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Blueberry Breeding @ UF
Florida Blueberry Growers Association

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Making Information about Cultivars available to our producers!

www.blueberrybreeding.com

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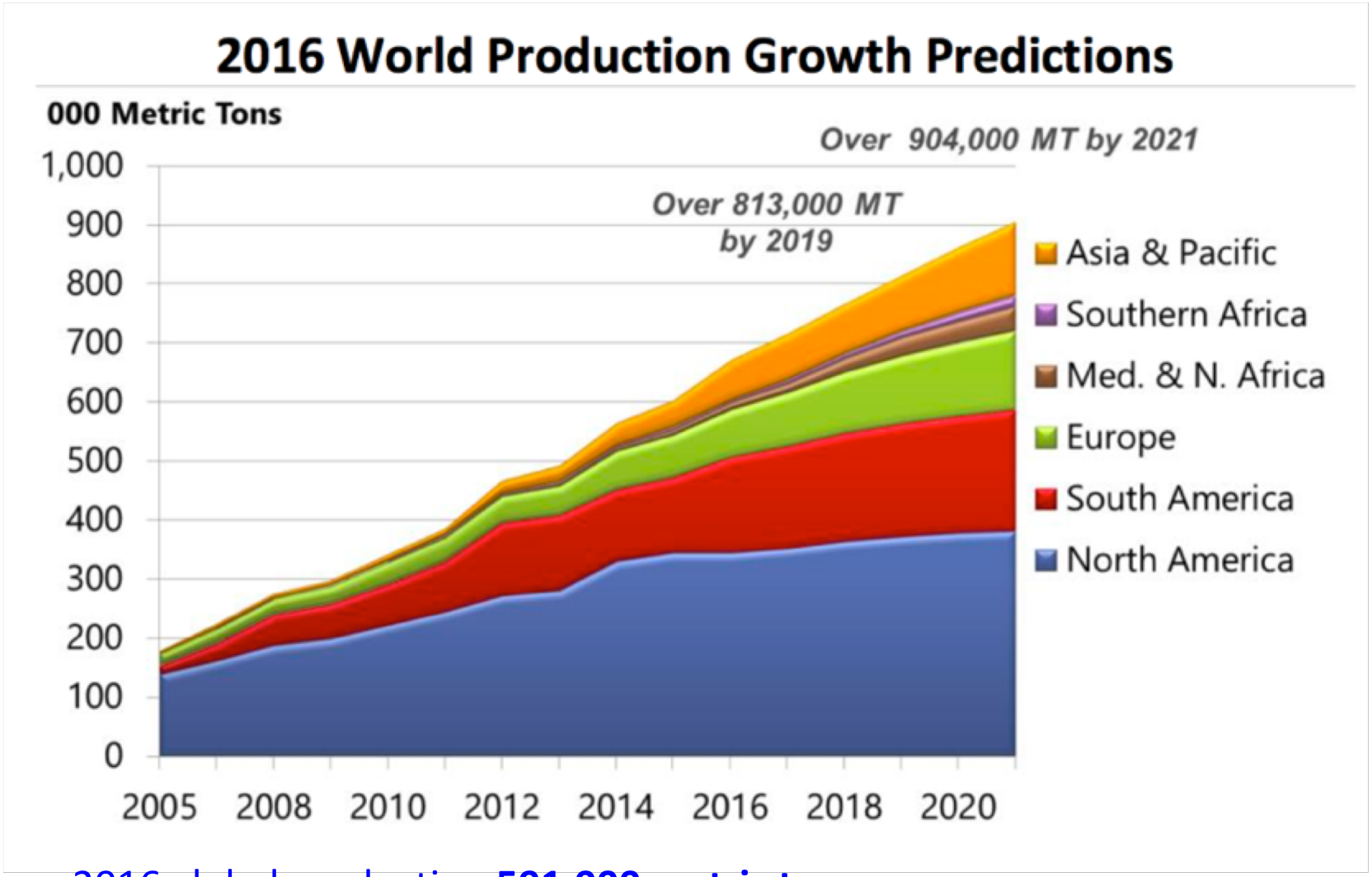
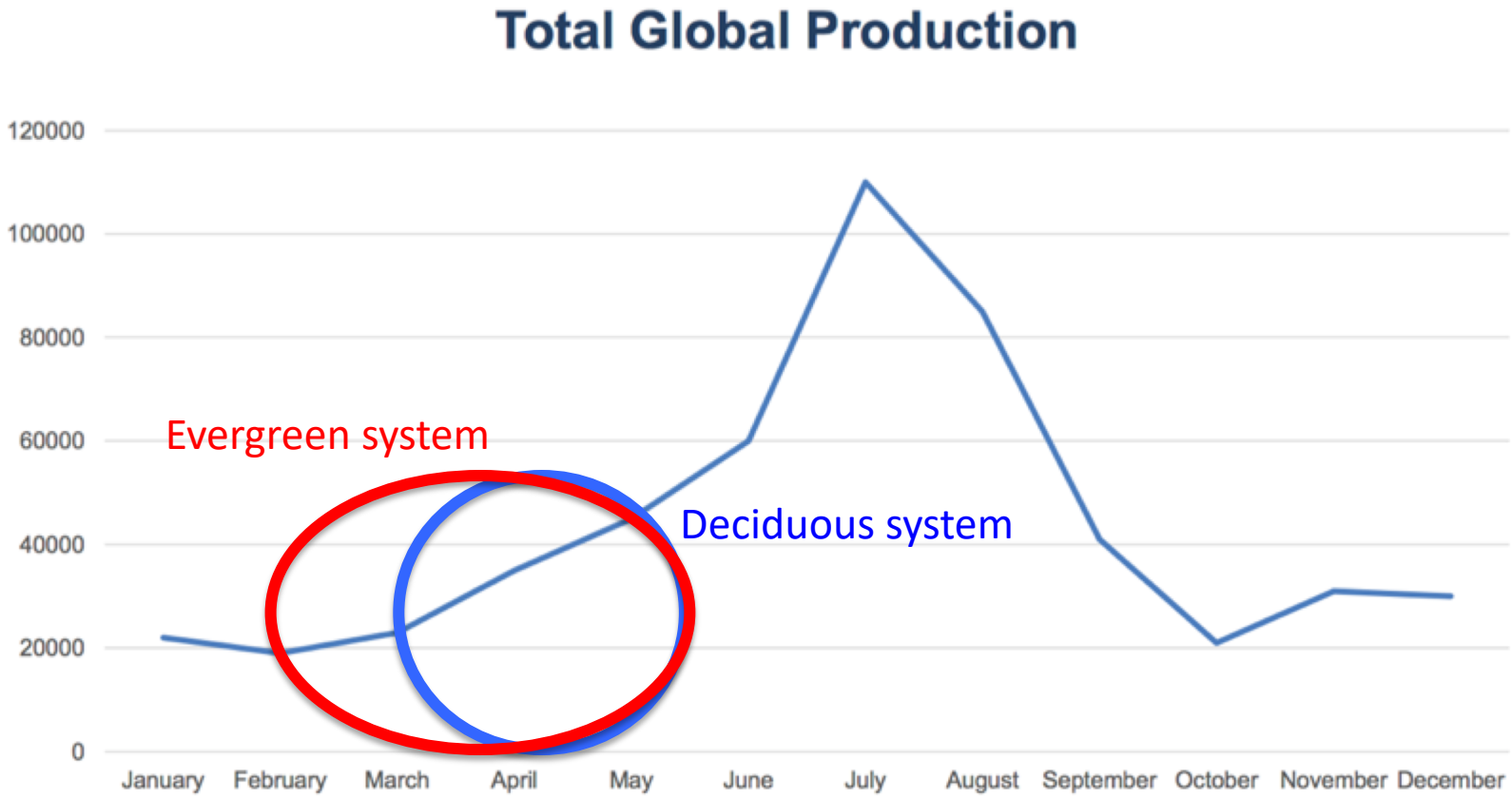


- 2016 global production **591,000 metric tons**
- United States 41% fresh and 83% processed market
- United States utilize 68% of global production
- Consumption in North America, Europe, and Asia
- Production doubled (US), tripled (EU) and quadrupled (APAC) since 2008

Brazelton et al 2017 IBO

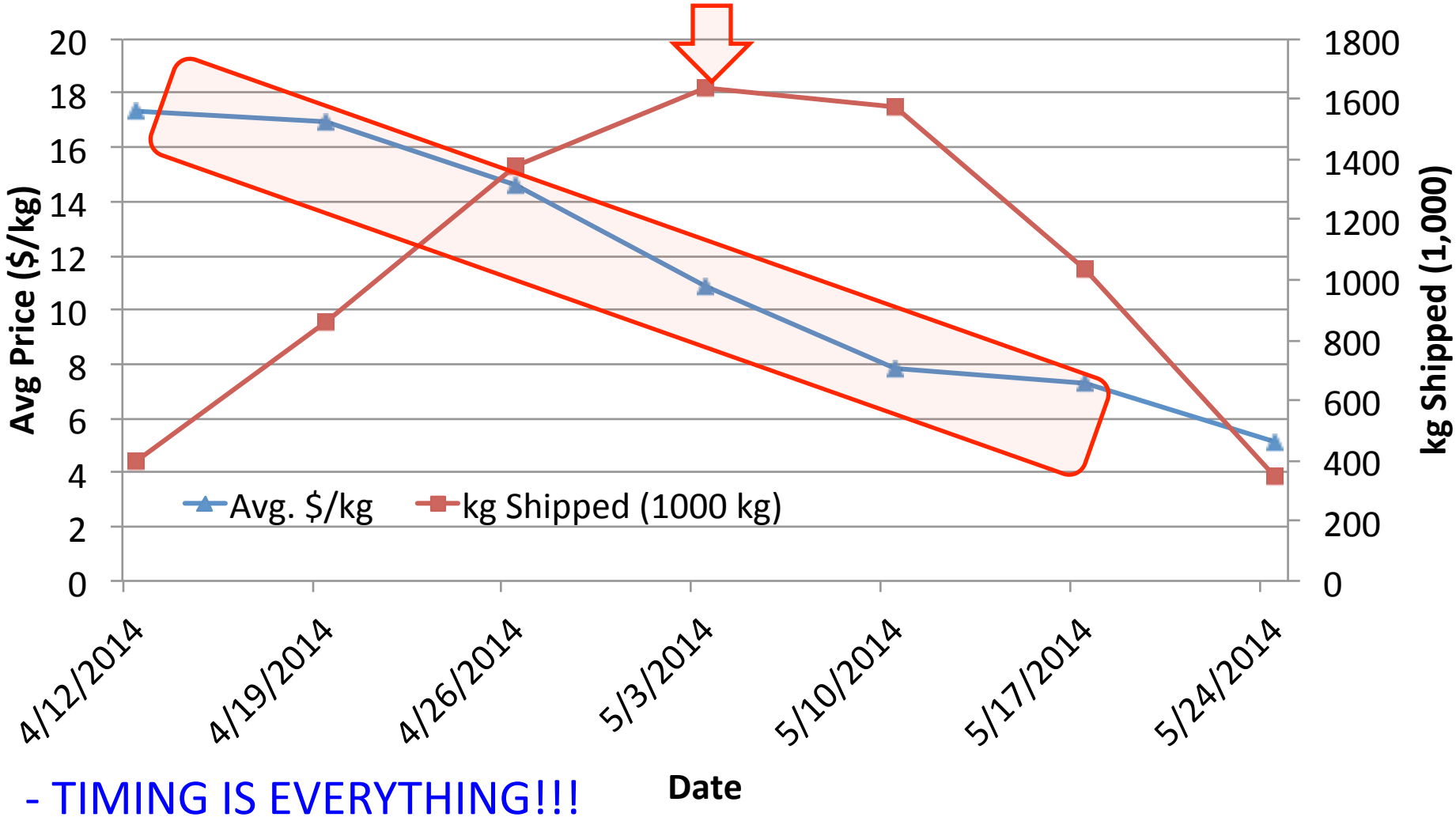
Monthly Global Production and Florida



- Florida window

Brazelton et al 2017 IBO

Florida Market Window - 2014



- TIMING IS EVERYTHING!!!
- FL window is dynamic with weather - Experience from 2015 and 2016

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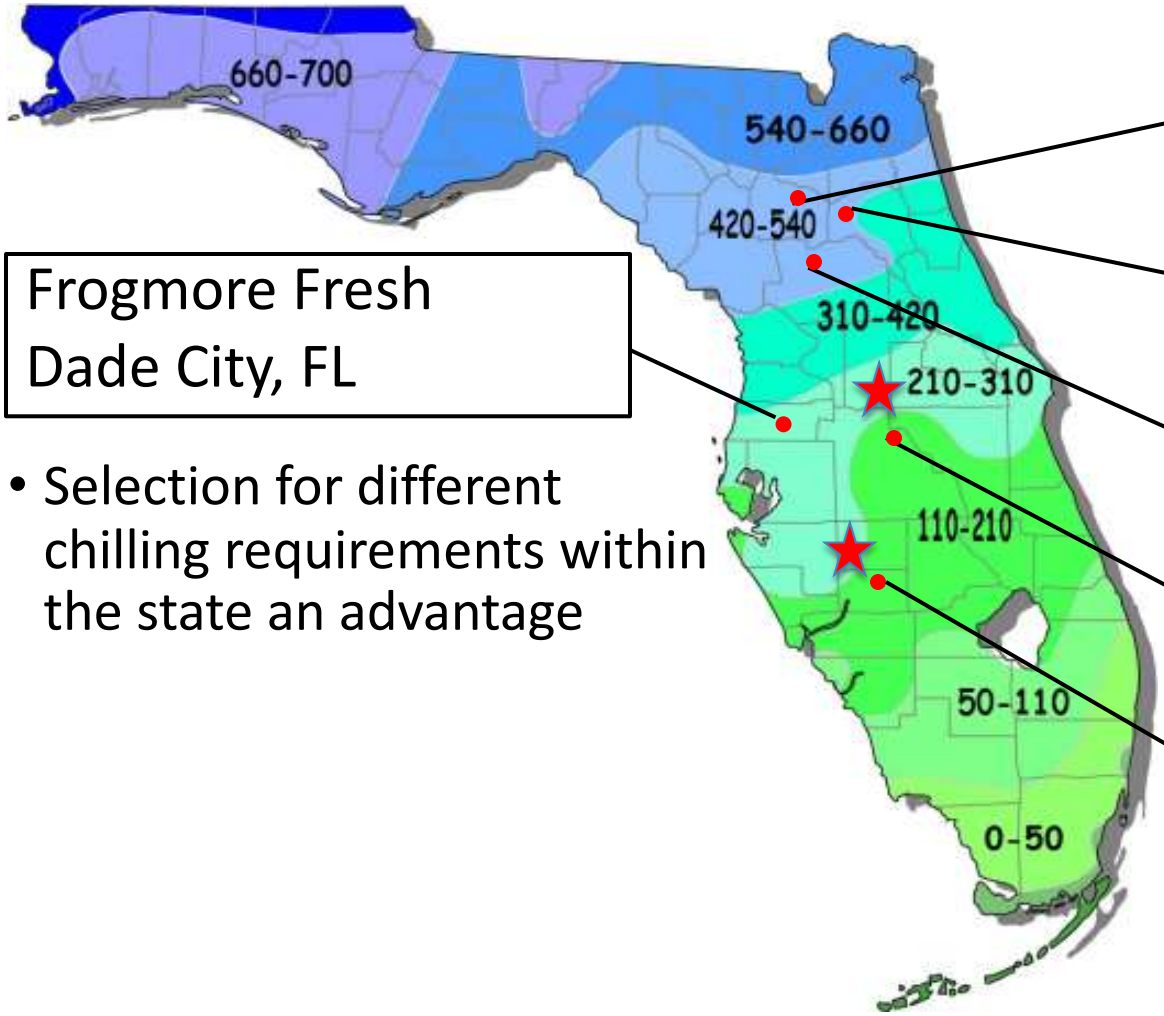
UF Blueberry Breeding Program Test Sites



Suwanee Creek Farms
Homerville, GA

Straughn Farms
Windsor/Waldo, FL

Miller Blueberry Plant.
Interlachen, FL

PSREU
Citra, FL

Dole Fruit
Haines City, FL

Island Grove Ag Prod.
Arcadia, FL

Frogmore Fresh
Dade City, FL

- Selection for different chilling requirements within the state an advantage

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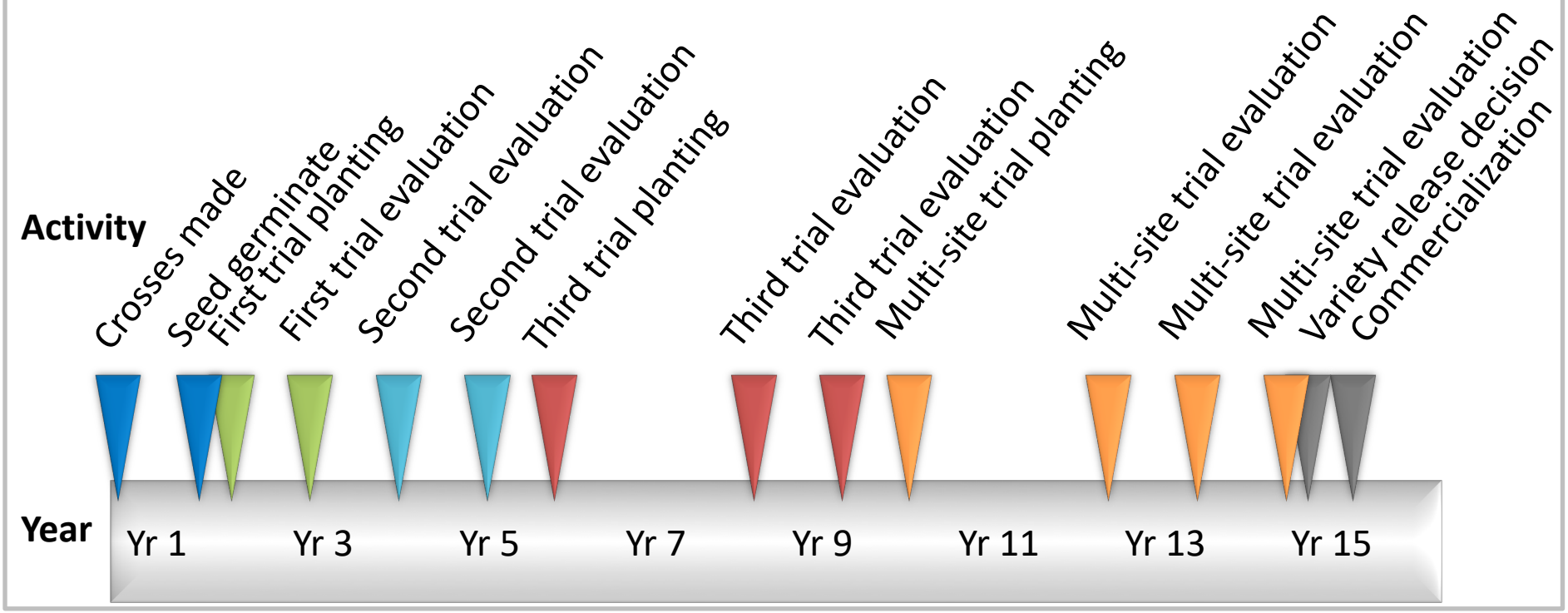
UF Blueberry Cultivar Development Timeline



- Large numbers of parents and crosses each year
- High density seedling plantings for rapid first evaluation
- Growers-Cooperators early in the breeding cycle
- **Large number of cultivars released historically!**

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UF-IFAS Blueberry Releases (2004-2016)

Release Year	Variety	FL Outlook	Notes
2004	Springhigh	Decreasing	Early season alternative but Marketers do not want fruit
2005	Primadonna	Stable	Early season, but difficult to achieve full crop potential
	Snowchaser	Minor	Very early but fruit quality often not ideal
	Sweetcrisp	Decreasing	More acreage in Georgia than FL
2007	Farthing	Increasing	Widely planted north of I-4
	Scintilla	Decreasing	Plant longevity is an issue
2009	Bobolink	Minor	Has not been widely adopted
	Chickadee	Increasing	Interest in very low-chill areas in Central Florida
	Flicker	Decreasing	Anthracnose problems in Central Florida
	Kestrel	Increasing	Interesting in very low-chill areas in Central Florida
	Meadowlark	Stable	Widely planted north of I-4, *Xylella* an issue
	Raven	Minor	Has not been widely adopted
2013	Indigocrisp	Increasing	Planting increasing Gainesville-north, standing water an issue
2015	Arcadia	Increasing	Great yield in Central-South FL
	Avanti	Increasing	Planting increasing in Central-South FL
	Endura	Increasing	Good Yield in Central-South FL
2016	Keecrisp	Increasing	High fruit quality (Crunchy), North Florida
	Patrecia	Increasing	Large early fruit, North FL. Possible Springhigh replacement

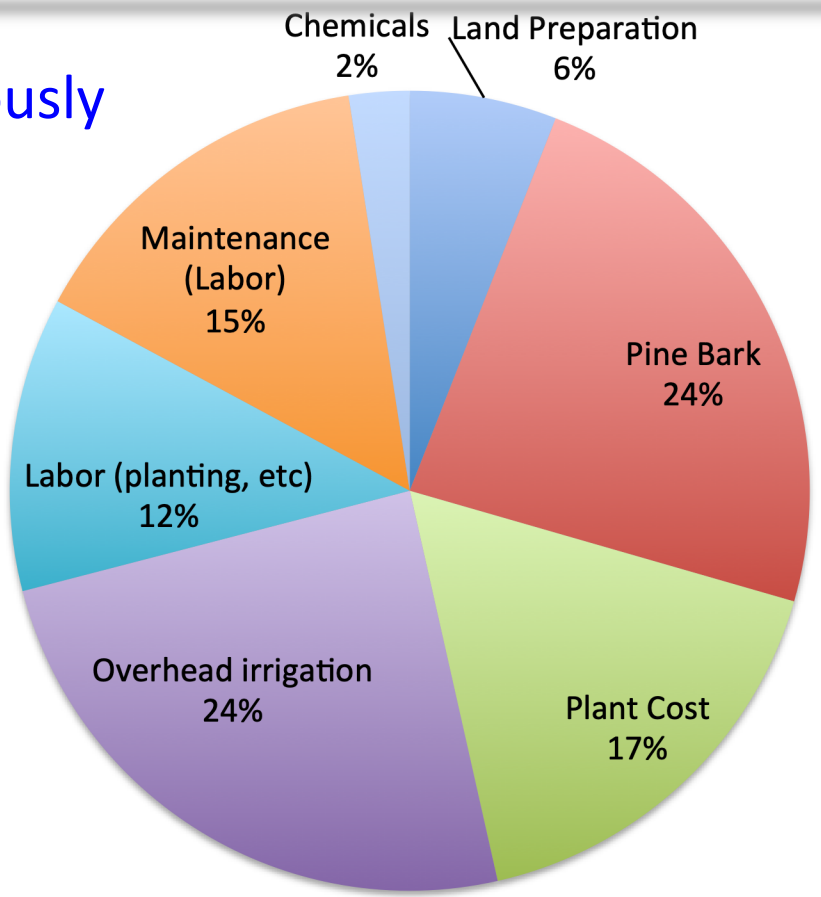
HOW THE BREEDING PROGRAM CAN HELP OUR FL PRODUCERS?

1. By developing cultivars that can have higher yield, better quality, and appropriated timing of production to maximize producer profit.

2. By developing cultivars that decrease the cost of production and/or harvesting, thus maximize producer profit.

Average Historical Cost % Establishment and Maintenance

Spraying cost has increased tremendously due to new pests. Example: SWD!!



Soil Amendment!!!

<u>Strategic goal:</u> Develop cultivars with lower soil amendment requirements.

Most studies shown that soil amendment is needed for yield.

Most studies have been done with already released cultivars

Selection for this trait will be explored at the seedling stage to observe whether variation exist and thus start selecting for it!

Exploring wild species. Based on Grafting results!

Working with Faculty specialists in this area from UF.

<u>Strategic goal:</u> Develop cultivars with lower spraying requirements; disease/pest tolerant/resistant

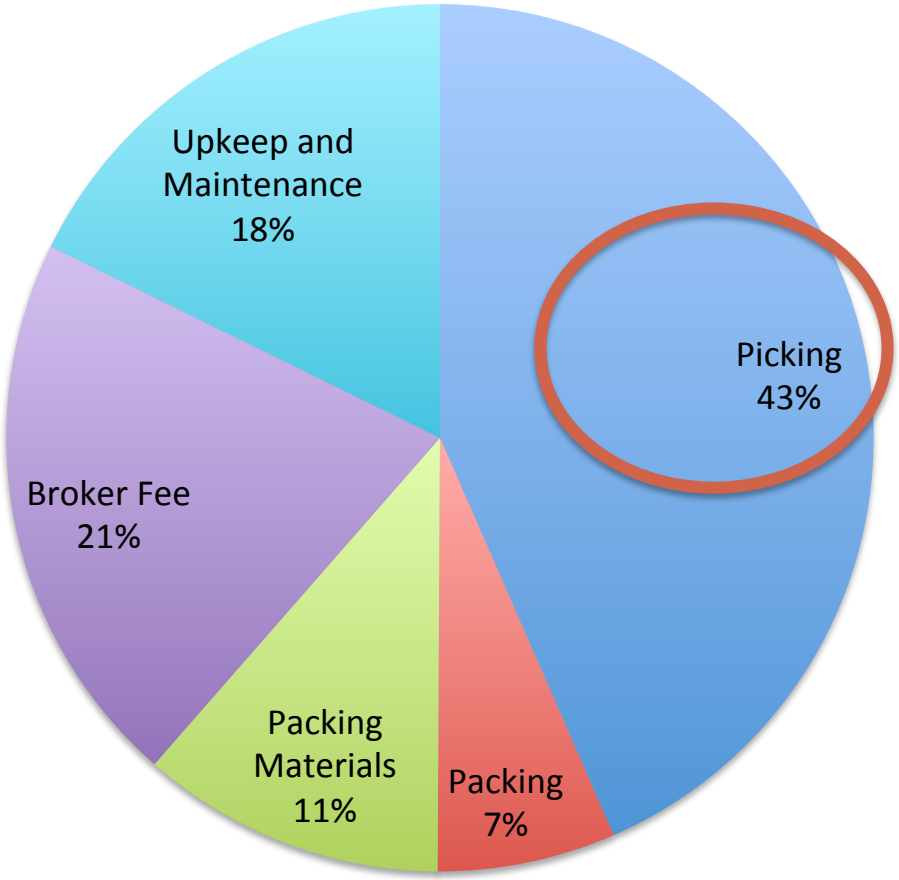
Strategy 1: We will select and use as parents, long lasting experimental lines, >90% plot survival after 8-9 years in the field with good yield.

Strategy 2: Are we able to screen for pests/diseases?

Working in collaboration with UF plant pathologist and entomologist to develop protocols for screening of economically important diseases/pests.

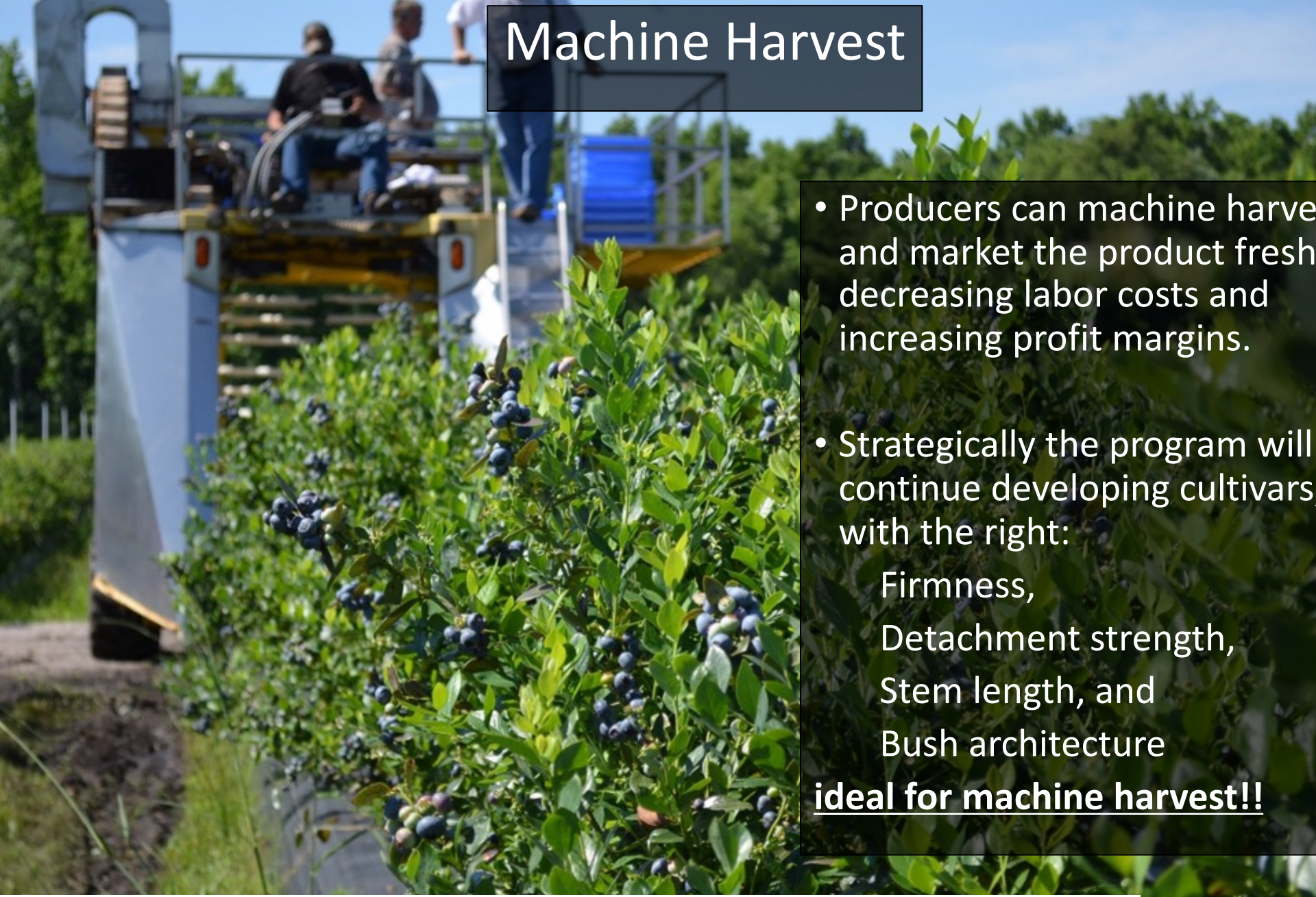
Goal will be to create a cultivar catalog for the different levels of resistance observed

Average Historical Harvesting Cost % per Flat



Machine harvest

Machine Harvest



- Producers can machine harve and market the product fresh decreasing labor costs and increasing profit margins.

- Strategically the program will continue developing cultivars with the right:
  - Firmness,
  - Detachment strength,
  - Stem length, and
  - Bush architecture

ideal for machine harvest!!

IEW: in 2017 season we machine harvested three new cultivars

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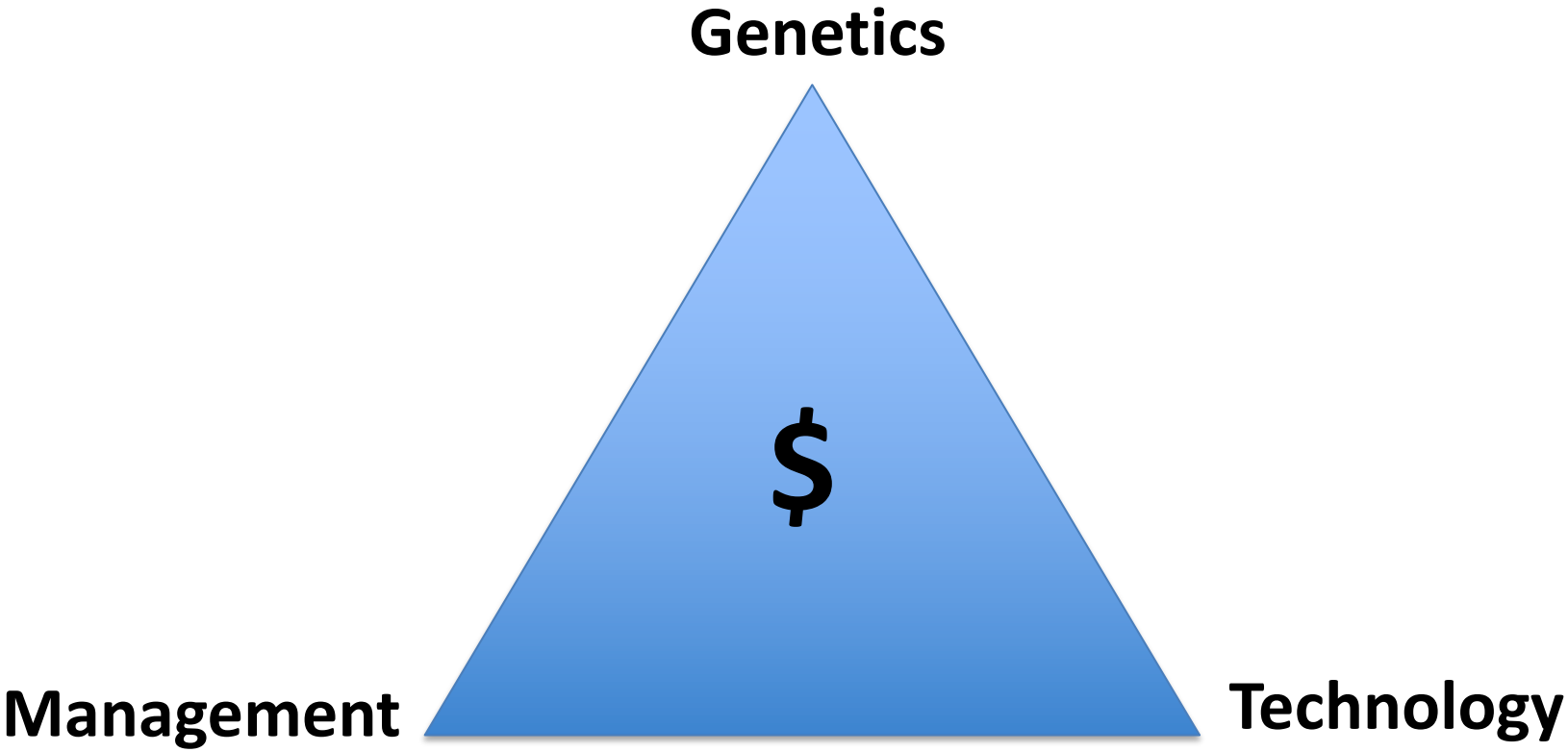
Machine Harvesting Triangle



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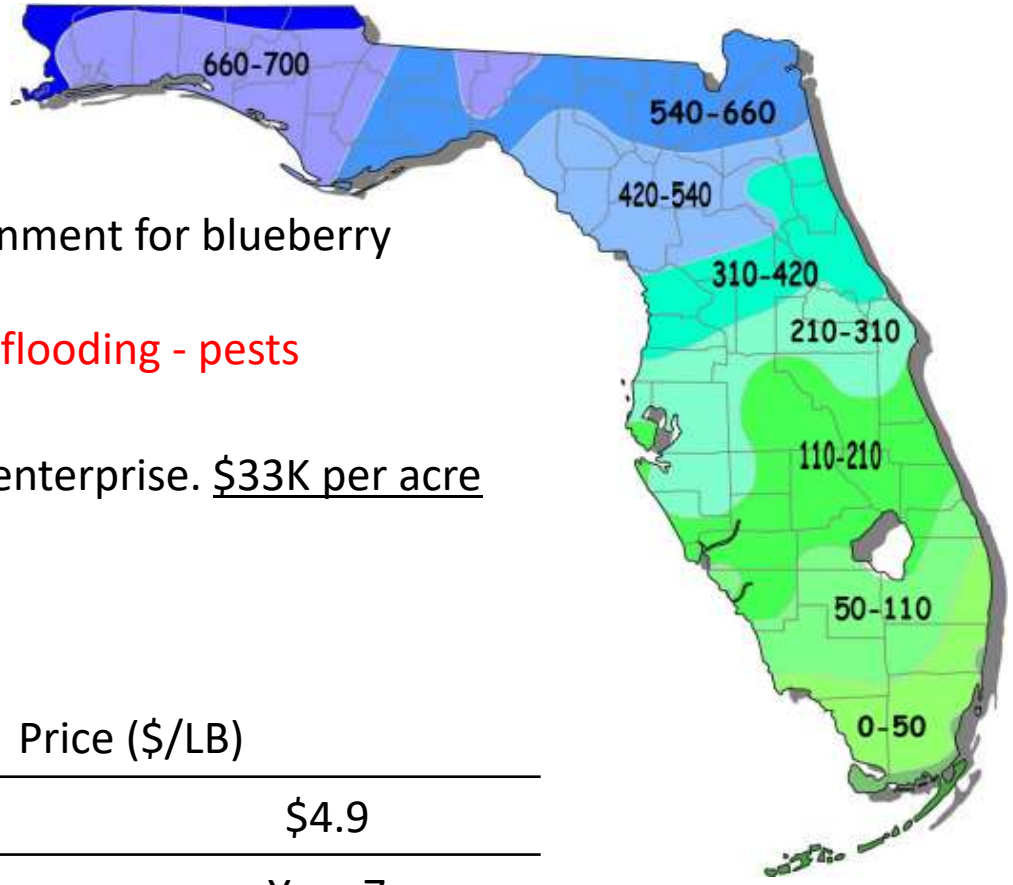
Blueberry production in Florida



- Florida is an extremely challenging environment for blueberry production

  humidity – heat – disease – soil – flooding - pests

- Establishment of a planting is a high cost enterprise. $33K per acre spent by year 2.

- Plantings in FL last 7 years on average!

	Price ($/LB)	
Average Yield (Lb/A)	$3.7	$4.9
6000 Lb/A	>15 Years	Year 7
8000 Lb/A	Year 11	Year 5

- Profitability is tied to the length of production (Singerman et al. 2017. EDIS Publication)

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Selections Approved for Release as Cultivars 2017

Production for Fresh Market during Florida harvesting window

Magnus (04-213)* – Early production of **large fruit** for hand harvest in FL window for fresh fruit market. Not firm enough for machine. Expecting over 8 years of high yield. Earlier than Star and Emerald. Recommended for Central-North Florida.

Wayne (06-354)* – Early production and high fruit yield. Not firm enough for machine harvest. Expecting over 8 years of high yield. **Jewel-like but firmer!** Recommended for Central-North Florida.

Optimus (08-262)* – Early production of firm, **machine harvest** fruit (see machine harvest data). High fruit quality. Medium size. Recommended for Central-North Florida.

*Plant Patents Pending. Licenses available in 2018 to FL nurseries.

Machine harvest April 2017

Genotypes	Date	Lb Packed Fruit/Bush	Lb Waste	Yield/Acre (1290 bush)
Wayne	April 6 17	1.23	0.42	1,583
Optimus	April 6 17	1.22	0.28	1,574
Wayne	April 17 17	0.96	0.49	1,232
Optimus	April 17 17	1.75	0.28	2,258
Wayne	April 28 17	0.79	0.20	1,016
Optimus	April 28 17	0.68	0.08	876

Packed total yield →		
	Wayne	3,831
	Optimus	4,708

Scenario: 1290 Plants per Acre

Genotypes	Date	Price $/Lb	$ per Acre	Savings MH vs HH	Total Savings	Total Income per Acre
Wayne	April 6 17	5.3	$8,392.4	$0.50	$791.7	$9,184.2
Optimus	April 6 17	5.3	$8,341.9	$0.50	$787.0	$9,128.8
Wayne	April 17 17	4	$4,927.8	$0.50	$616.0	$5,543.8
Optimus	April 17 17	4	$9,031.4	$0.50	$1,128.9	$10,160.3
Wayne	April 28 17	3.1	$3,149.2	$0.50	$507.9	$3,657.2
Optimus	April 28 17	3.1	$2,716.8	$0.50	$438.2	$3,155.0

Total Saving respect to hand harvest

Type of Labor	Local Labor	H2A Labor
Plants per Acre	**1290**	**1290**
Wayne	**$1,916**	**$3,831**
Optimus	**$2,354**	**$4,708**

Assumptions Cost: Local Labor 0.85 $/Lb; H2A Labor 1.35 $/Lb; Machine 0.35 $/Lb

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Machine harvest April 2017

Genotypes	Date	Lb Packed I	Lb Waste	Yield/Acre (1742 bush)
Wayne	April 6 17	1.23	0.42	2,138
Optimus	April 6 17	1.22	0.28	2,125
Wayne	April 17 17	0.96	0.49	1,664
Optimus	April 17 17	1.75	0.28	3,049
Wayne	April 28 17	0.79	0.20	1,372
Optimus	April 28 17	0.68	0.08	1,183
	Packed total yield →		**Wayne**	5,174
			Optimus	6,358

Scenario: 1742 Plants per Acre

Genotypes	Date	Price $/Lb	$ per Acre	Savings MH vs HH	Total Savings	Total Income per Acre
Wayne	April 6 17	5.3	$11,333.0	$0.50	$1,069.2	$12,402.2
Optimus	April 6 17	5.3	$11,264.7	$0.50	$1,062.7	$12,327.5
Wayne	April 17 17	4	$6,654.4	$0.50	$831.8	$7,486.2
Optimus	April 17 17	4	$12,195.8	$0.50	$1,524.5	$13,720.3
Wayne	April 28 17	3.1	$4,252.7	$0.50	$685.9	$4,938.6
Optimus	April 28 17	3.1	$3,668.7	$0.50	$591.7	$4,260.4

Total Saving respect to hand harvest

Type of Labor	Local Labor	H2A Labor
Plants per Acre	**1742**	**1742**
Wayne	**$2,587**	**$5,174**
Optimus	**$3,179**	**$6,358**

Assumptions Cost: Local Labor 0.85 $/Lb; H2A Labor 1.35 $/Lb; Machine 0.35 $/Lb

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Machine harvest April 2017

Genotypes	Date	Lb Packed I	Lb Waste	Yield/Acre (1936 bush)
Wayne	April 6 17	1.23	0.42	2,376
Optimus	April 6 17	1.22	0.28	2,362
Wayne	April 17 17	0.96	0.49	1,849
Optimus	April 17 17	1.75	0.28	3,389
Wayne	April 28 17	0.79	0.20	1,525
Optimus	April 28 17	0.68	0.08	1,315
			Wayne	5,750
	Packed total yield →		**Optimus**	7,066

Scenario: 1936 Plants per Acre

Genotypes	Date	Price $/Lb	$ per Acre	Savings MH vs HH	Total Savings	Total Income per Acre
Wayne	April 6 17	5.3	$12,595.1	$0.50	$1,188.22	$13,783.4
Optimus	April 6 17	5.3	$12,519.3	$0.50	$1,181.06	$13,700.3
Wayne	April 17 17	4	$7,395.5	$0.50	$924.44	$8,320.0
Optimus	April 17 17	4	$13,554.0	$0.50	$1,694.26	$15,248.3
Wayne	April 28 17	3.1	$4,726.3	$0.50	$762.30	$5,488.6
Optimus	April 28 17	3.1	$4,077.3	$0.50	$657.63	$4,734.9

Total Saving respect to hand harvest

Type of Labor	Local Labor	H2A Labor
Plants per Acre	**1936**	**1936**
Wayne	**$2,875**	**$5,750**
Optimus	**$3,533**	**$7,066**

Assumptions Cost: Local Labor 0.85 $/Lb; H2A Labor 1.35 $/Lb; Machine 0.35 $/Lb

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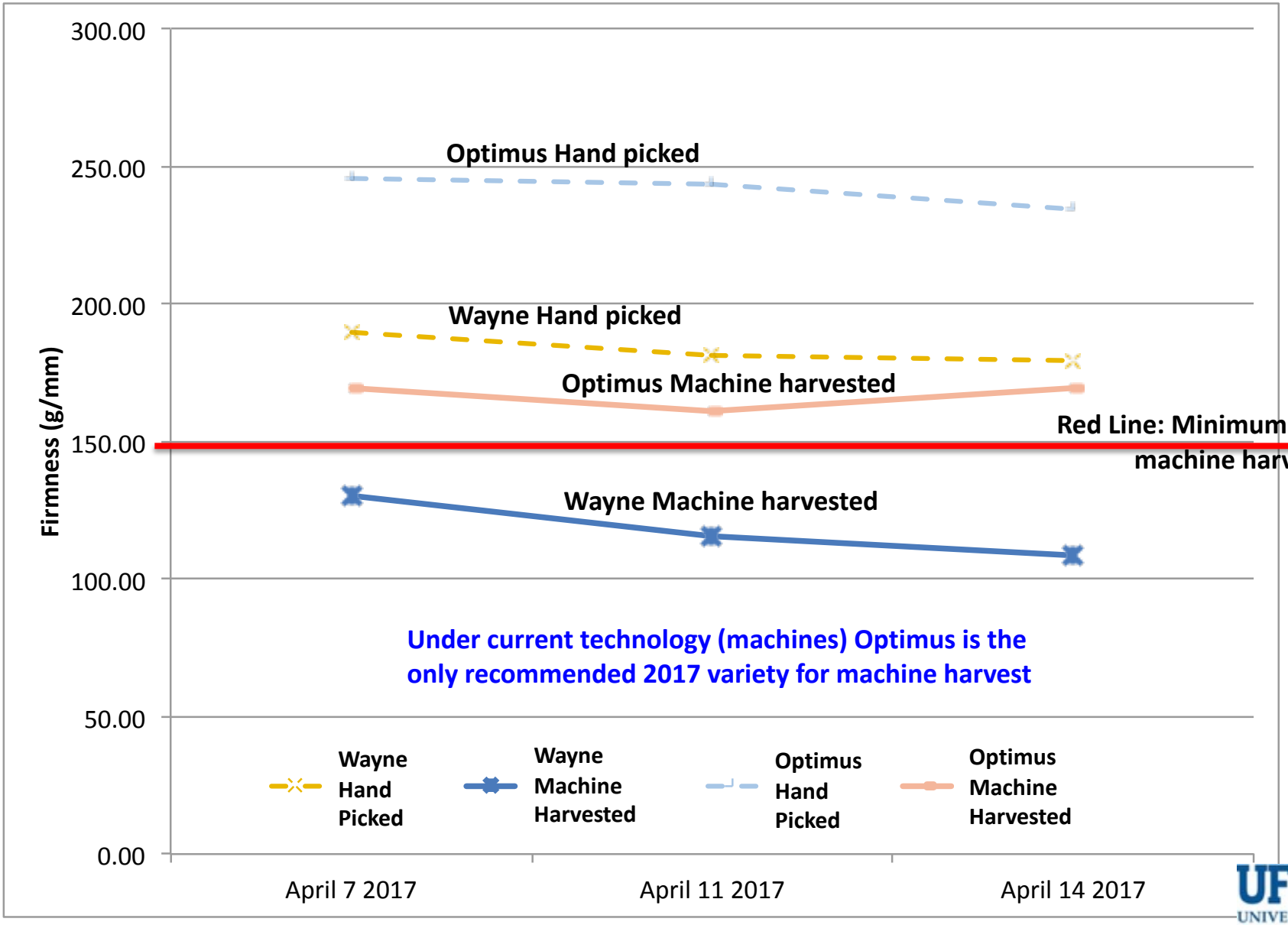
Post-harvest Firmness 1, 4 and 8 days after hand picked and Machine Harvest (04/06/17)



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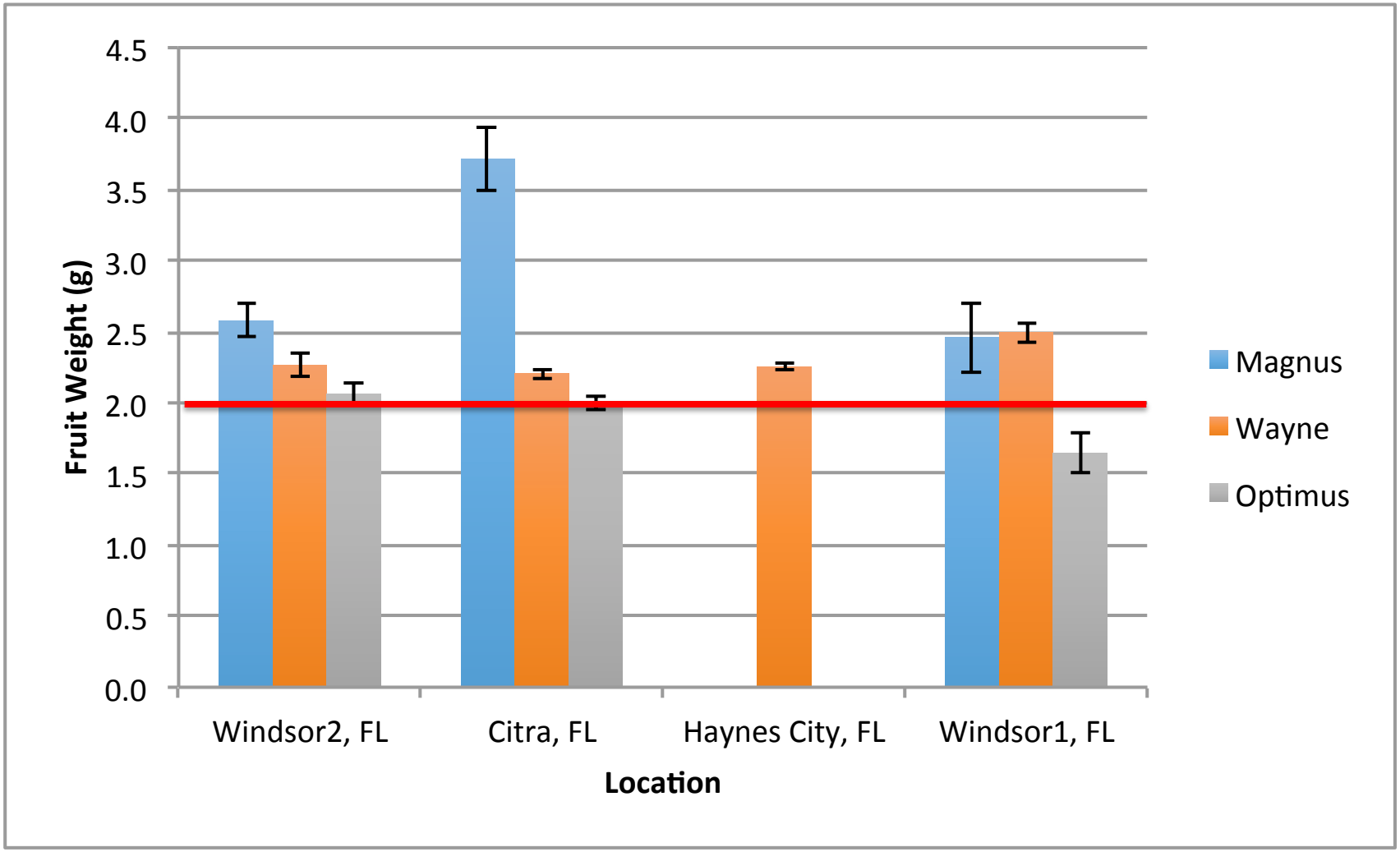
Fruit Weight (g)



Summary data 2011-2017

Red line= 2.0 g recommended minimum weight acceptability

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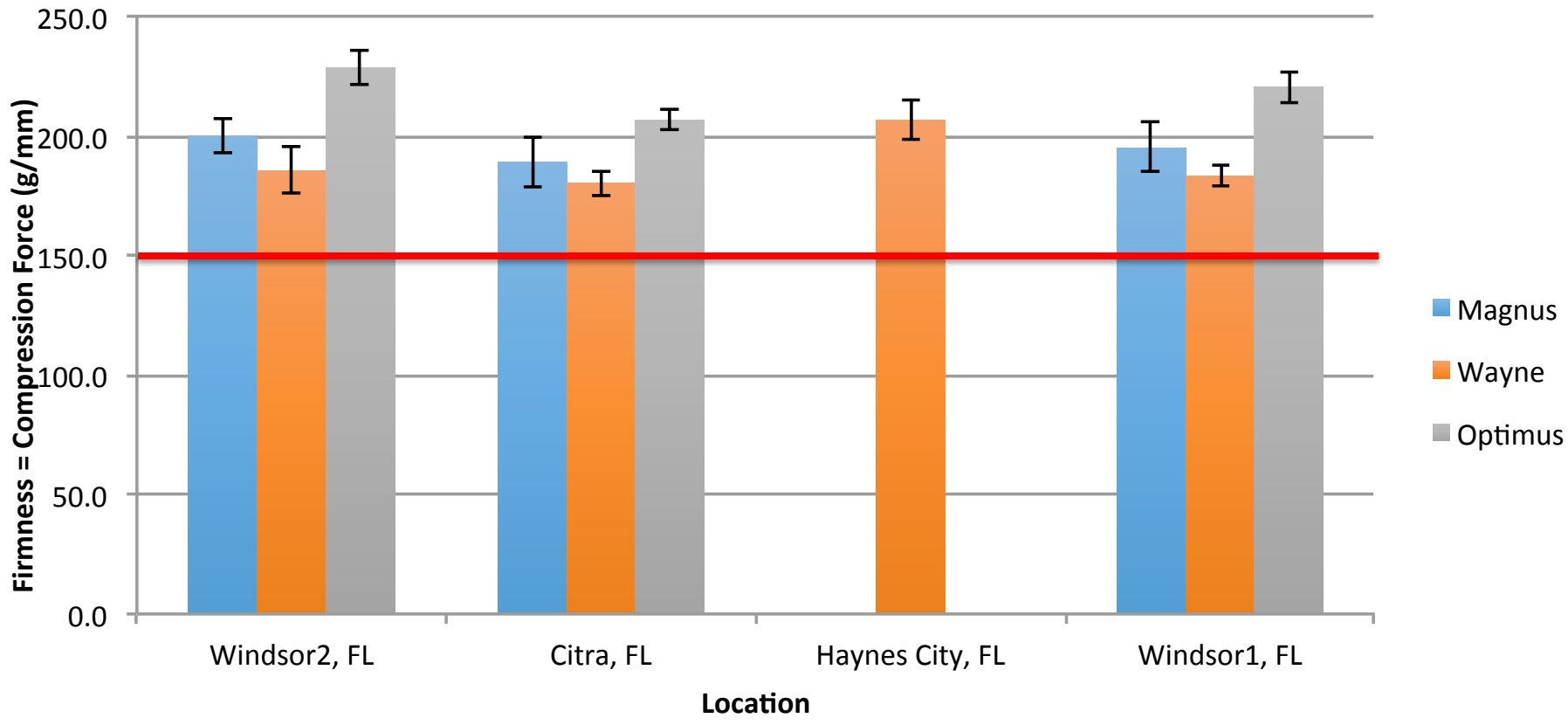
Firmness = Compression Force (g/mm)



Summary data 2011-2017

Red line= 150 g/mm recommended minimum firmness acceptability

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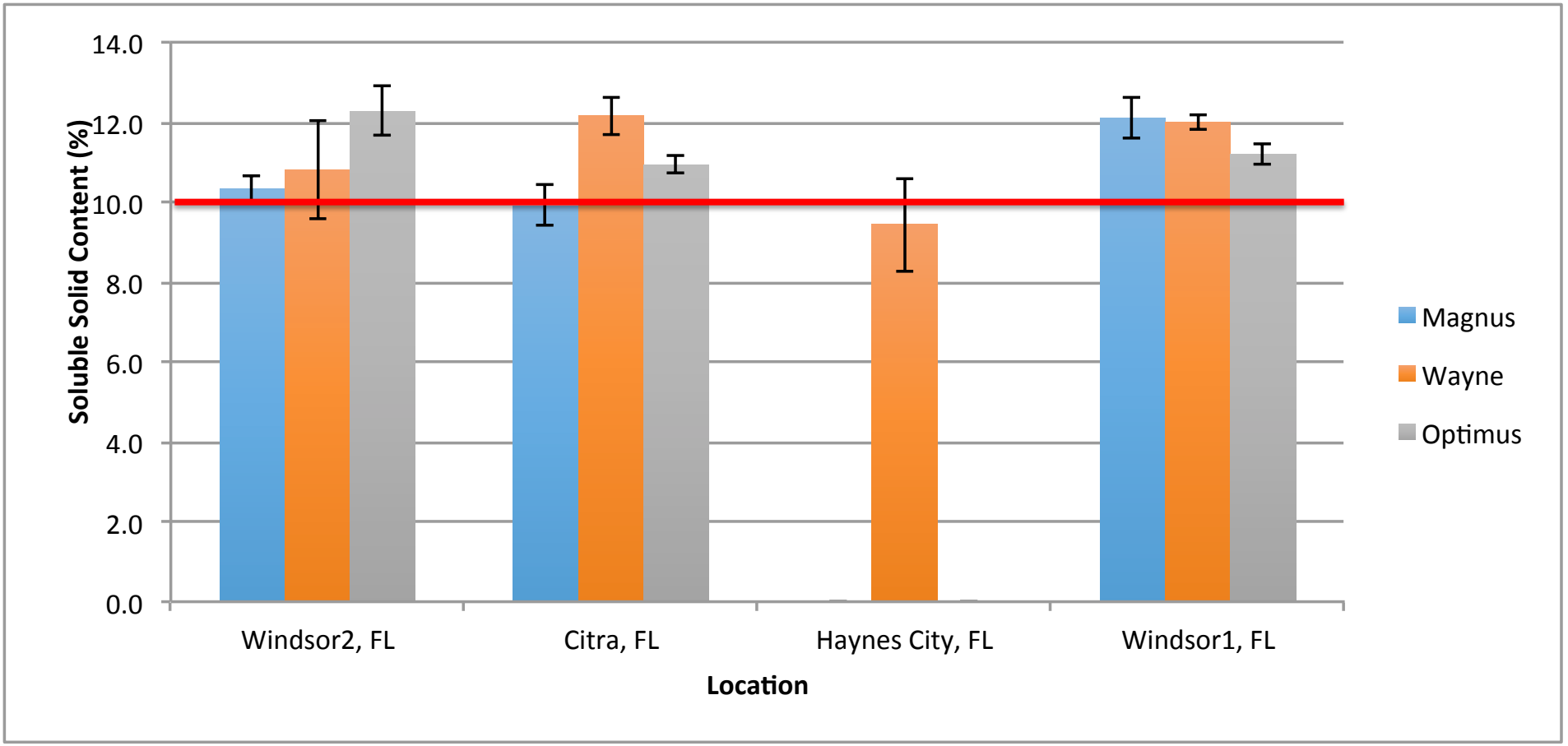
Soluble Solid Content (%)



Summary data 2011-2017

Red line= 10% recommended minimum Brix acceptability

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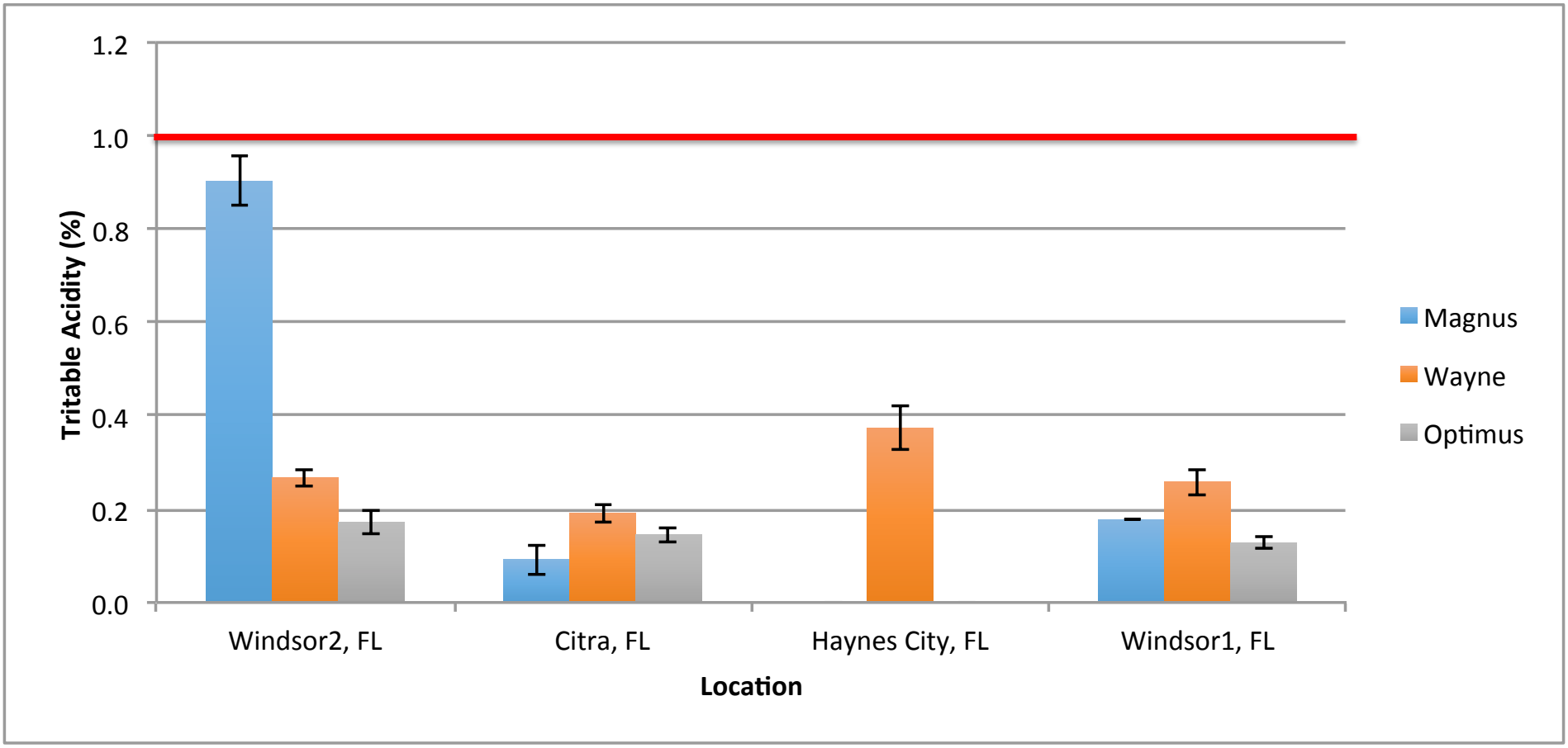
Titratable Acidity (%)



Summary data 2011-2017

Red line= 1% recommended maximum Acidity acceptability

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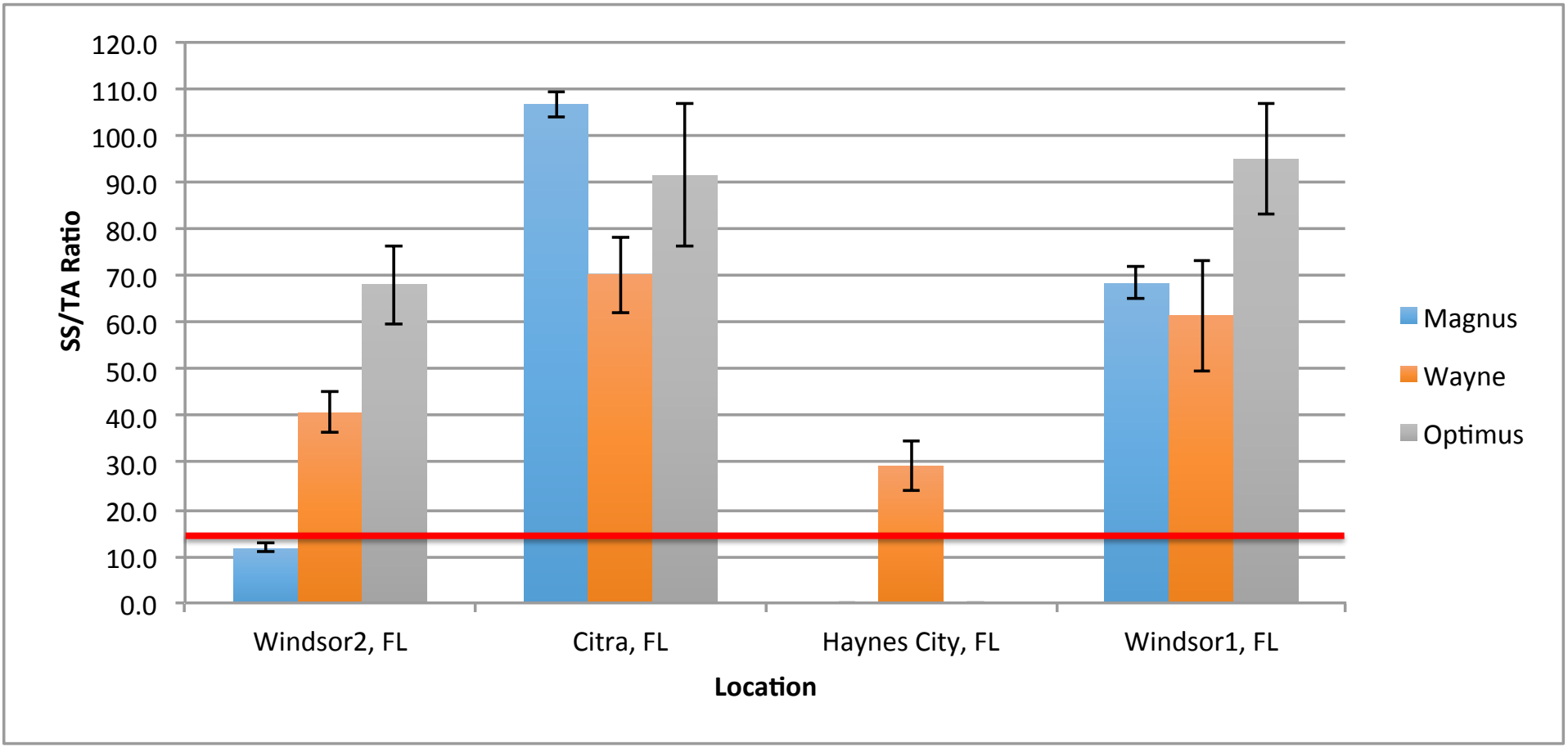
Sugar/Acid Ratio



Summary data 2011-2017

Red line= 14 recommended minimum ratio Brix/Acid acceptability

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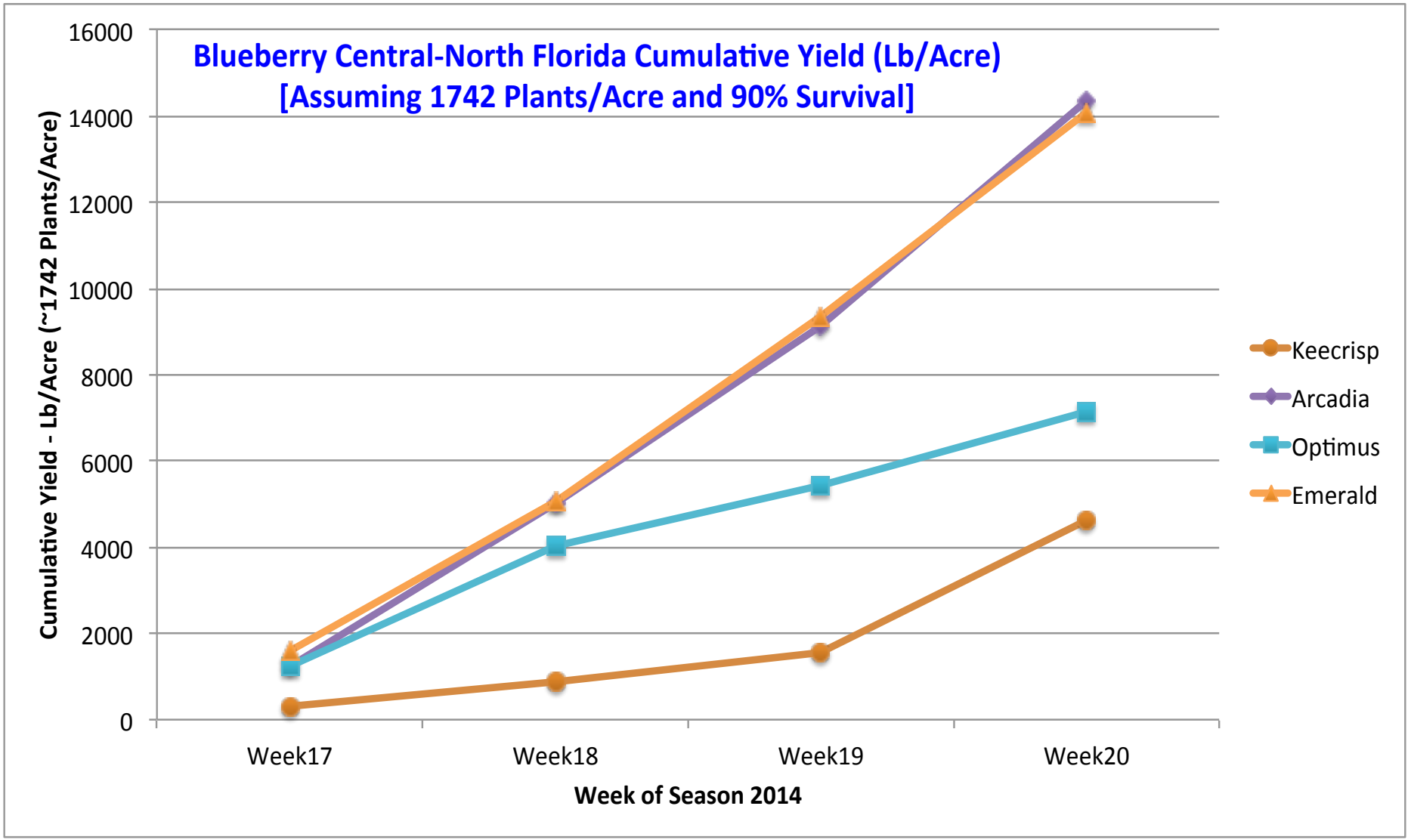

Analysis based on the extrapolation of 2 harvested representative plants during the 2014 season

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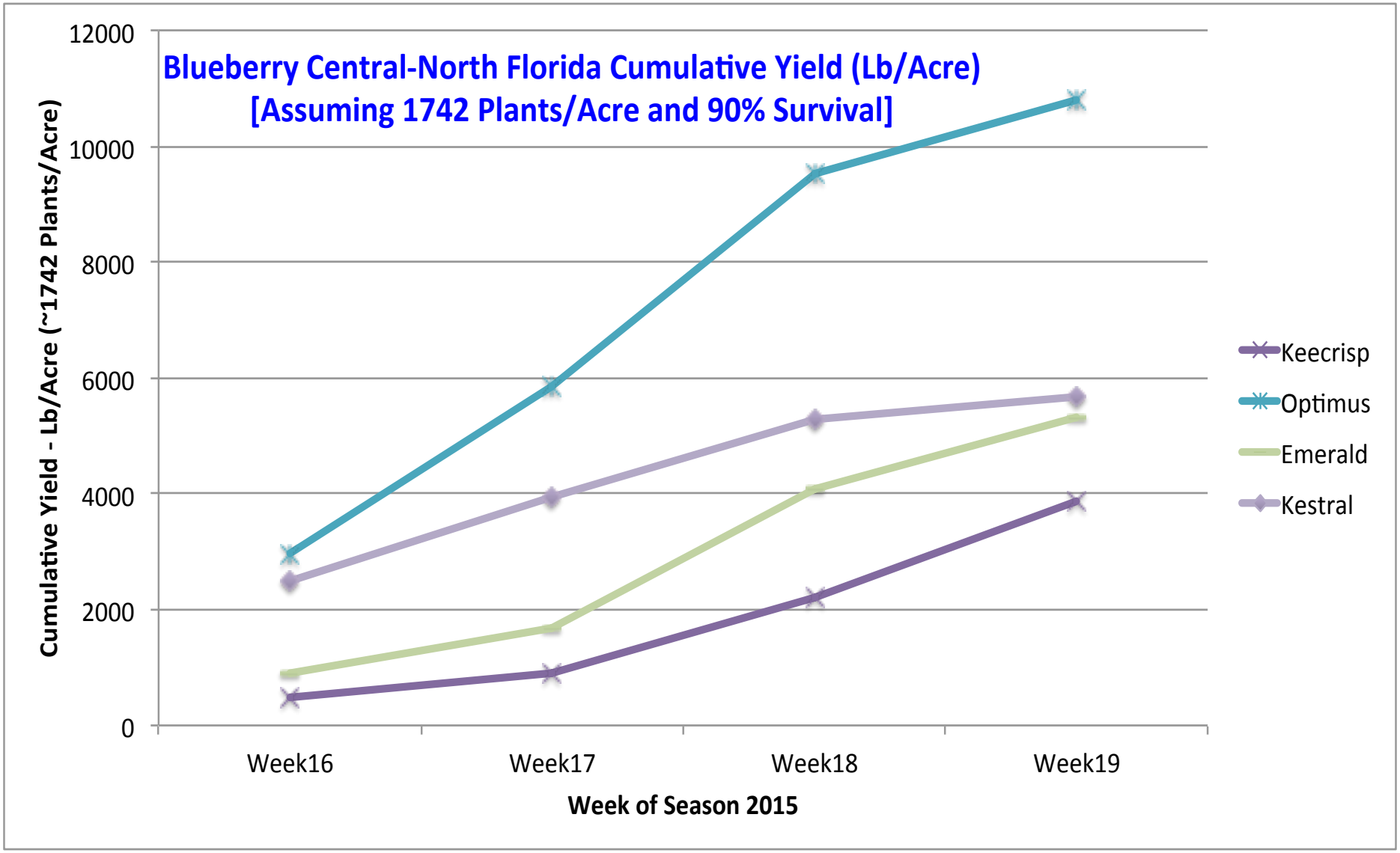

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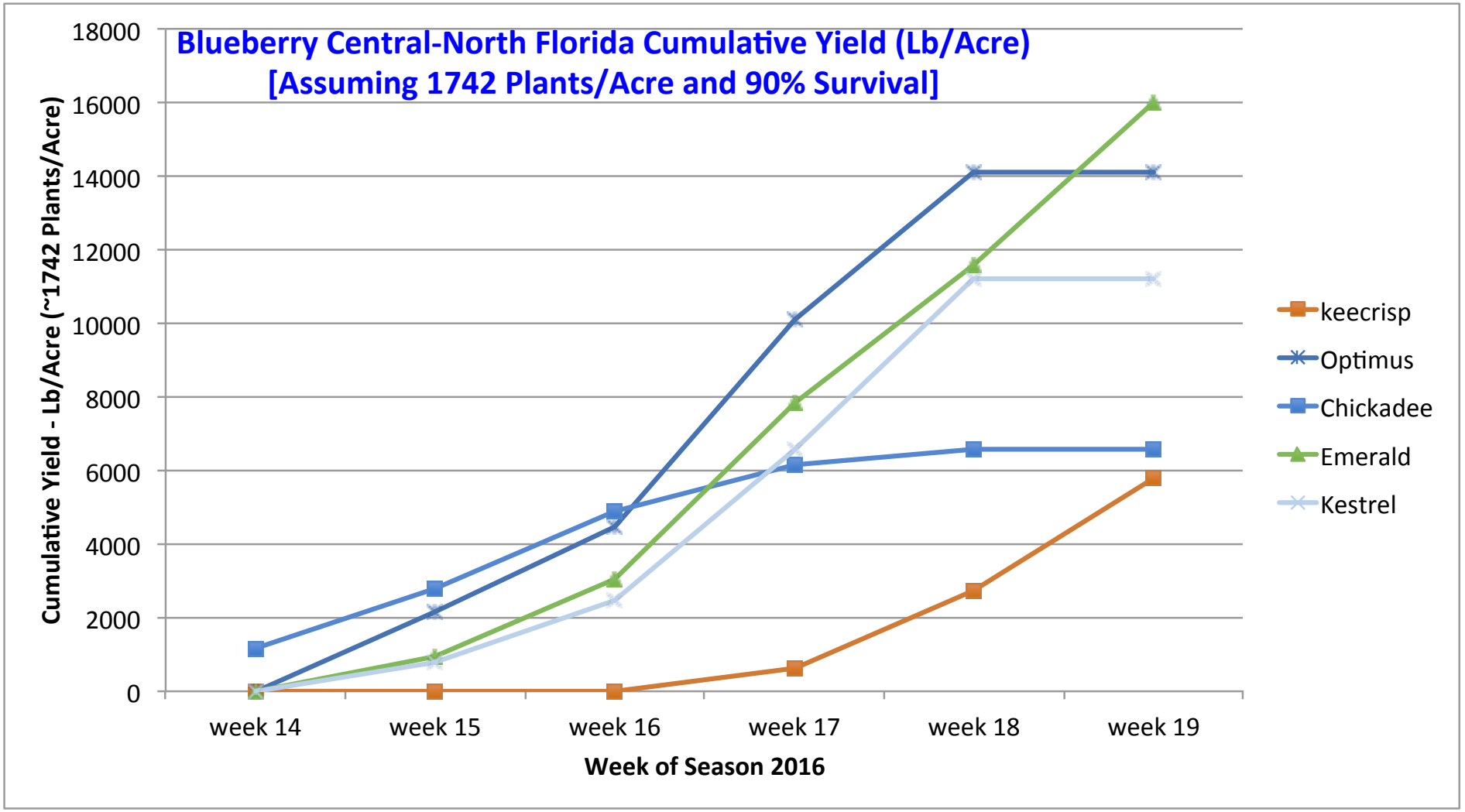

Analysis based on the Extrapolation of 2 harvested representative plants during the 2016 season

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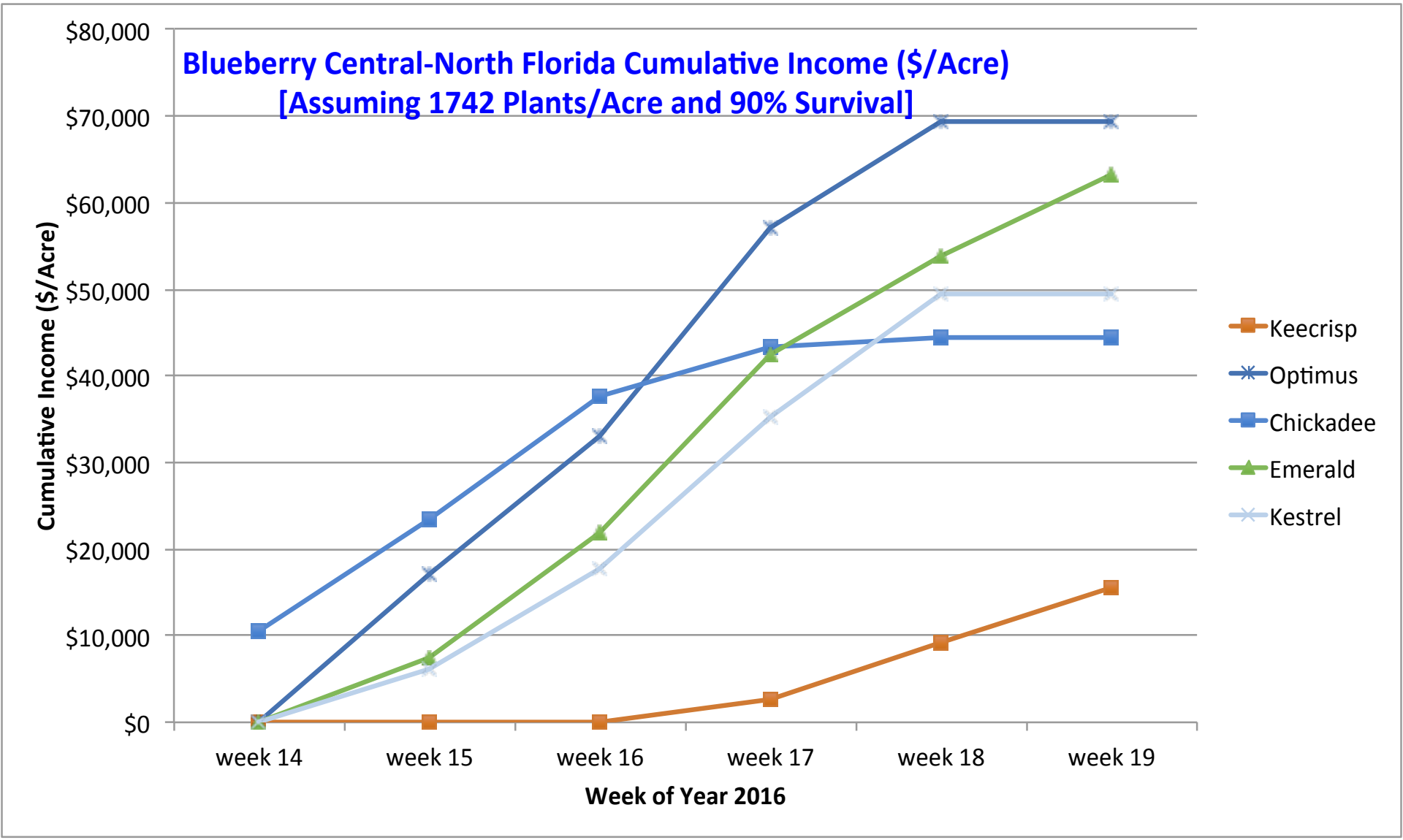

Analysis based on the Extrapolation of 2 harvested representative plants during the 2016 season. Price per week is as important as yield!

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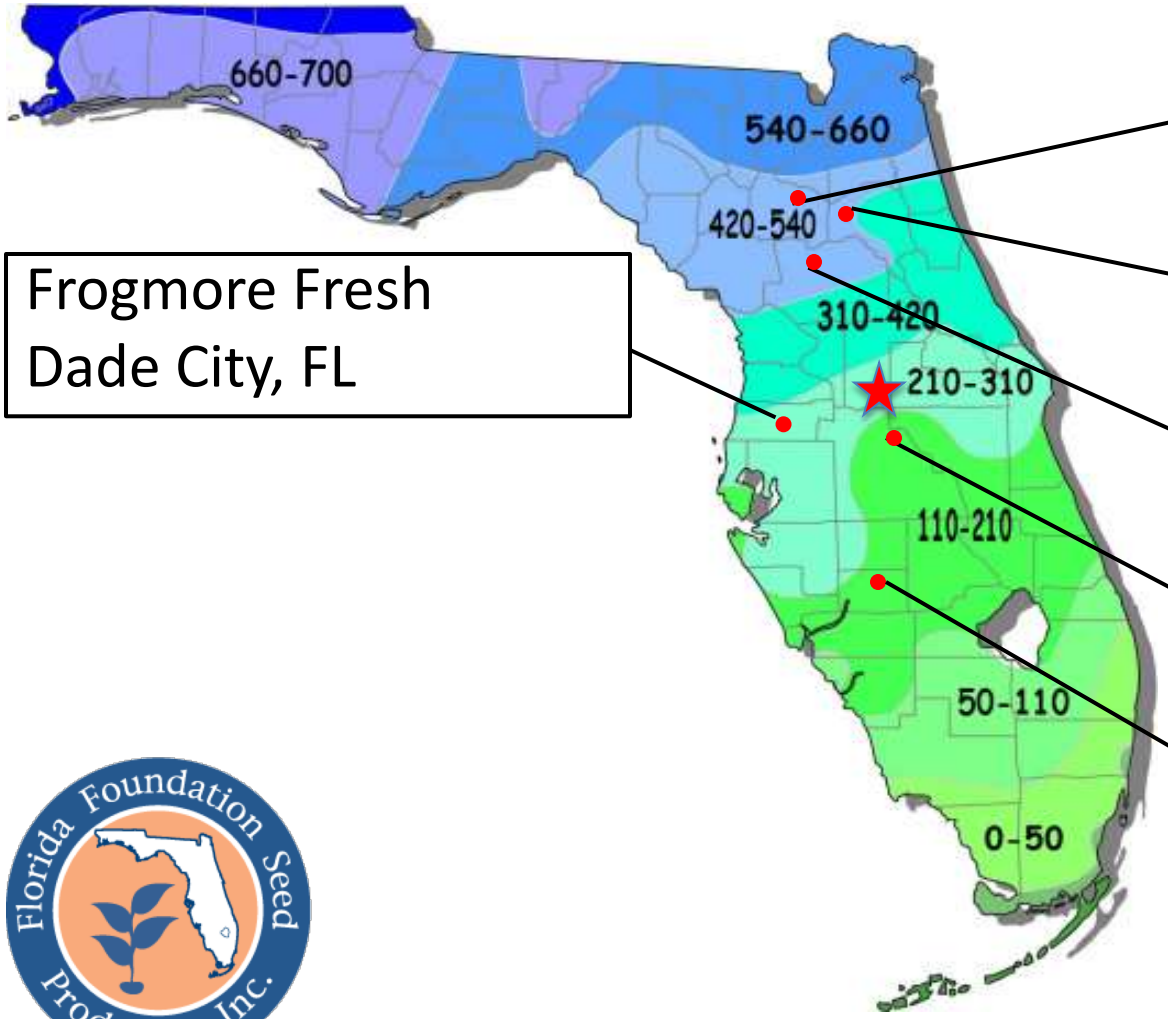
Thanks to our collaborators!!



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