

CITRUS BLACK SPOT SPREAD

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WHERE IS CITRUS BLACK SPOT CURRENTLY

- The disease is mainly located in southwest Florida in Collier, Hendry, Lee, Charlotte, and Glades Counties
- There was one site on the Polk and Highlands County border that has since been removed from citrus production
- Citrus black spot has mostly affected active groves, but one homeowner site was identified
- Hurricane Irma passed through the black spot affected regions in 2017
- The disease has spread north and west most recently, roughly following the path of Irma
- Generally, disease will start in isolated parts of the grove, but will intensify if disease management is not undertaken
- Once identified the area will become subject to quarantine rules (DA-2012-09-federalorder.pdf (fdacs.gov))

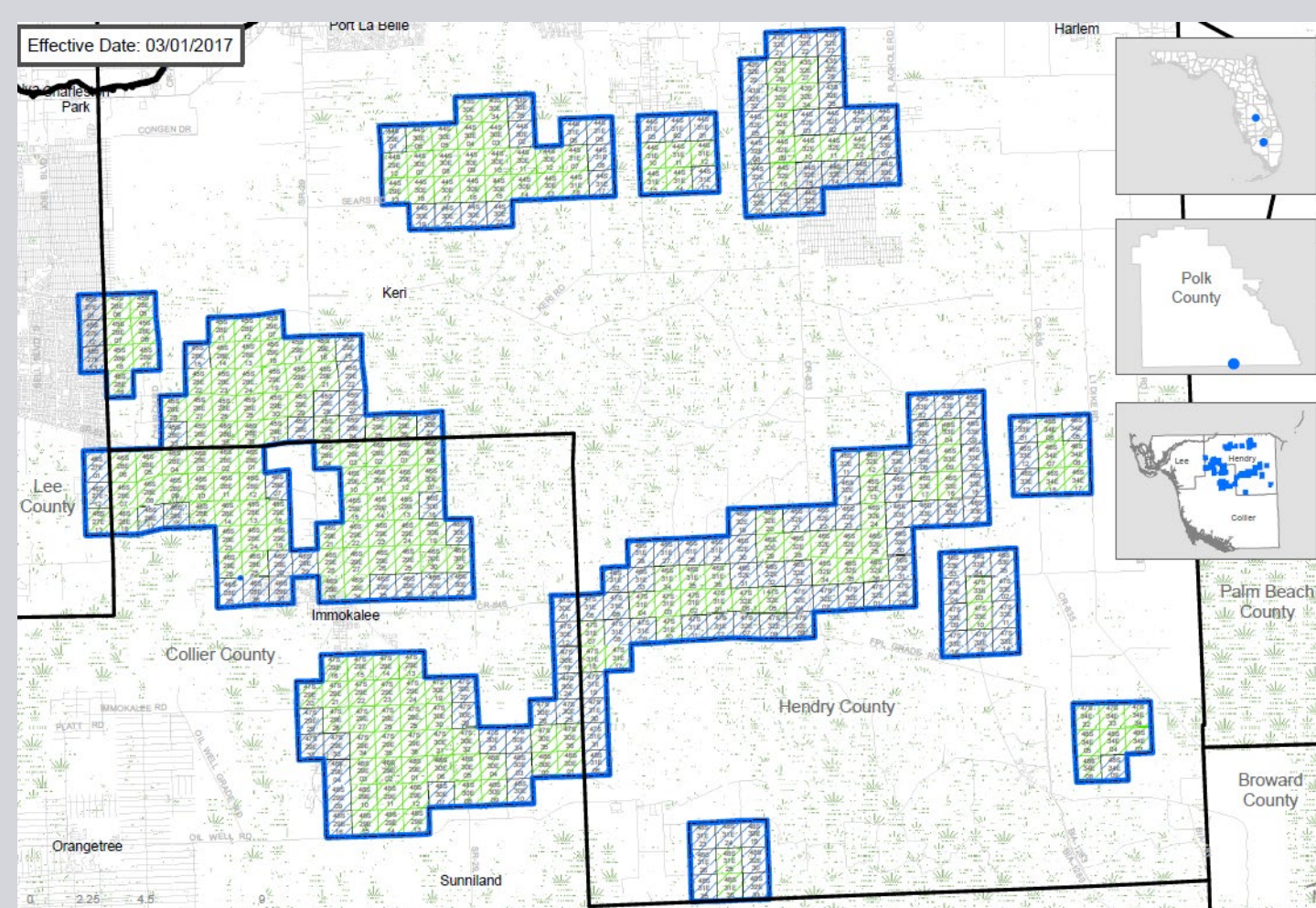
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FRUIT SYMPTOMS TO LOOK FOR WHEN SCOUTING

- Scout after color break if your grove is in the southwest citrus growing region
- Some years, symptoms are more severe than others and not all fruit symptoms are likely to be present on each tree or even each grove
- Hard spot is the most unique symptom with small, round lesions (under 1/5 inch in diameter) with brick red to chocolate brown margins. The center is necrotic tan color often with fungal structures like pinprick dots
- Cracked spot is a raised chocolate brown to black area with cracks that can turn into hard spot over time. Can be isolated lesions or large areas with diffuse background
- Early virulent spot are small brick red depressed lesions than can become hard spot or virulent spot. Virulent spots are large areas of leathery rind with a brown color. Structures are usually present

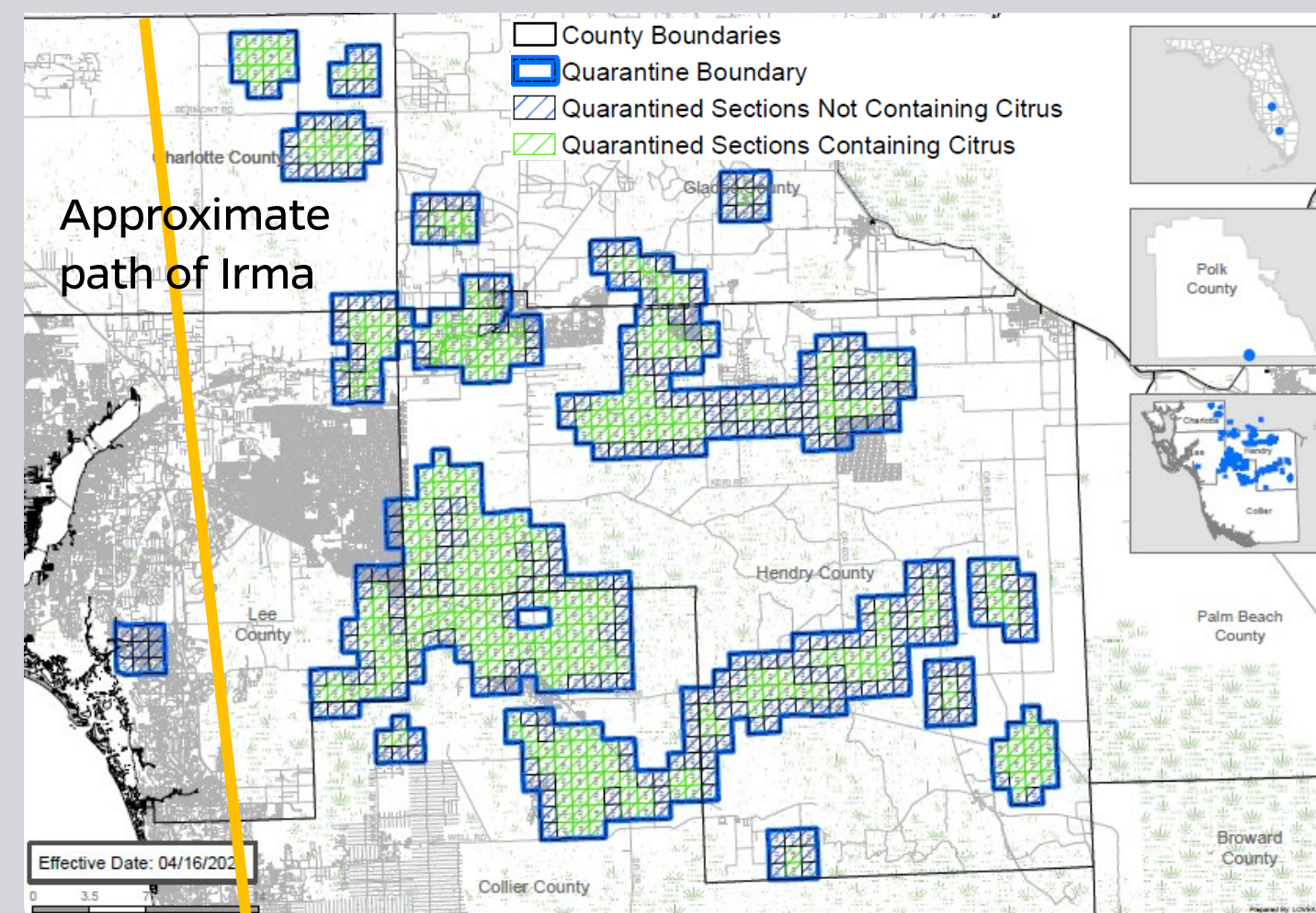
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March 1, 2017 (shortly before Irma)



Maps of quarantine areas are produced by the Citrus Health Response Program (CHRP), a joint program between FDACS and the USDA.

April 16, 2021 (most current)



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FRUIT SYMPTOMS



The fruit symptoms were seen in groves in 2021. From the top clockwise: virulent spot, early virulent spot, early virulent spot and hard spot, hard spot, cracked spot, severe cracked spot.

FUNGICIDAL MANAGEMENT

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CURRENT FUNGICIDE RECOMMENDATIONS

- Monthly applications with a fungicide program
- Start applications at beginning of May or if April is wet, start in April
- Rotate modes of action (FRAC codes) to manage resistance
- Use at least 125 gal/acre

PRODUCT	FRAC CODE	RATE
Copper products	M 01	Use label rate
Abound	11	9.0 – 15.5 fl oz
Amistar Top	11 + 3	15.4 fl oz
Gem 500 SC	11	1.9 – 3.8 fl oz
Headline SC	11	12 – 15 fl oz
Pristine	11 + 7	16-18.5 oz

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FIELD TRIAL 2019-2020

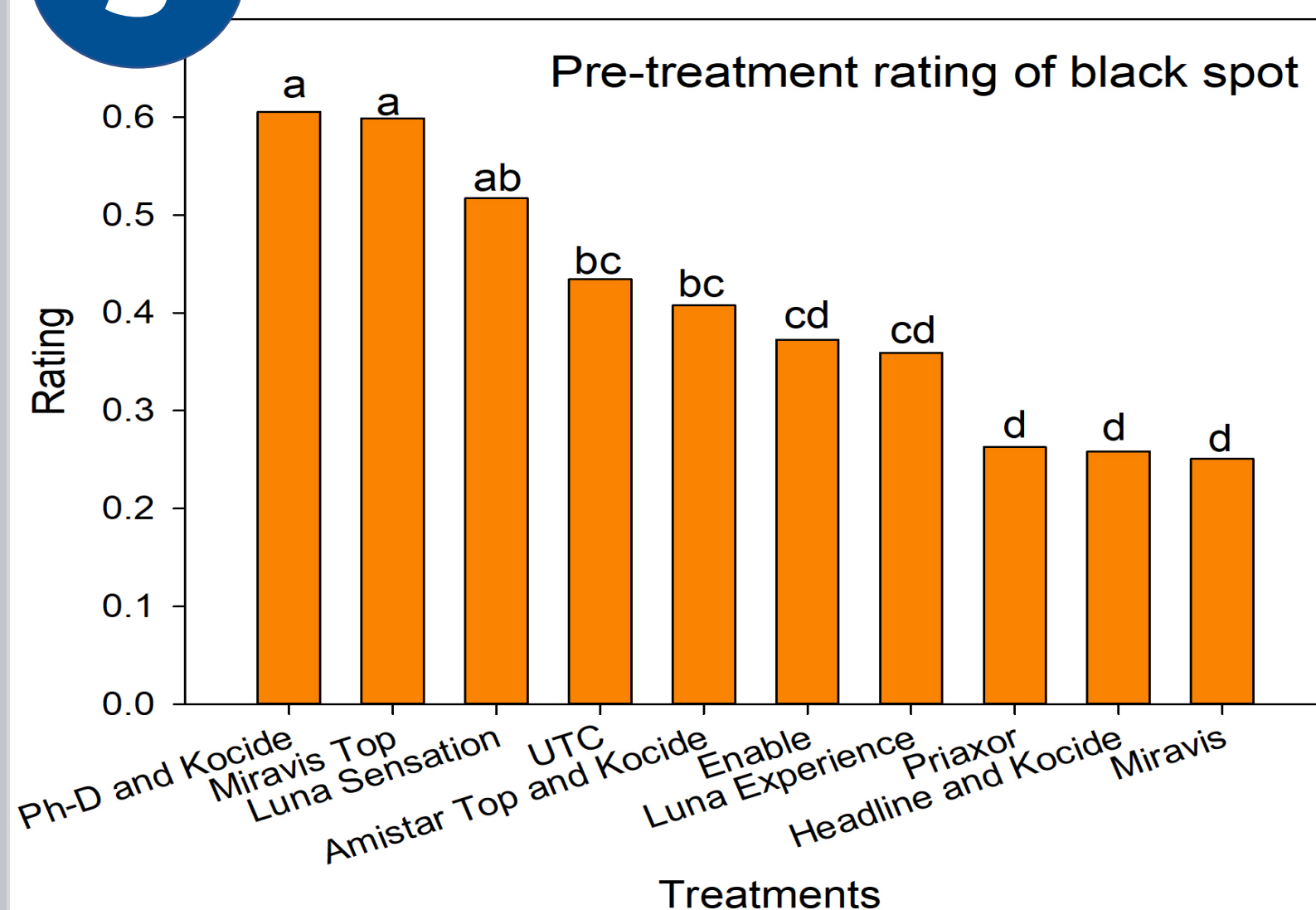
- Purpose to find new modes of action to use for CBS management as management currently relies heavily on the strobilurins (FRAC 11)
- Located in 20+ year-old Valencia grove with history of CBS
- Used monthly applications from mid-May to early September (5 applications)

Highlights

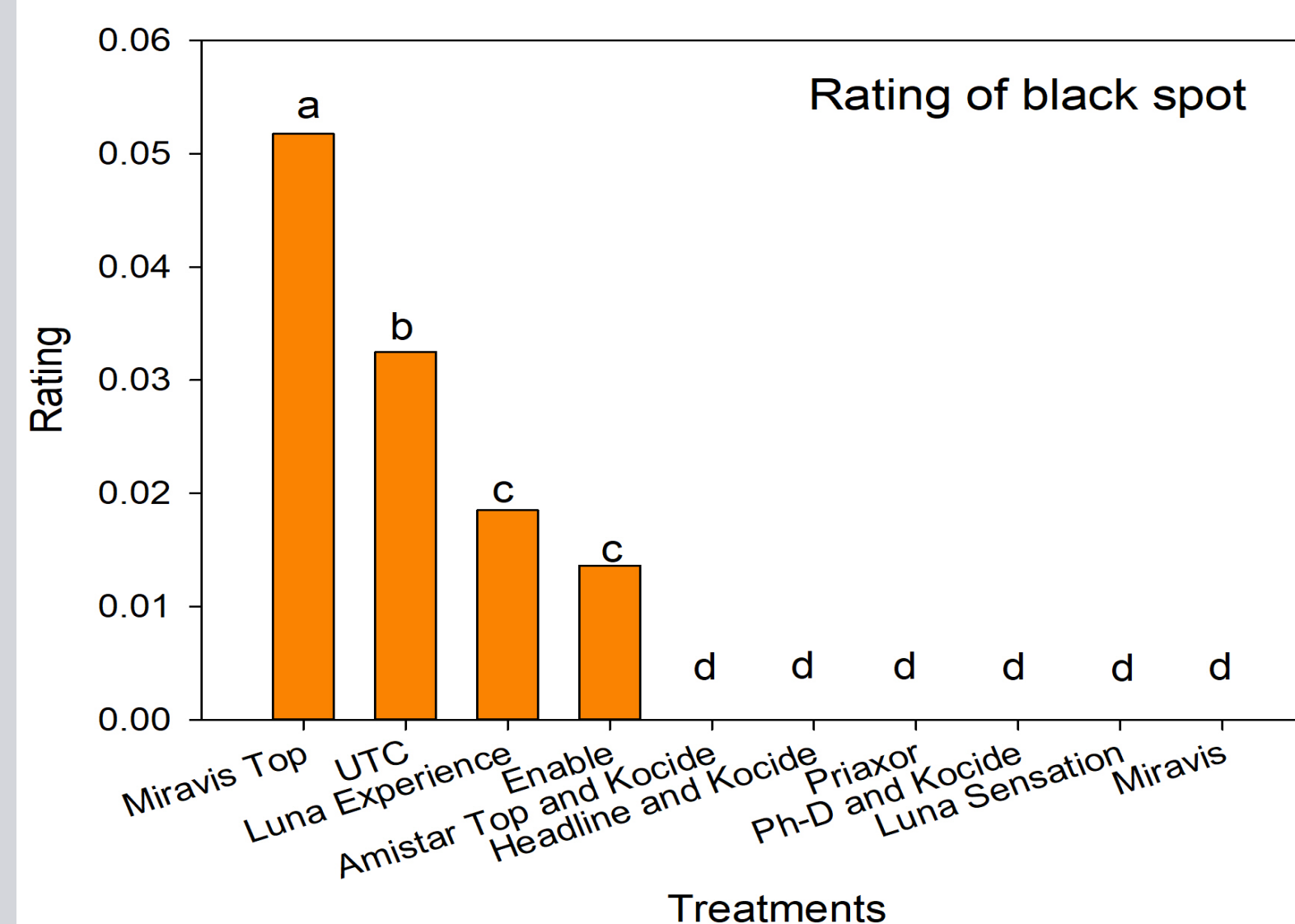
- More disease in pre-treatment ratings than post-treatment ratings, likely because of weather in the 2019-2020 season
- Some products look very promising but too soon to change recommendations
- Light disease pressure may make products look better than otherwise would
- Another trial currently under way for 2021-2022 season
- Will hopefully change recommendations based on results from 2021-2022 trial

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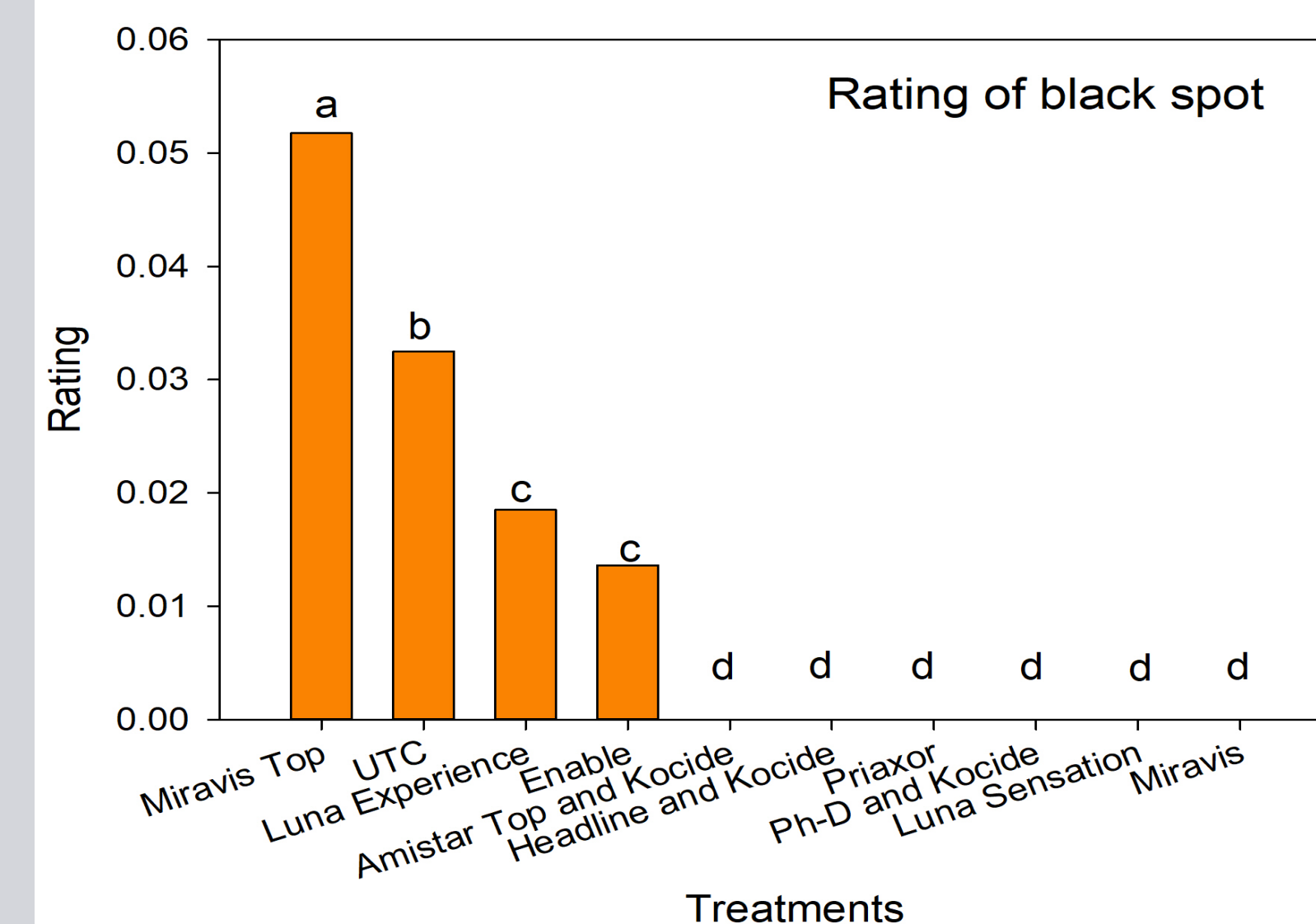
PRE-TREATMENT RATINGS



POST-TREATMENT RATINGS



FRUIT DROP RATINGS



TREATMENT PER ACRE

1. Miravis (14.9 fl oz); 2. Miravis Top (15.0 fl oz.); 3. Enable (8 fl oz); 4. Amistar Top rotated with Kocide 3000 (15.4 fl oz or 3.5 lb); 5. Luna Sensation (4 fl oz); 6. Luna Experience (8 fl oz); 7. Ph-D rotated with Kocide 3000 (6.2 oz or 3.5 lb); 8. Priaxor (11 fl oz); 9. Headline rotated with Kocide 3000 (15.0 fl oz or 3.5 lb); 10. Untreated control (UTC)

Funding:



LEAF LITTER MANAGEMENT

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WHY LEAF LITTER MANAGEMENT MATTERS

- Very few leaf symptoms of citrus black spot are usually visible, but the leaves are infected
- Leaf litter is a source of spores that cause citrus black spot infections
- Spores are formed in specialized structures in the leaves as they decompose
- The spores are splashed from the litter into the canopy by rain and wind
- Some growers have reported enhanced fungicide control from spreading compost under their trees

PRODUCT	RATE PER ACRE
Control	Untreated control
Soil-set	1.3 fl oz
Urea	40 lb

2

FIELD TRIAL 2014-2017

- Purpose to improve fungicide application efficacy without increasing number
- In 20+ year-old Valencia grove with history of CBS
- One application of soil amendment in late March to early April with herbicide boom at 50 gal/acre in 10-foot strip on either side of tree
- Grower conducted normal fungicide program of 3 to 4 applications

Highlights

- Soil-set reduced the frequency of fruit infections two of three treated seasons
- Fruit severity was reduced each treated season by Soil-set
- In fruit destined for processing, reducing severity will reduce the proportion of fruit that drop from citrus black spot
- Soil-set did not slow the intensification of the disease in the grove

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CITRUS BLACK SPOT FRUIT INCIDENCE

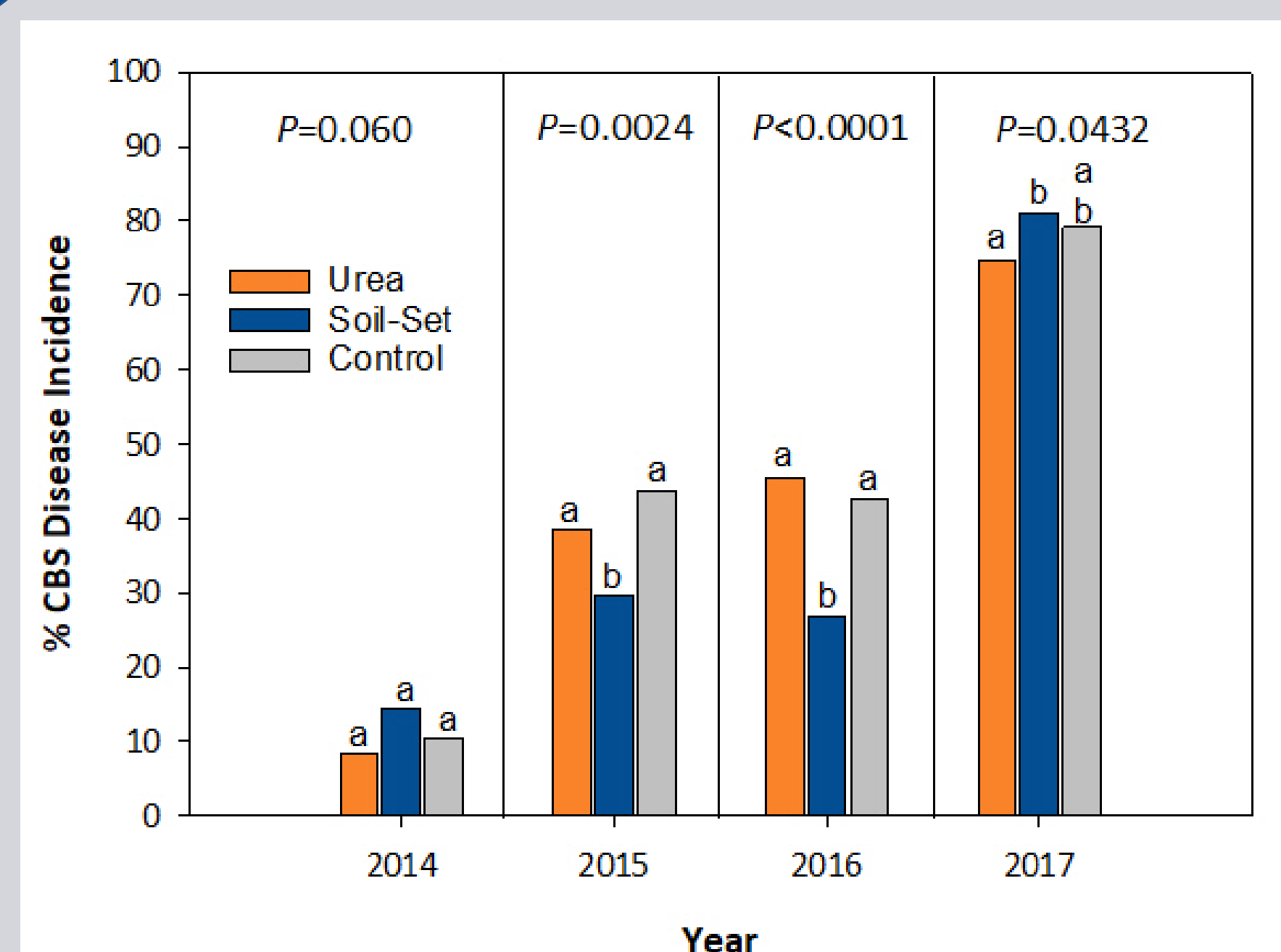


FIGURE NOTES

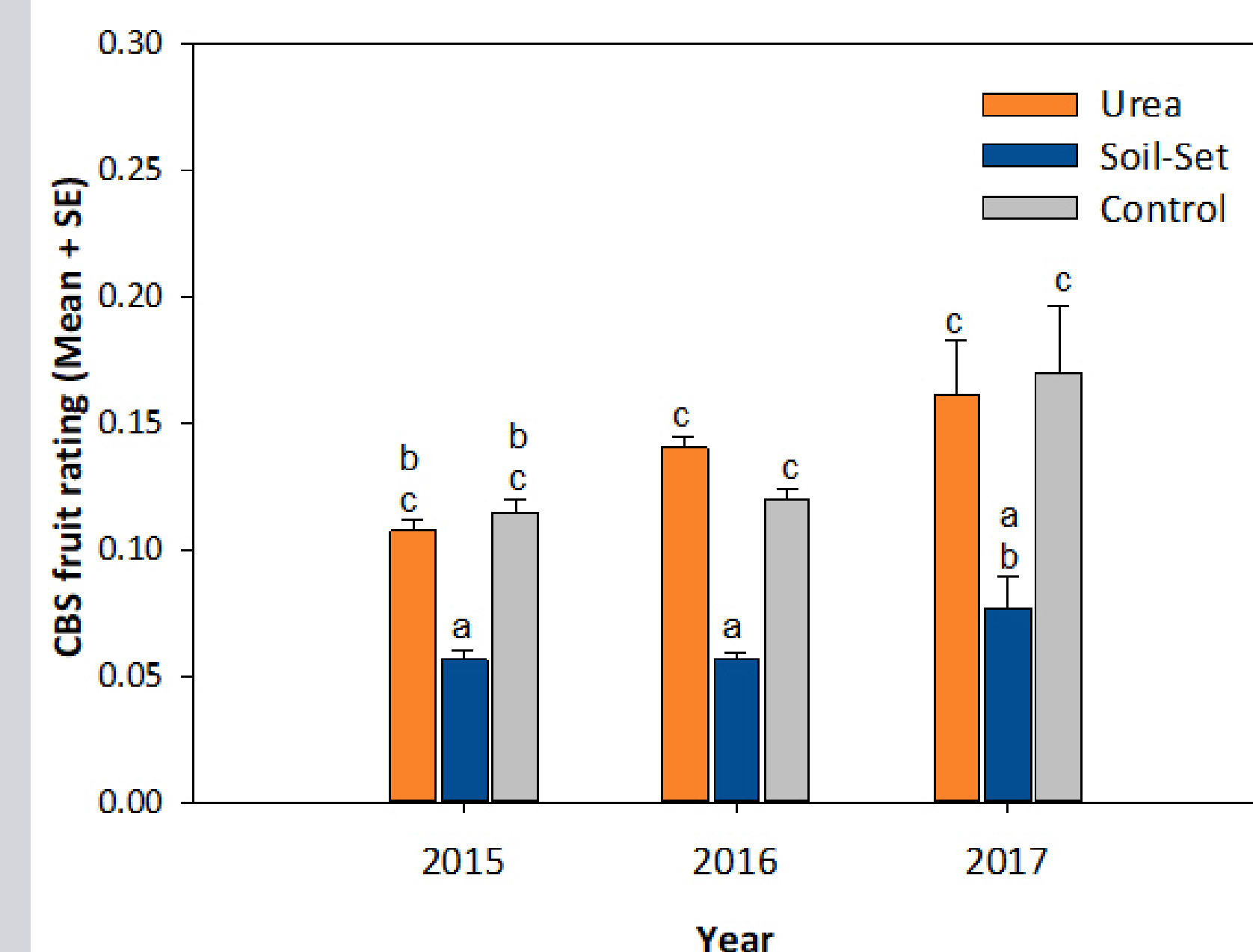
There was no treatment in 2014 but there was an indication of the level of disease before starting the experiment

Funding:



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CITRUS BLACK SPOT FRUIT SEVERITY



FRUIT AGE AFFECTS SUSCEPTIBILITY

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CRITICAL STAGE OF FRUIT SUSCEPTIBILITY

- Fruit stage at the time of inoculation determines the period between infection and appearance of first symptoms
- Fruit symptom severity depends on the time and fruit stage when the pathogen infects the fruit
- If needed to prioritize fungicide application timings, applications should be targeted to younger fruit to reduce fruit drop inducing severe lesions

GREEN FRUIT SIZE AT INOCULATION	FRUIT DIAMETER (INCH)
Small (expanding fruit)	$< 1 \frac{2}{5}$
Medium (expanding fruit)	$1 \frac{2}{5} > \text{Fruit} \leq 1 \frac{4}{5}$
Large (fully expanded fruit)	$> 1 \frac{4}{5}$

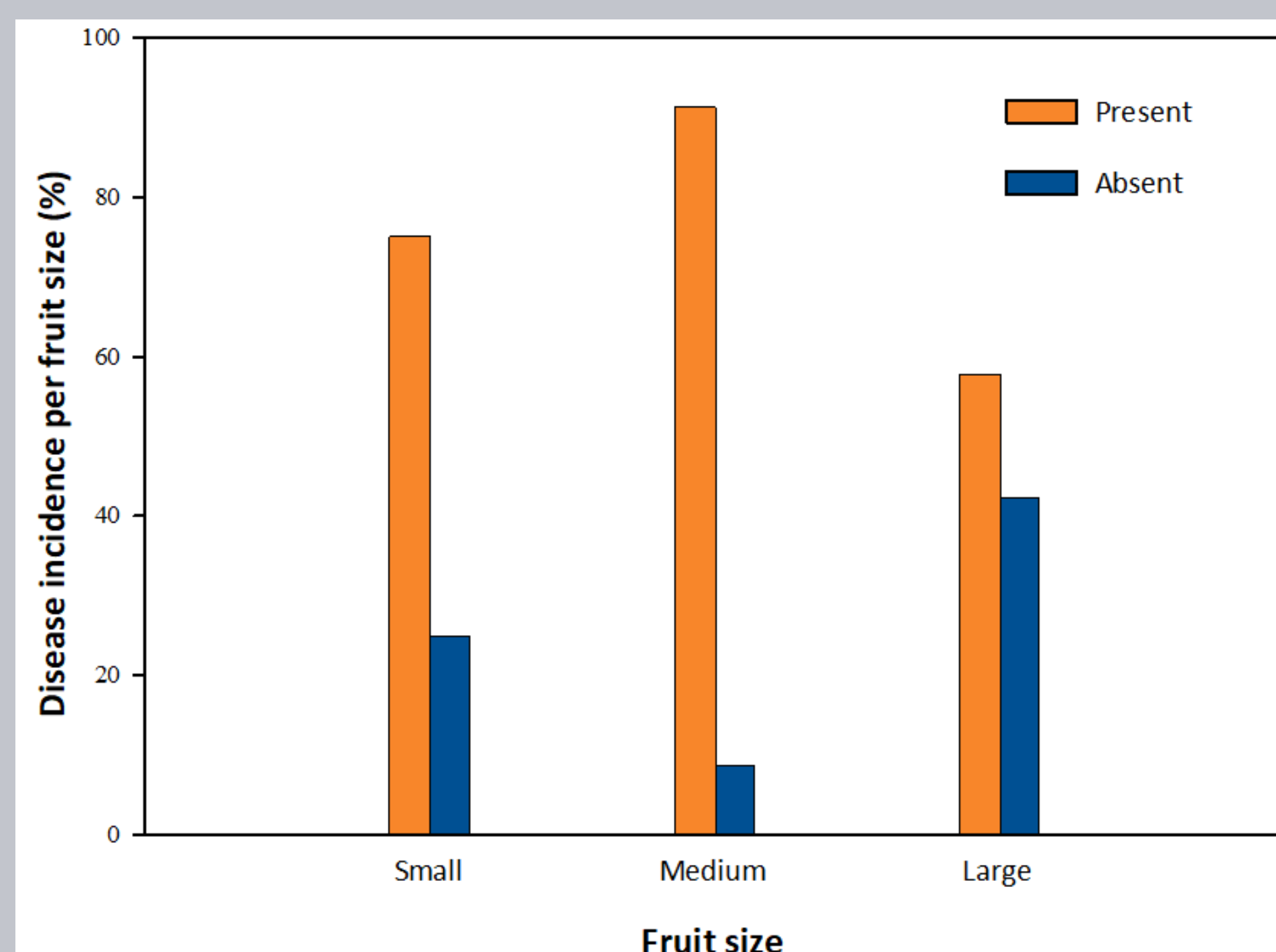
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GREENHOUSE TRIAL 2019-2020

- To determine critical fruit stage for susceptibility to asexual spore infection
 - Observed 97 fruit (72 inoculated) from 24 Meyer lemon trees
 - Fruit size ranged in diameter from $\frac{3}{4}$ to $2 \frac{3}{4}$ inch when inoculated
- Highlights
- First symptoms were observed after 5 months post-inoculation on green fruit with inoculated diameters between $1 \frac{3}{5}$ to $2 \frac{1}{5}$ inch
 - Symptoms were more severe on fruit inoculated at the early developmental stages compared to the late stages of maturity
 - If optimal environmental conditions are present, fruit are susceptible to infection regardless of their development stage
 - Ideally, fruit should be protected by fungicides for most of their maturation process

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CITRUS BLACK SPOT PRESENCE AND ABSENCE



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CITRUS BLACK SPOT SYMPTOMS FROM INOCULATIONS



Funding:

