CHOOSING FRESH CITRUS VARIETIES FOR A CUPS PRODUCTION SYSTEM

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Citrus Under Protective Screen

CUPS facility at the CREC
1.3 acres (58,000 sq. feet)

CUPS has excluded ACP and prevented HLB for five years at the CREC, despite being adjacent to HLB+ and ACP-infested trees

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2018-2019 CUPS highlights

About 250 acres of commercial CUPS in Florida, and expanding

Commercial CUPS W. Murcott @ 1 year

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‘W murcott’ in commercial CUPS @ 2.5 years (August 2019) KLM Farms, where the 2018 CUPS field day was held

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- **‘W murcott’ in commercial CUPS @ 2.5 years (August 2019)**
- **Trees are planted in the ground**
- **‘W murcott’ fruit is seedless in CUPS**

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INTRODUCTION & OBJECTIVES

- Grapefruit production in Florida has been drastically reduced by HLB: 40.8 million boxes in 2003/04 to 5.4 million boxes in 2018/19 (**87% reduction**) *www.nass.usda.gov*

- 'Honey' murcott, 'Dancy' and other favorite Florida varieties are also very susceptible to HLB

- Grow Citrus Under Protective Screen (CUPS) to exclude the Asian Citrus Psyllid and completely block *C*Las transmission

- Produce asymptomatic, low-seeded, premium grade fresh fruit in HLB-endemic Florida by using CUPS

- CUPS is an integrated system with a high establishment cost – citrus grown must be high yielding, high quality, with potential to generate high fruit revenue

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CREC CUPS 2018/19 season for two main varieties: 4th year highlights

- ‘Ray Ruby’ grapefruit: December 5, 2018, average 892 boxes/acre, 100% pack-out
- ‘Honey’ murcott: January 23, 2019 average 529 boxes/acre, 100% pack-out

‘Ray Ruby’ grapefruit
426 cartons packed
70% US #1
$25.89 /box net fruit revenue
($23,094 /acre /year)

‘Honey’ murcott
326 cartons packed
90% US #1
$42.48 /box net fruit revenue
($22,472 /acre /year)

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RESULTS

‘Ray Ruby’ grapefruit @ 2.5 years, 35 L pots, 871 trees /acre:

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January 2018: ‘Ray Ruby’ grapefruit @ 3.5 years

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October 2018: ‘Ray Ruby’ grapefruit @ 4.1 years
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‘Ray Ruby’ grapefruit @ 4.25 years, 20 L pots, 871 trees /acre:


Dancy in CUPS

UF711 in CUPS

‘Honey’ murcott @ 3.5 years, large fruit = best price

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‘Honey’ murcott from CUPS

Sugarbelle


Early pride

‘Ray Ruby’ grapefruit

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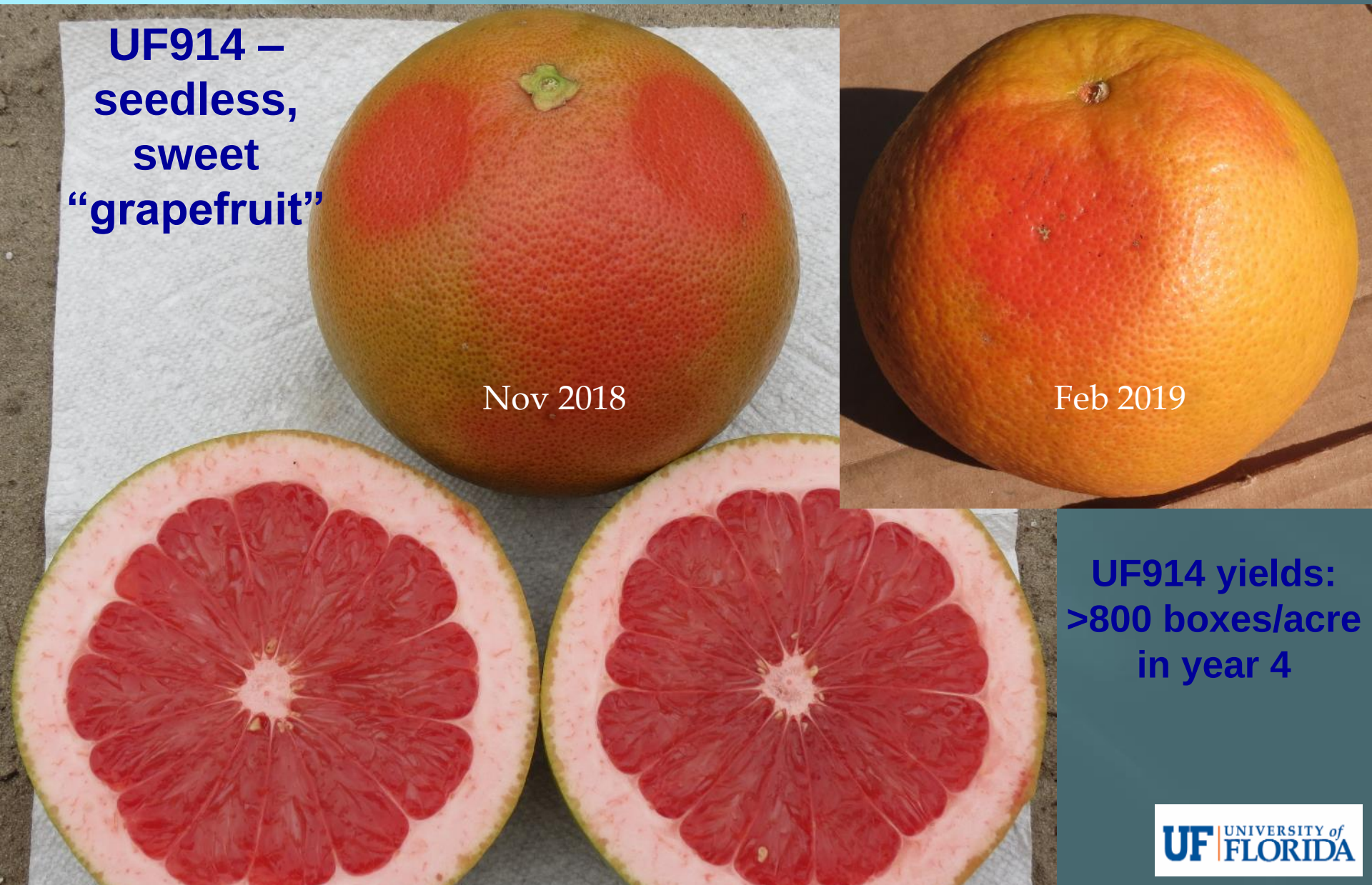
Other grapefruit varieties and hybrids also perform well in CUPS:

UF914 – seedless, sweet "grapefruit"



UF914 yields: >800 boxes/acre in year 4

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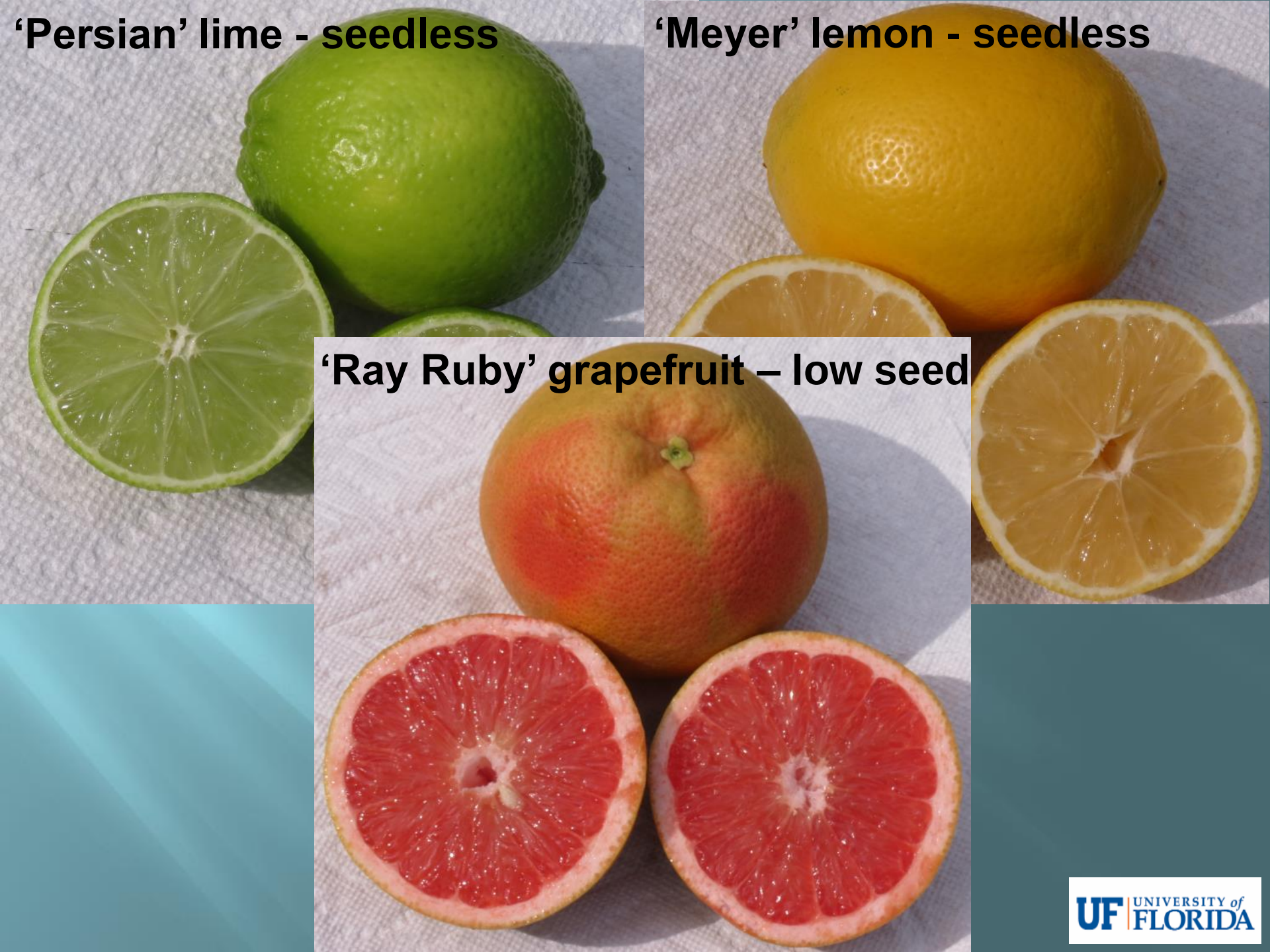
Variety	Color break	Maturity	GA response	Seed	Other	Score
Ray Ruby, Ruby Red	good	Dec - Jan		low	No alternate bearing, low pruning req.	*****
Honey murcott	good	Jan - Feb	yes	high	Alternate bearing high pruning req.	****
W. murcott	bad	Dec - Jan	yes	none	Alternate bearing high pruning req.	****
Dancy	excellent	Dec - Jan	yes*	low	high pruning req.	***
Sugarbelle	bad	Nov-Dec	yes*	none	high pruning req.	***
Kinnow mandarin	good			high	high pruning req.	**
Early Pride	excellent	Oct-Nov	yes*	none	Alternate bearing high pruning req.	**
Clementine			yes*	none		*
Temple			no	low		*
Bingo	good	Oct-Nov		none	Severe dieback	*
BB4	good	Oct-Nov		none	Alternate bearing Preharvest drop	*
UF914	good	Nov-Jan		none	No alternate bearing, low pruning req. Fruit issues yrs 1-3	***

*GA appears to be essential for these varieties in CUPS

Other varieties trialed in CUPS: 2014 to 2019

Variety	General observations	Score
Sanguinelli blood orange	Poor color break & granulation	*
Page tangelo	Good color break; Over-maturing fruit: granulation	**
Satsuma	Over-maturing fruit: granulation	*
Hamlin	Poor color break & granulation	**
Valencia	Poor color break & granulation	**
Glen navel	Over-maturing fruit: granulation	*
Cara cara navel	Over-maturing fruit: granulation	*
Persian lime	Excellent quality; moderate yield	*****
Eureka lemon	Vigorous; moderate yield; rust mite	***
Meyer lemon	Very high yield; rust mite	*****



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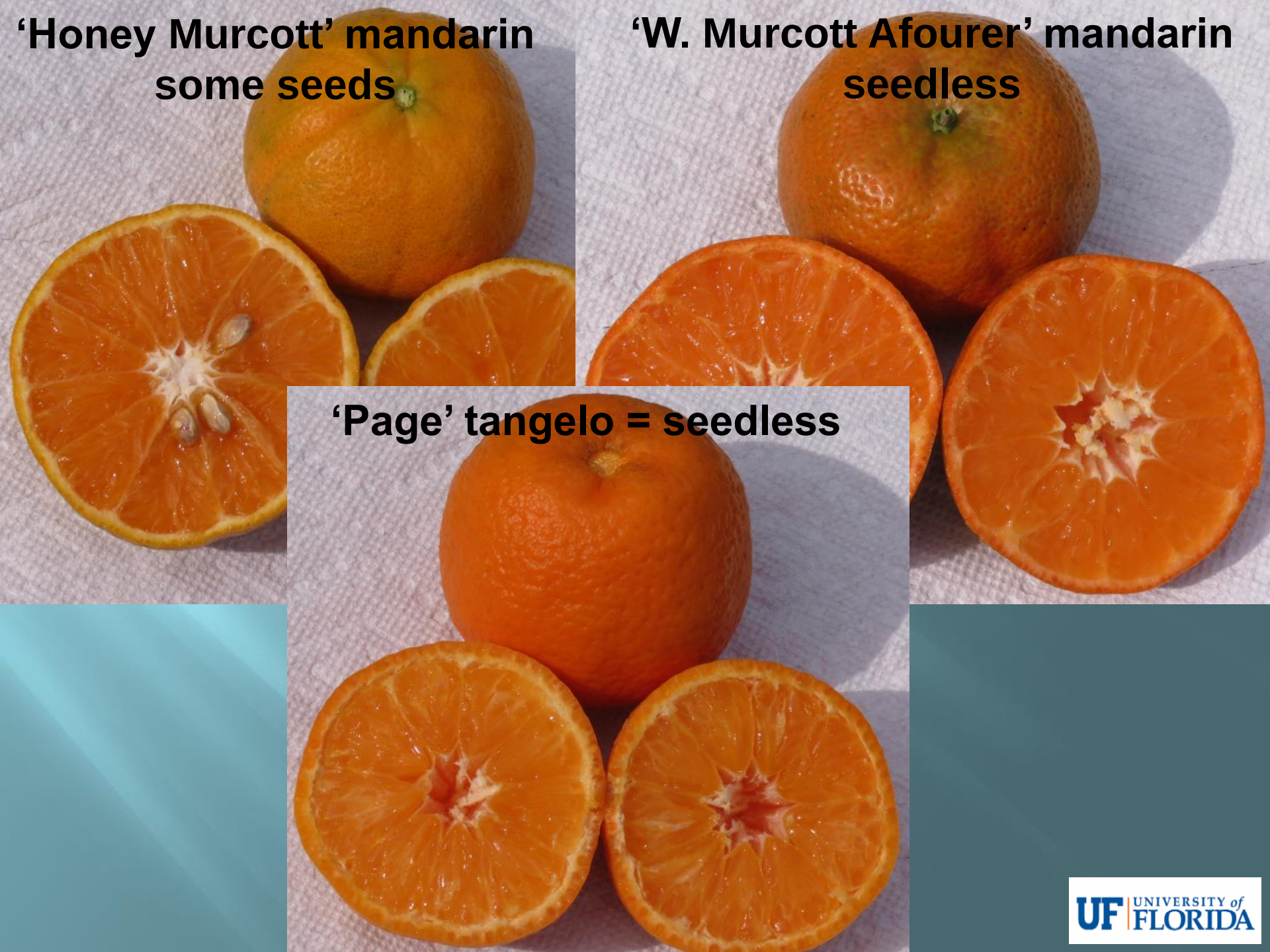

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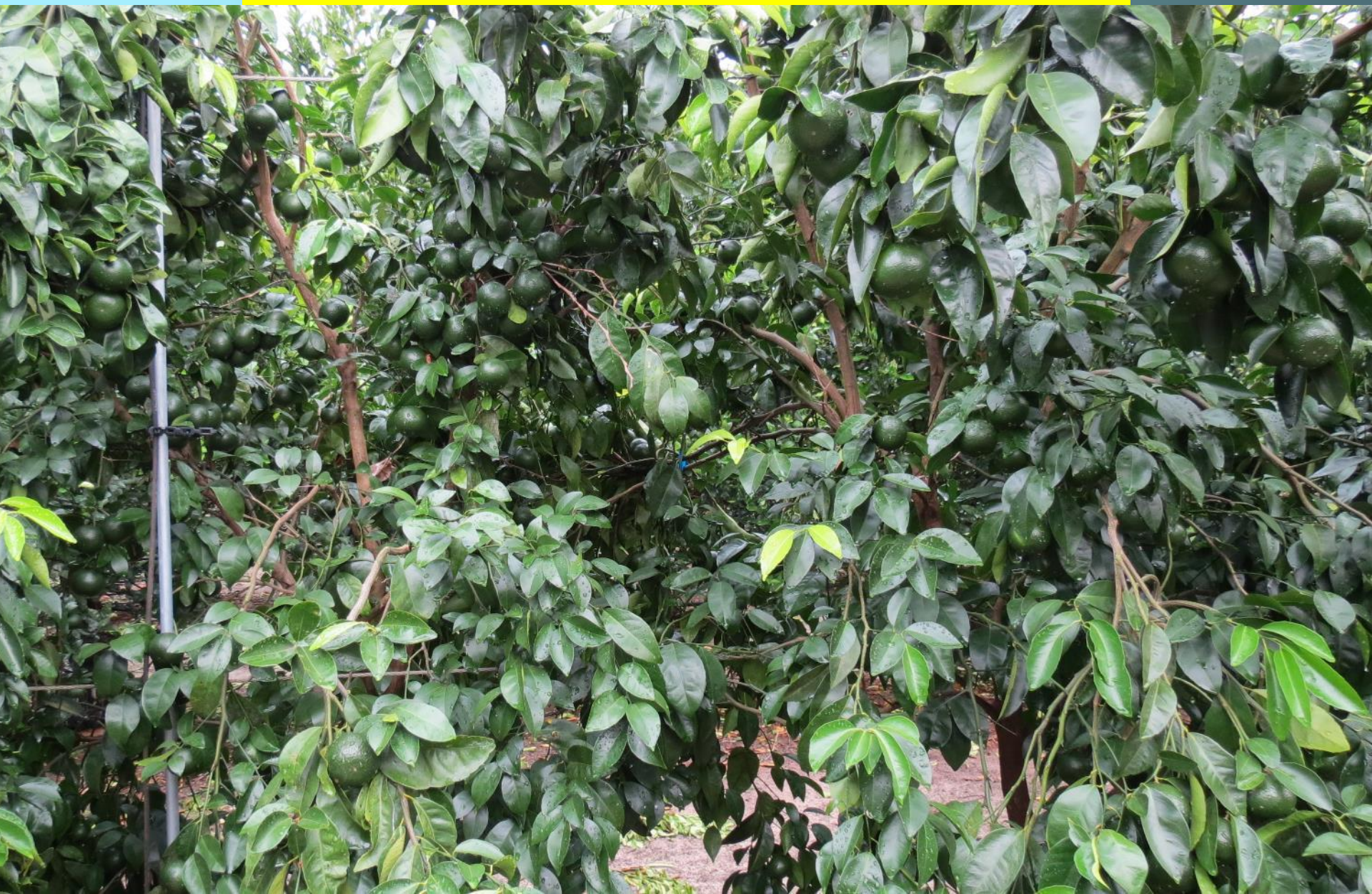
‘Sugar belle’ – seedless

‘UF BB4’ – seedless

CURRENT (August 2019) observations: Kinnow mandarin ~2.5 years



CURRENT (August 2019) observations:
Dancy tangerine ~2.5 years
10 ppm GA applied at bloom; no alternate bearing yet

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Dancy tangerine ~2.5 years
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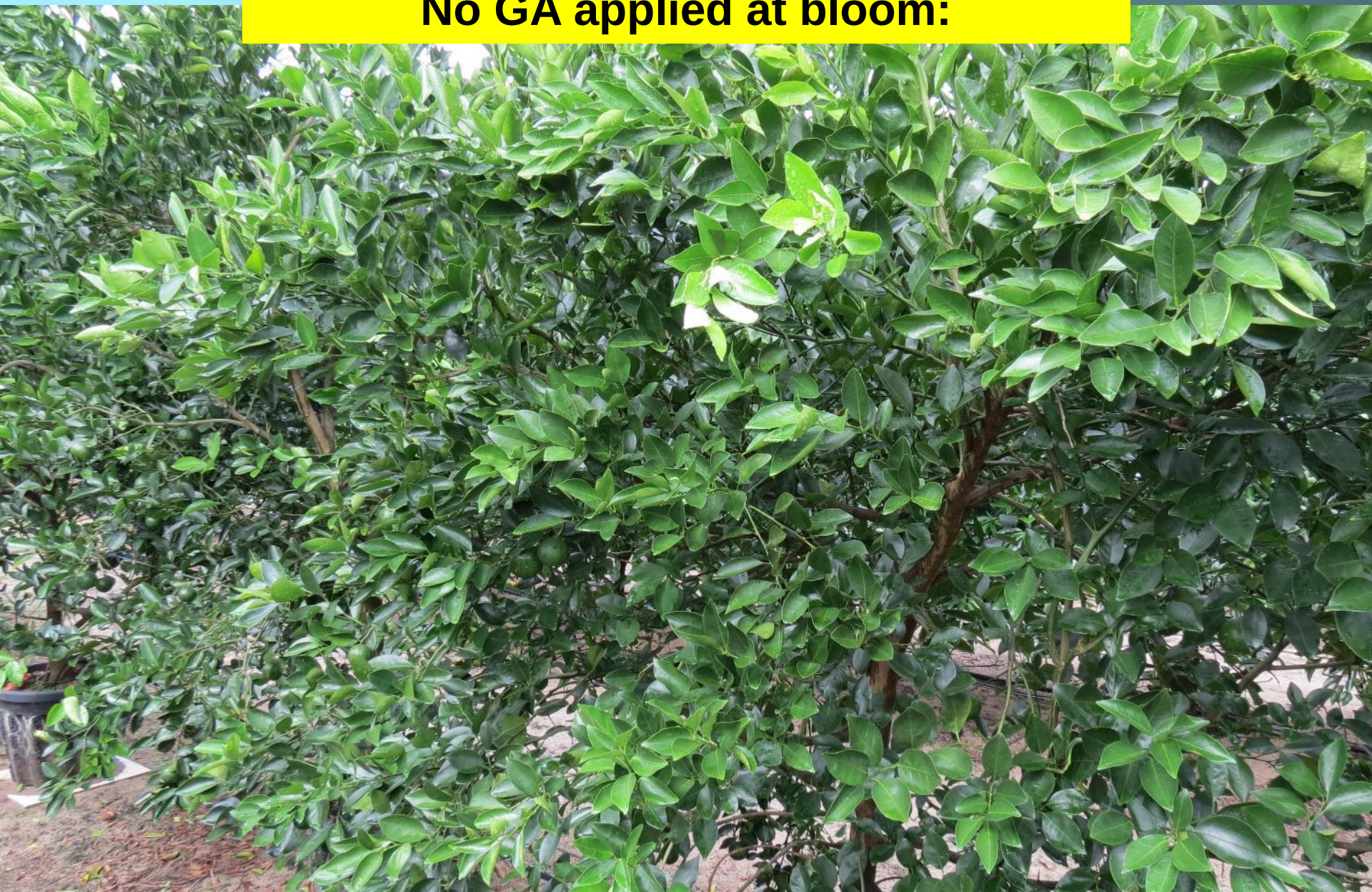
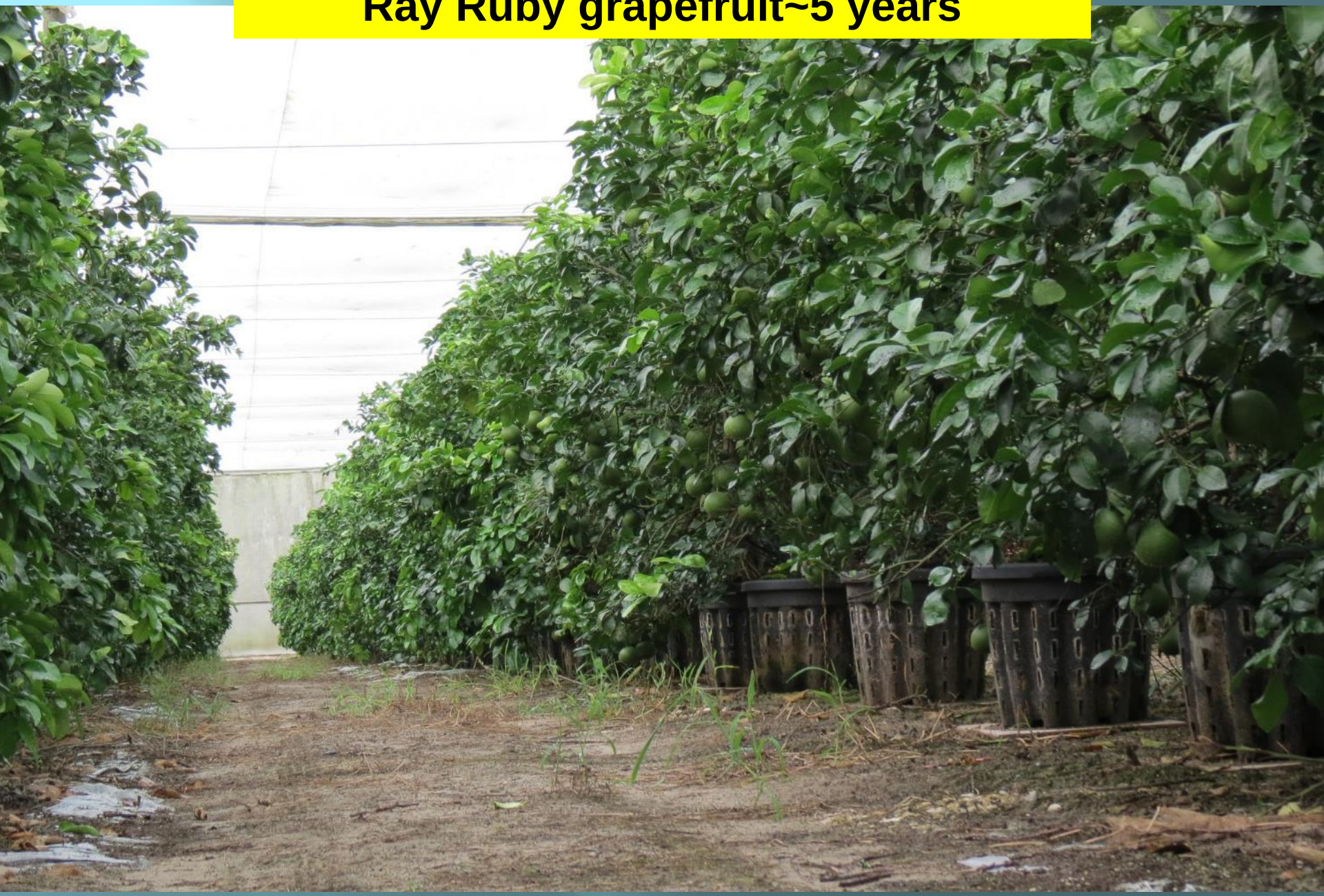
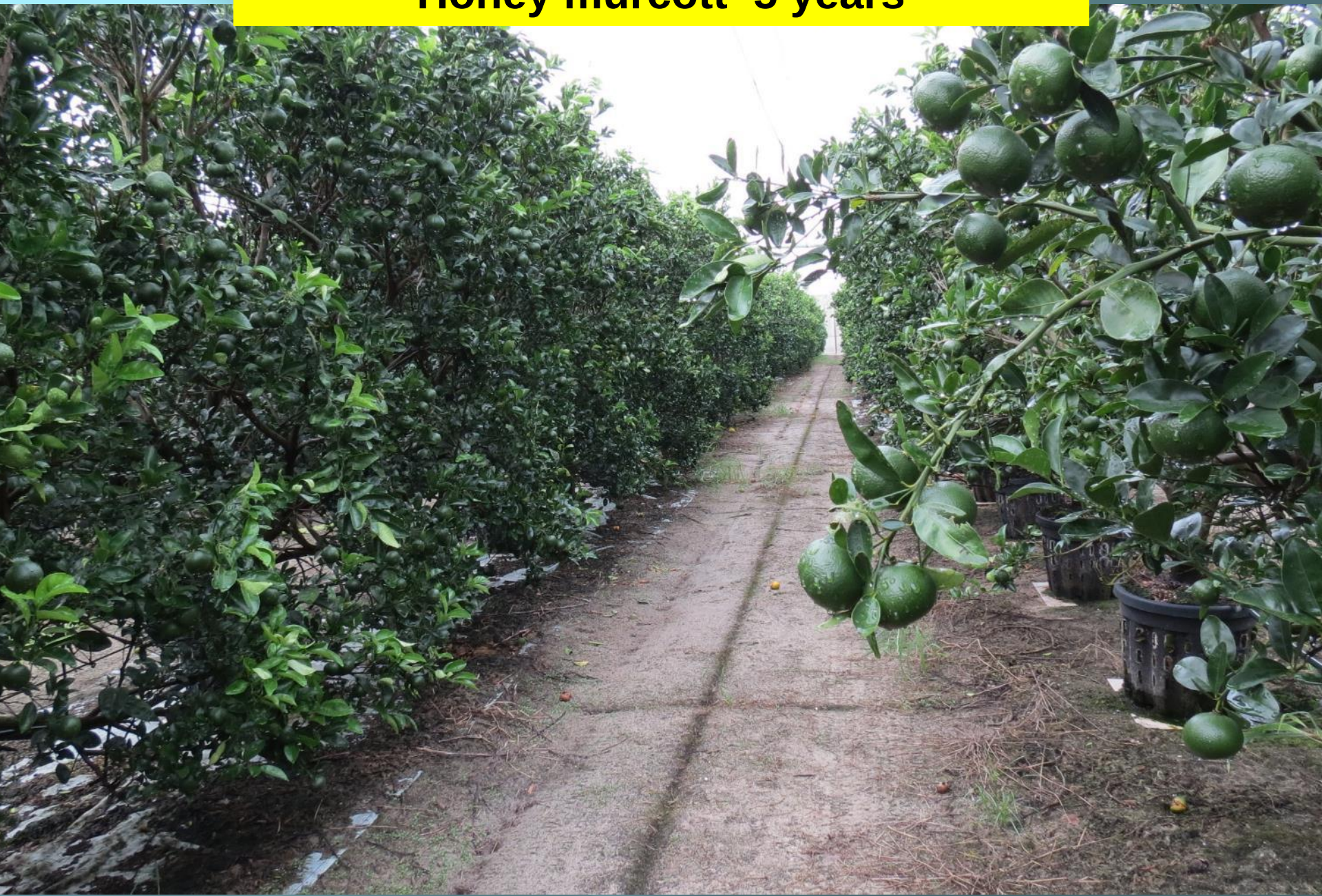


CURRENT (August 2019) observations:
Sugar Belle~2.5 years
10 ppm GA applied at bloom:

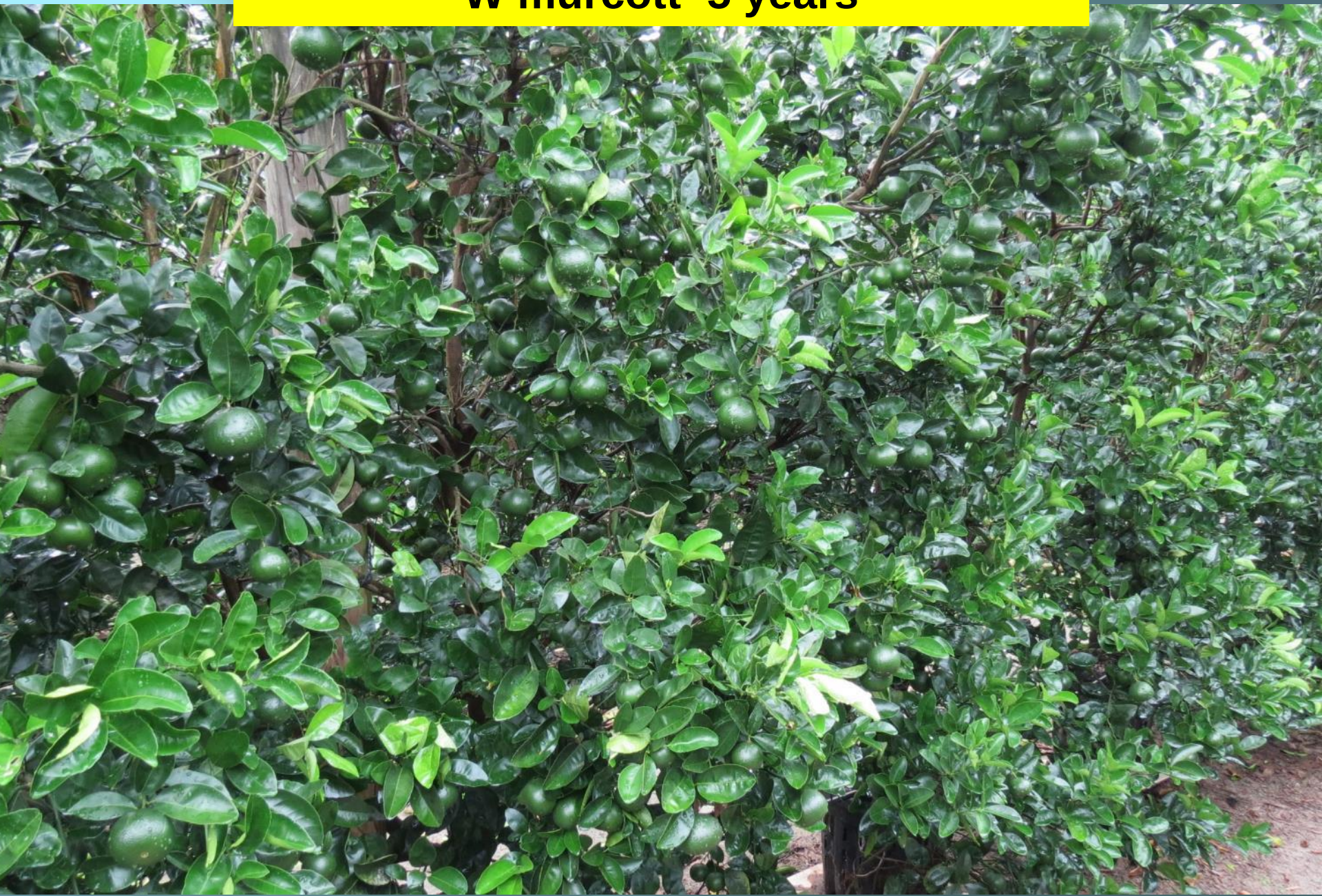
CURRENT (August 2019) observations: Ray Ruby grapefruit~5 years



CURRENT (August 2019) observations: Honey murcott~5 years



CURRENT (August 2019) observations: W murcott~5 years



TWO VARIETIES WITH KNOWN, RELIABLE PERFORMANCE IN THE CREC CUPS

- **Ray Ruby** grapefruit thrives in the CUPS, and started production in year 1; seems to love heat
- Both fruit quantity and quality are high, resulting in high net fruit revenue
- Greasy spot disease pressure is high for CUPS grapefruit
- CUPS allows growing a very HLB-susceptible variety (grapefruit) in HLB-endemic conditions, while retaining non-GMO status
- Demand for CUPS-grown Florida grapefruit can be high due to the great taste of “fresh-from-Florida” fruit and the 87% reduction in supply from traditional field-grown sources

TWO VARIETIES WITH KNOWN, RELIABLE PERFORMANCE IN THE CREC CUPS

- **Honey murcott** thrives in the CUPS heat, and started production in year 2. Some fruit splitting occurs in September. Good color break

- Both fruit quantity and quality are high, resulting in high net fruit revenue; alternate bearing is a disadvantage

- CUPS allows growing yet another favorite, very HLB-susceptible variety (Honey) in HLB-endemic conditions, while retaining non-GMO status

- Demand for CUPS-grown Florida Honey murcott fruit of premium size (80s, 100s) and great taste is high, despite the presence of seeds


Florida
Classic
120
Tangerine, Honey
Grown, US
Product of USA

CONCLUSIONS

- CUPS is an attractive non-GMO fresh fruit solution to HLB
- Economic viability of CUPS technology can be maximized by early high yields of premium grade fruit & high pack-out,100%
- Emphasis is on producing larger, clean fruit with good color; red grapefruit varieties and Honey murcott are good choices
- W. murcott is an attractive variety for CUPS, but the poor color break is an unsolved issue; unresponsive to ethylene degreening? Experimenting with restricting nitrogen from phase II fruit development onwards
- Early Pride, Dancy, Kinnow, Sugar Belle, UF914, and others need more data to build knowledge base for CUPS production

Thank you for your support

Grower stakeholders & cooperators

UF/IFAS Extension Agents

Laboratory and Support Staff

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IFAS Research
Florida Agricultural Experiment Station

(Mark McLellan, previous Dean for Research)

CREF
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