Control = Water

Thy = Thymeguard (Thyme oil)

Men = Mentor EC (Propiconazole)

Qua = Quadris Top
(Azoxystrobin + Difenconazole)

Hea = Headline (Pyraclostrobin)

Mer = Mertect 340F (Thiabendazole)

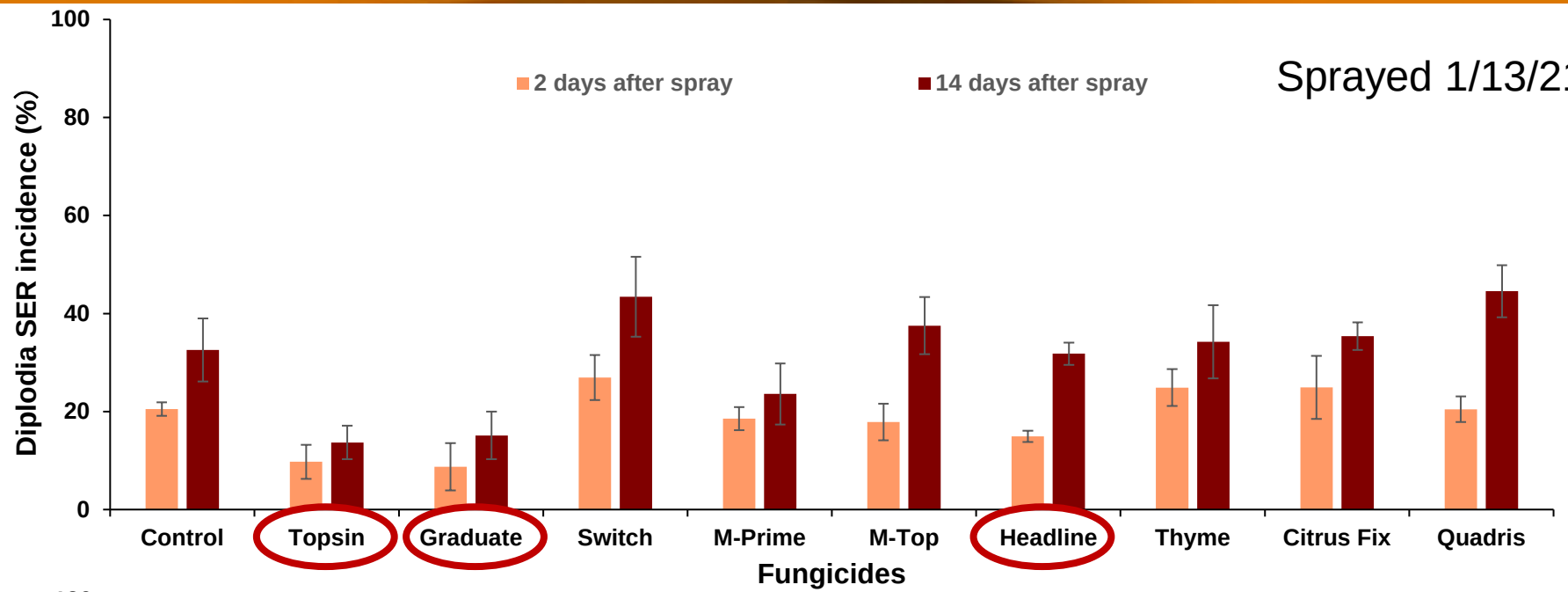
Gra = Graduate A+
(Azoxystrobin + Fludioxonil)

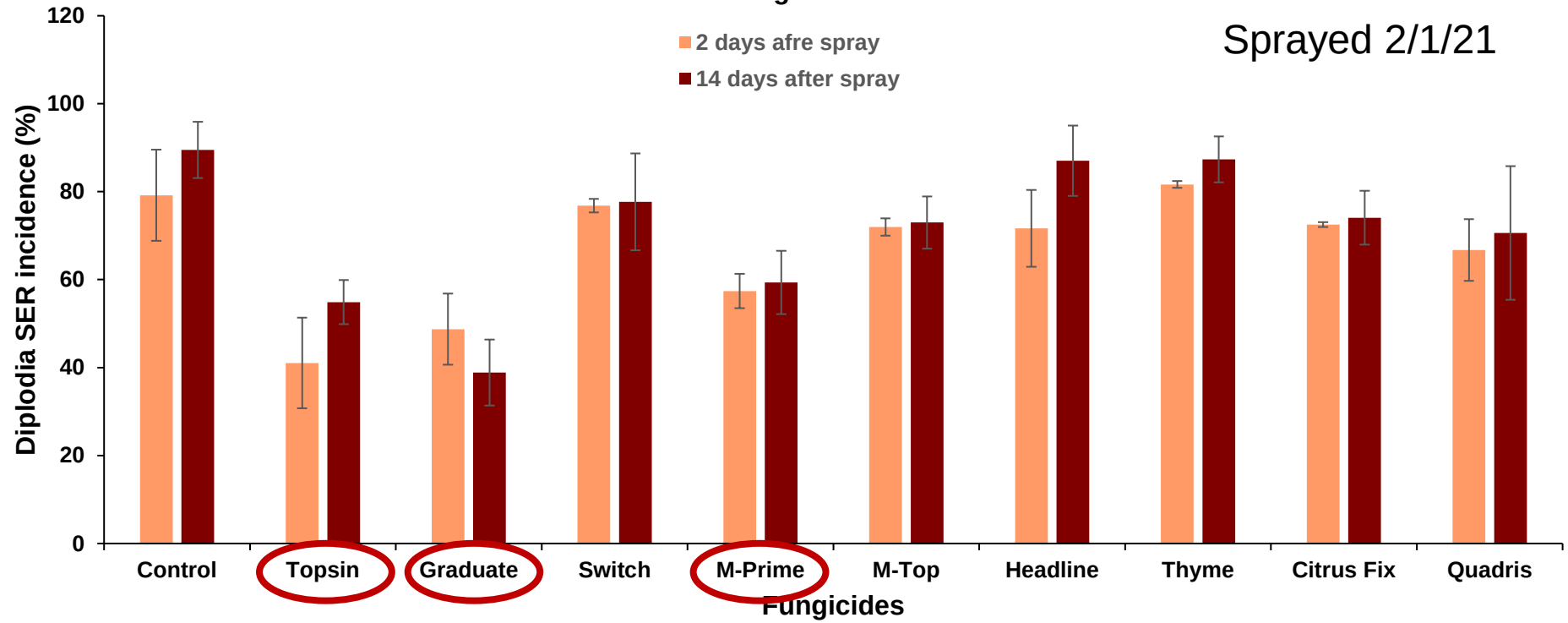
Top = Topsin (thiophanate-methyl)

2020-21 Preharvest Trials (all red grapefruit)

- CONTROL - WATER
- Topsin 4.5 FL*
  - **thiophanate-methyl (45%)**
- Graduate A+ *
  - **fludioxonil (20.6%) + azoxystrobin (20.6%)**
- Switch 62.5 WG
  - **fludioxonil (25%) + cyprodinil (37.5%)**
- Miravis Prime*
  - **fludioxonil (21.4%) + pydiflumetofen (12.8%)**
- Miravis Top
  - **difenconazole (11.5%) + pydiflumetofen (6.9%)**
- Headline
  - **(Peraclostrobin) pyraclostrobin (23.6%)**
- Thyme Guard (Thyme)
  - **Thyme (23%)**
- Citrus Fix*
  - **2, 4-D (45%)**
- Quadris Top
  - **azoxystrobin (18.2%) + difenoconazole (11.4%)**

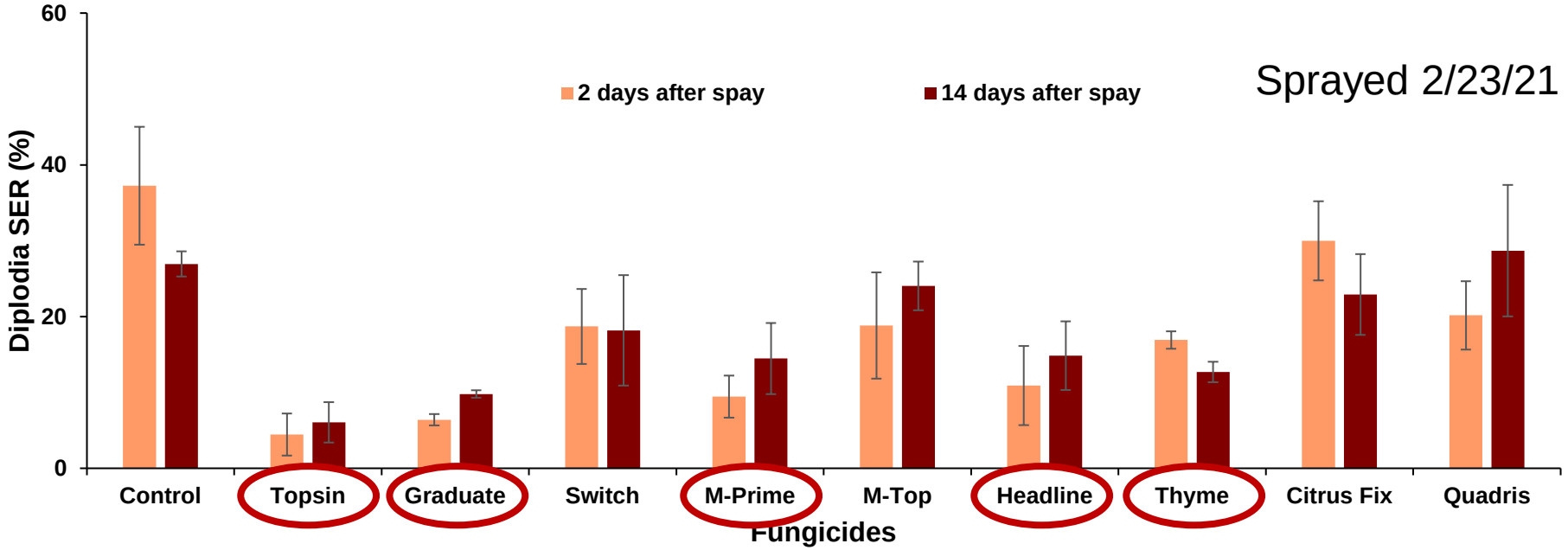
***not labeled preharvest for FL grapefruit**

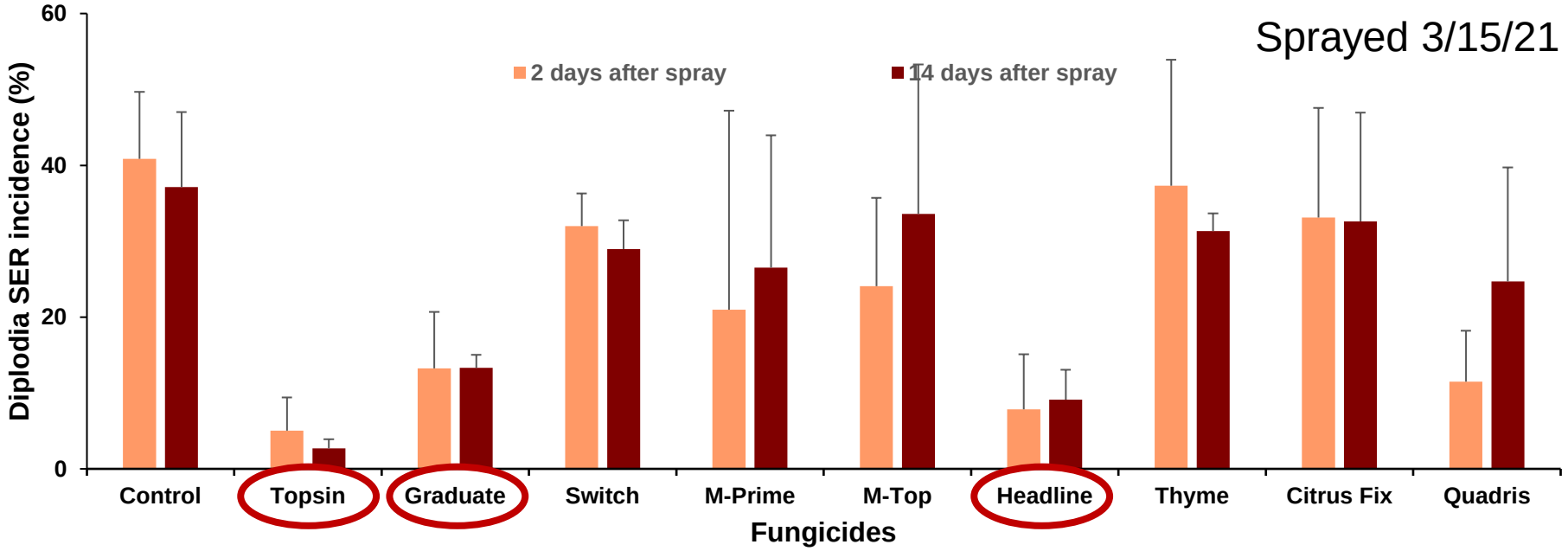




After harvest, fruit held:
5 days at 85F with 5 ppm ethylene

+ 3 weeks at 75F





After harvest, fruit held:
5 days at 85F with 5 ppm ethylene

+ 3 weeks at 75F

Conclusions

- Graduate A+
  - **Fludioxonil (20.6%) + azoxystrobin (20.6%)**
  - **In all six field trials fludioxonil (20.6%) + azoxystrobin (20.6%) reduced postharvest SER similar to Topsin**
- Mertect (TBZ)
  - **Gave similar results as Graduate A+ the first year, but was dropped from further evaluation to prevent TBZ resistance from developing from both pre- and postharvest use**
- Headline and Miravis Prime
  - **Occasionally reduced postharvest SER**

Thank You!

- For more information,

  visit the UF Postharvest Website

  ritenour@ufl.edu

  http://irrec.ifas.ufl.edu/postharvest/

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