

Breeding Peaches During Climate Change: Hitting a Moving Target

José X. Chaparro



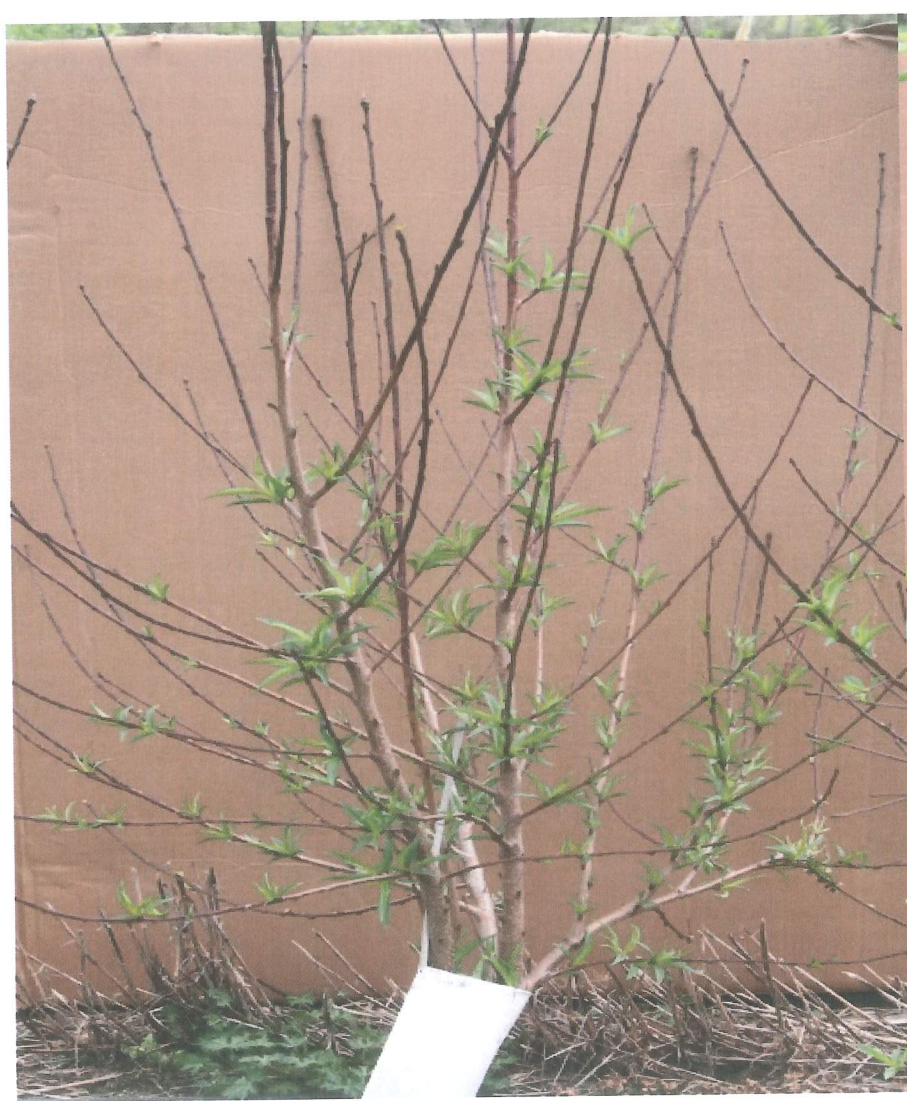
Fruit Tree Breeding at UF, Gainesville

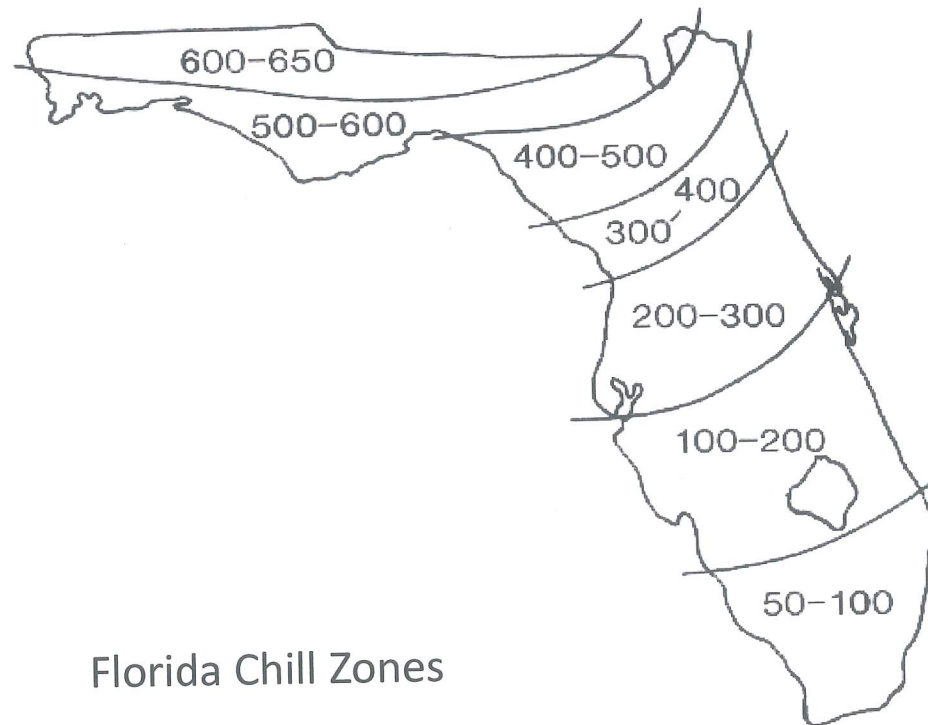
Objective: Breed subtropical
peaches for Florida growers.



Chilling Requirement

- The amount of cold temperature exposure endodormant flower and vegetative buds require to resume normal growth and development.
- Chill hour: 1 hr exposure between 0 - 7°C (32-45°F)





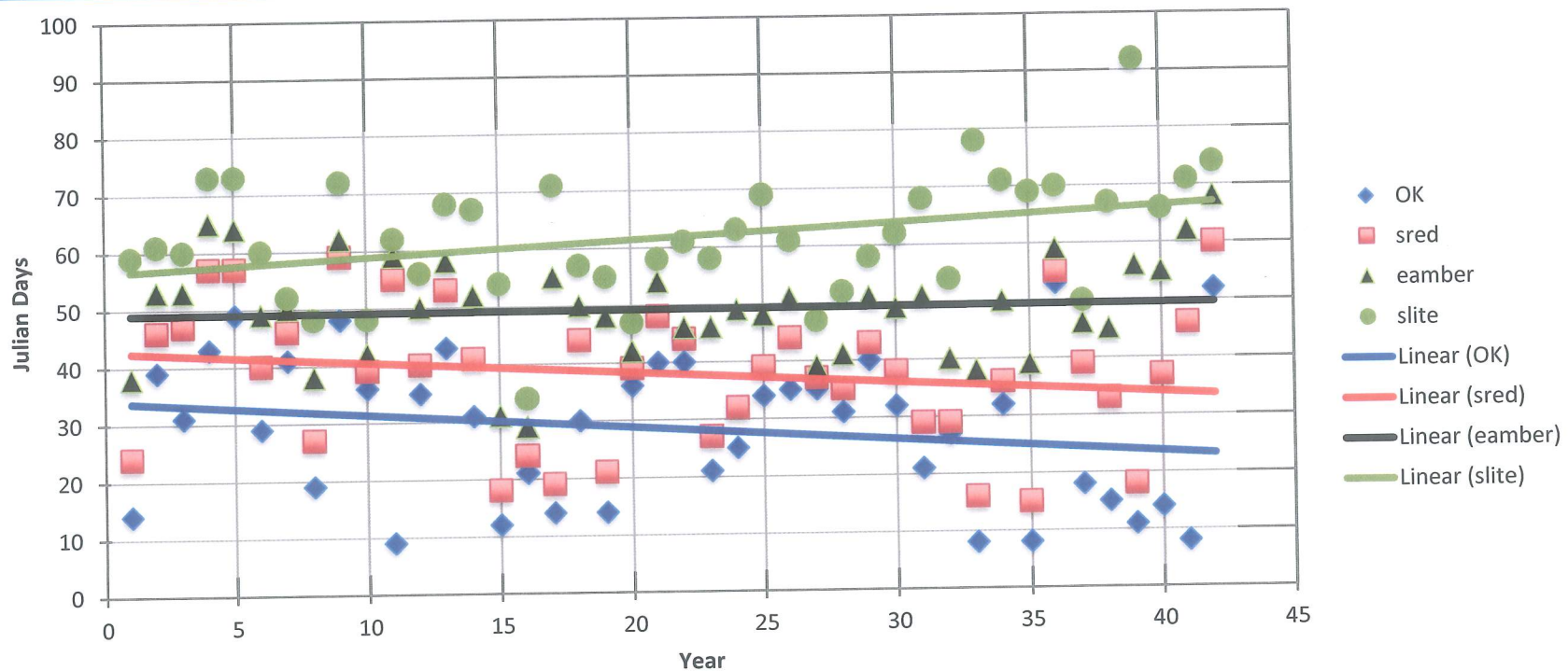
Florida Chill Zones

Map shows the number of hours below 7.2° C received by February 10 in 75% of winters.



Okinawa 150, Sunred 250, Early Amber 350, Sunlite 450

Full Bloom Dates for 'Okinawa' (150), 'Sunred' (250), 'Early Amber' (350) and 'Sunlite' (450) from 1975 to 2016.



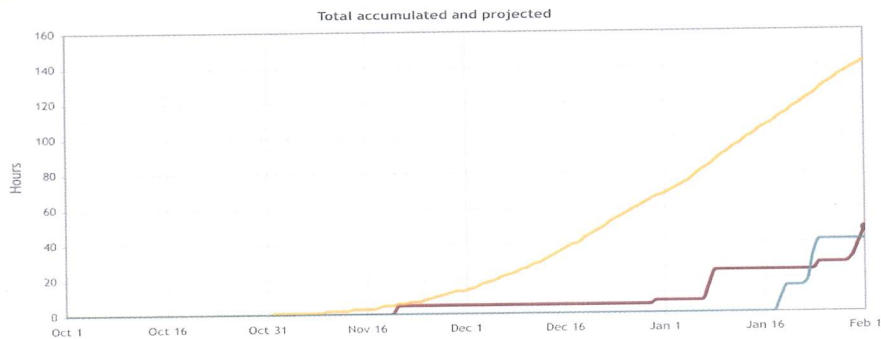
Cumulative Chilling Hours for Fall 2015 and Fall 2016

Temperature: 32-45 °F - Indian River County (FL)

Period [Oct 1, 2016 - Feb 1, 2017]:

This season	47 Hours
Last season	41 Hours
Historic average	142 Hours

■ Current accumulation
 ■ Historic Average
 ■ Last season
■ Neutral years, long-term climatology

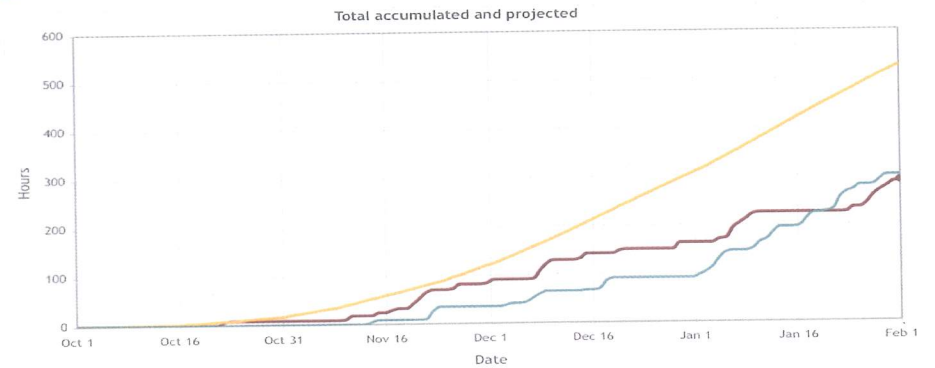


Temperature: 32-45 °F - Decatur County (GA)

Period [Oct 1, 2016 - Feb 1, 2017]:

This season	289 Hours
Last season	300 Hours
Historic average	526 Hours

■ Current accumulation
 ■ Historic Average
 ■ Last season
■ Neutral years, long-term climatology

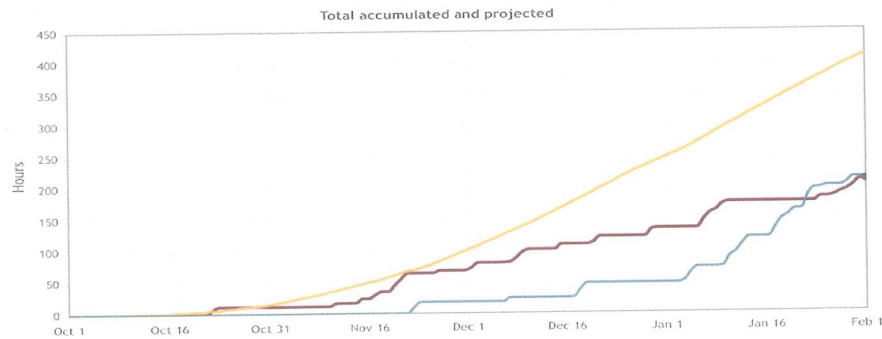


Temperature: 32-45 °F - Alachua County (FL)

Period [Oct 1, 2016 - Feb 1, 2017]:

This season	209 Hours
Last season	213 Hours
Historic average	410 Hours

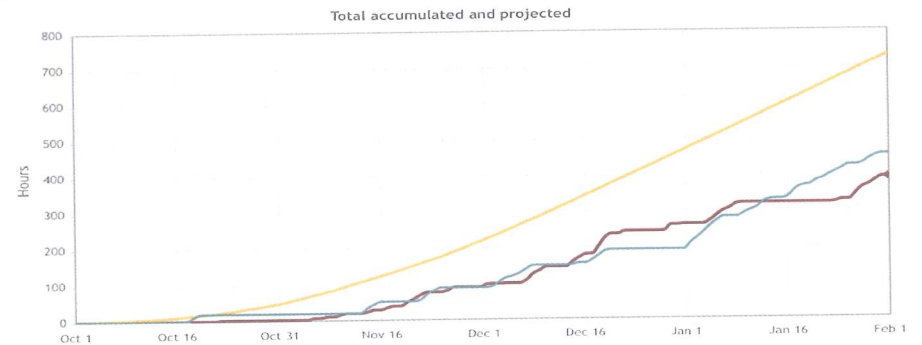
■ Current accumulation
 ■ Historic Average
 ■ Last season
■ Neutral years, long-term climatology



Period [Oct 1, 2016 - Feb 1, 2017]:

This season	389 Hours
Last season	453 Hours
Historic average	729 Hours

■ Current accumulation
 ■ Historic Average
 ■ Last season
■ Neutral years, long-term climatology



Cumulative Chilling Hours for Fall 2017 and Fall 2018

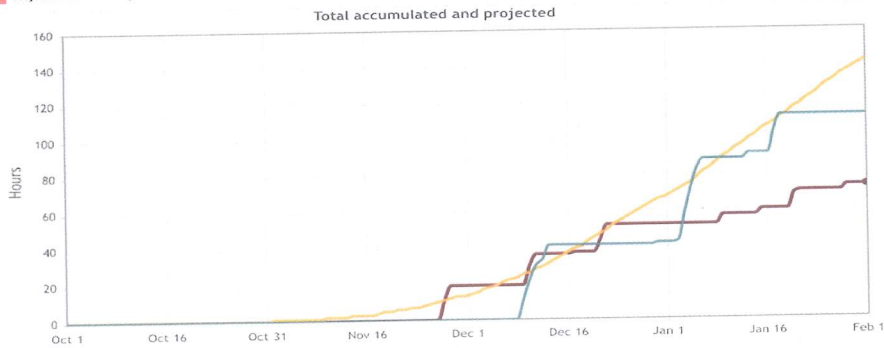
Temperature: 32-45 °F - Indian River County (FL)

Period [Oct 1, 2018 - Feb 1, 2019]:

This season	73 Hours
Last season	112 Hours
Historic average	142 Hours

■ Current accumulation
■ Projection based on long-term El Niño climatology

■ Historic Average
■ Last season



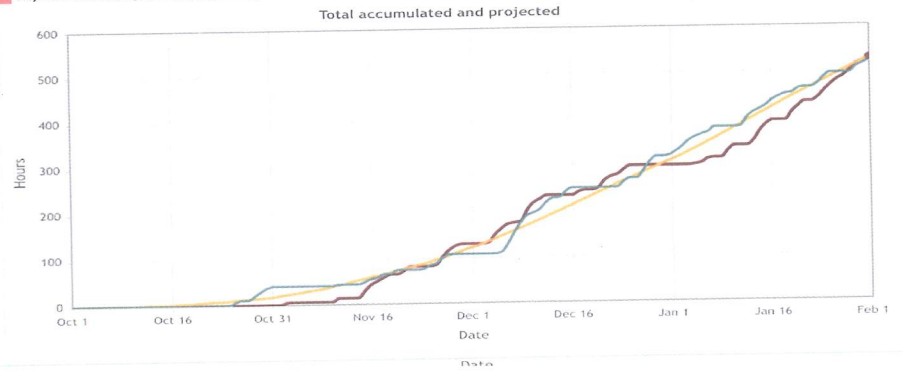
Temperature: 32-45 °F - Decatur County (GA)

Period [Oct 1, 2018 - Feb 1, 2019]:

This season	528 Hours
Last season	523 Hours
Historic average	526 Hours

■ Current accumulation
■ Projection based on long-term El Niño climatology

■ Historic Average
■ Last season



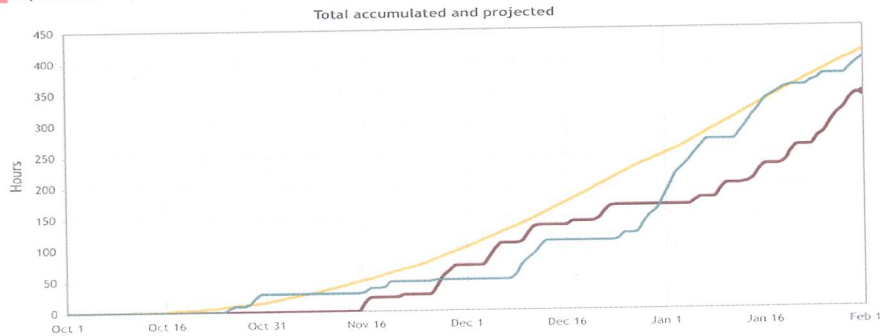
Temperature: 32-45 °F - Alachua County (FL)

Period [Oct 1, 2018 - Feb 1, 2019]:

This season	341 Hours
Last season	398 Hours
Historic average	410 Hours

■ Current accumulation
■ Projection based on long-term El Niño climatology

■ Historic Average
■ Last season



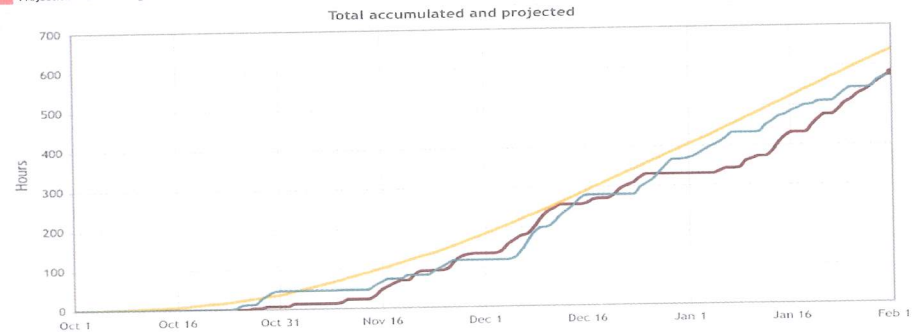
Temperature: 32-45 °F - Crisp County (GA)

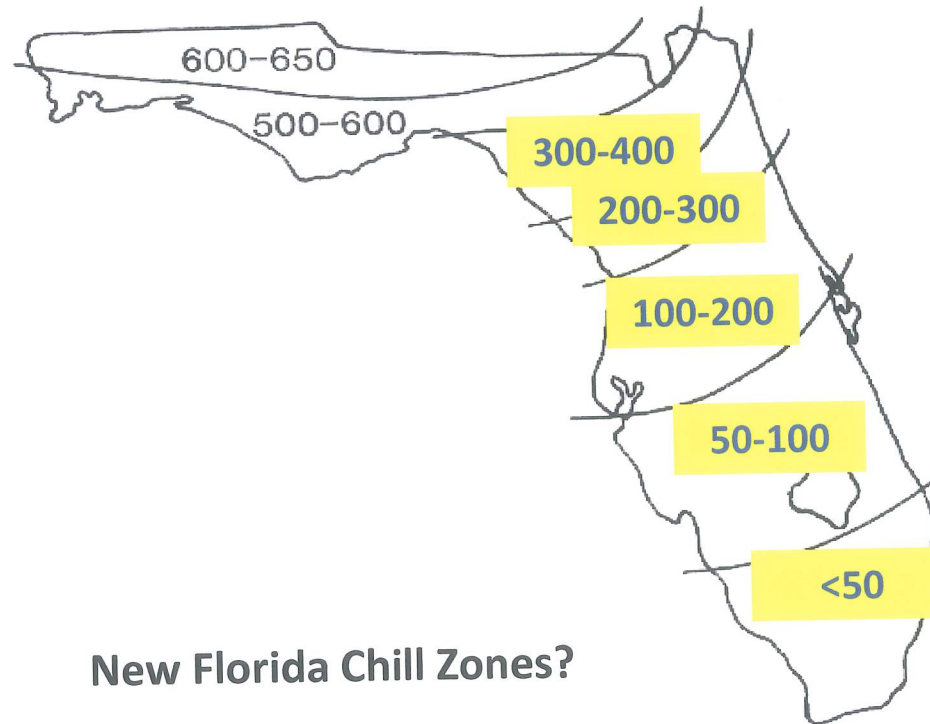
Period [Oct 1, 2018 - Feb 1, 2019]:

This season	578 Hours
Last season	577 Hours
Historic average	637 Hours

■ Current accumulation
■ Projection based on long-term El Niño climatology

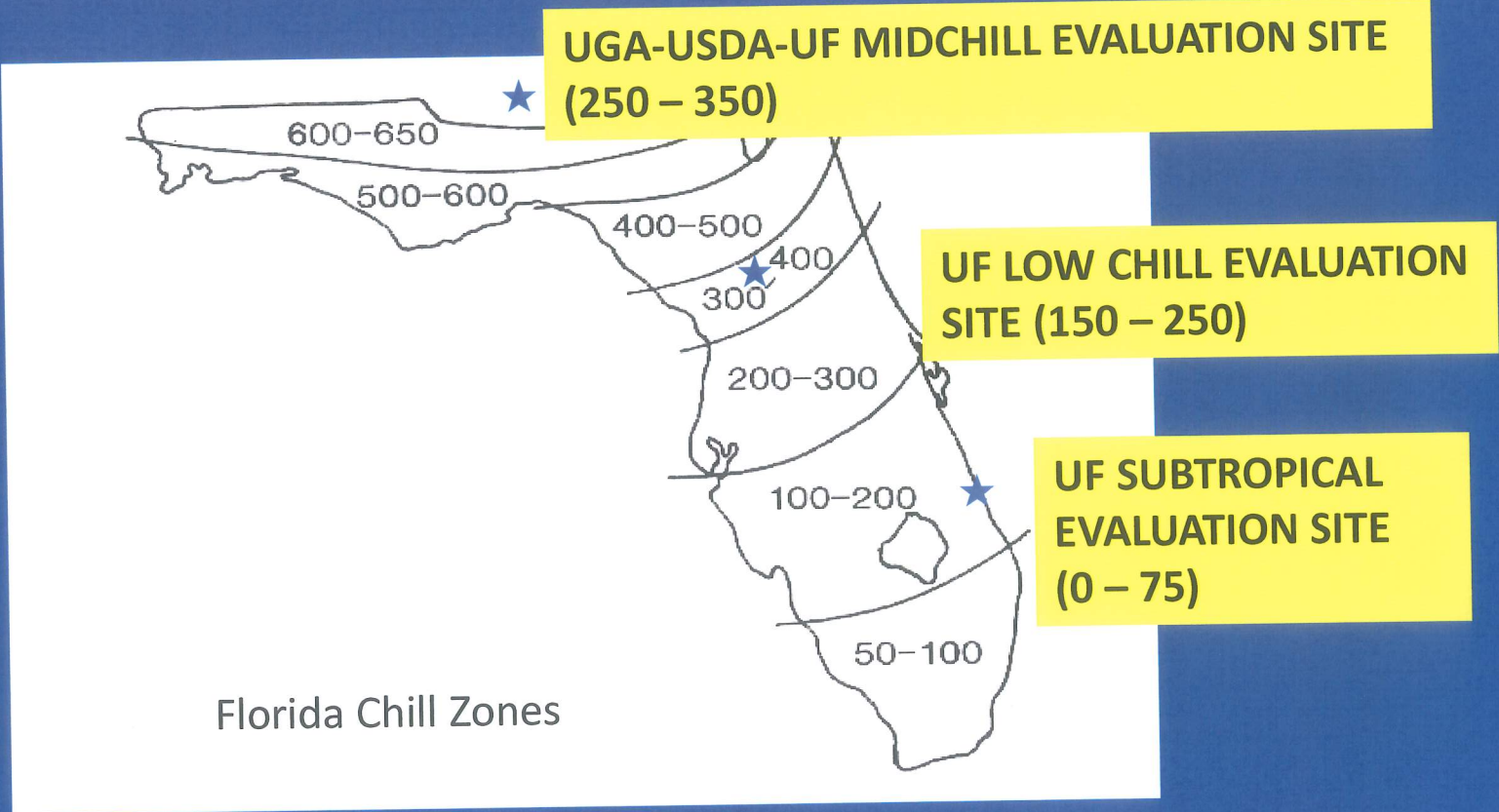
■ Historic Average
■ Last season





New Florida Chill Zones?

Map shows the number of hours below 7.2° C received by February 10 in 75% of winters.



Florida Chill Zones

Problems encountered with climate change in subtropical peach breeding.

- **Insufficient Chill**



UFSun 12/30/2015



Problems encountered with climate change in subtropical peach breeding.

- Insufficient Chill
- Blind nodes

Blind Nodes

- The absence of axillary buds in peach shoots. Results from a lack of axillary bud differentiation during shoot growth at high temperatures.



Problems encountered with climate change in subtropical peach breeding.

- Insufficient chill
- Blind nodes
- Fruit size and shape

Fruit Shape And Size

- **Warm temperatures during fruit development affect fruit shape by increasing the incidence of protruding tips and pronounced sutures.**
- **Warm temperatures also decrease the fruit development period and reduce fruit size.**



Problems encountered with climate change in subtropical peach breeding.

- Insufficient Chill**
- Blind nodes**
- Fruit size and shape**
- Premature defoliation**



Climate Change the Perfect Storm?

1. Inconsistent cropping

- a. Reduced and protracted bloom
- b. Reduced fruit set
- c. Reduced fruit size
- d. Poor fruit shape



2. Developmental abnormalities

3. Pest and pathogen problems

Cultivar Portfolio

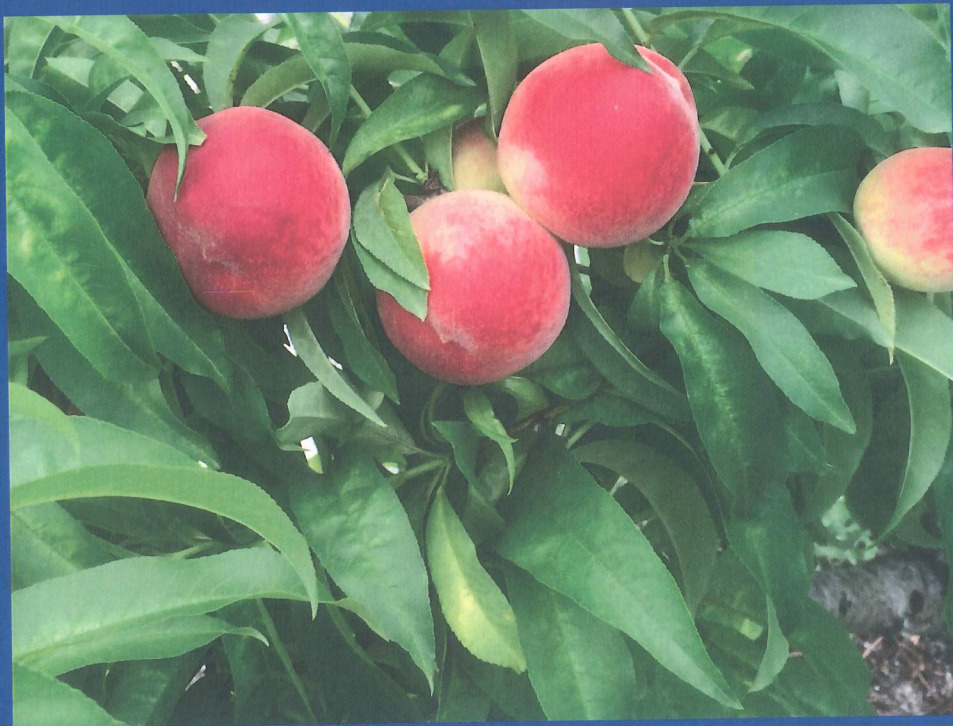
Region	Yellow Flesh	White Flesh	Nect.	Rootstocks
South Central	<i>Flordaprince</i> <i>Tropicbeauty</i> UFSun UFBest	<i>Flordaglo</i>		Flordaguard
North Central	<i>Flordabest</i> Gulfking Gulfprince UFGold UFGem UFBlaze UFBeauty* UFOne*	UFGlo <i>Flordaglo</i>	<i>Sunbest</i> <i>Suncoast</i> UFQueen UFRoyal	Flordaguard MP29
North Florida	<i>Flordabest</i> <i>Flordacrest</i> <i>Flordaking</i> Gulfking Gulfcrest Gulfcrimson Gulfprince GulfAtlas	UFGlo <i>White Robin</i> Gulfsnow	<i>Suncoast</i>	Flordaguard MP29 <i>Sharpe*</i>

FP13-04W



Chill 150 Hours
HD 4/20-4/30
Size 120 Grams
Blush 80%
White flesh
Melting Flesh
Brix 11-13

Fla. 09-03CW



Chill 200 Hours

HD 4/20-4/30

Size 120 Grams

Blush 70%

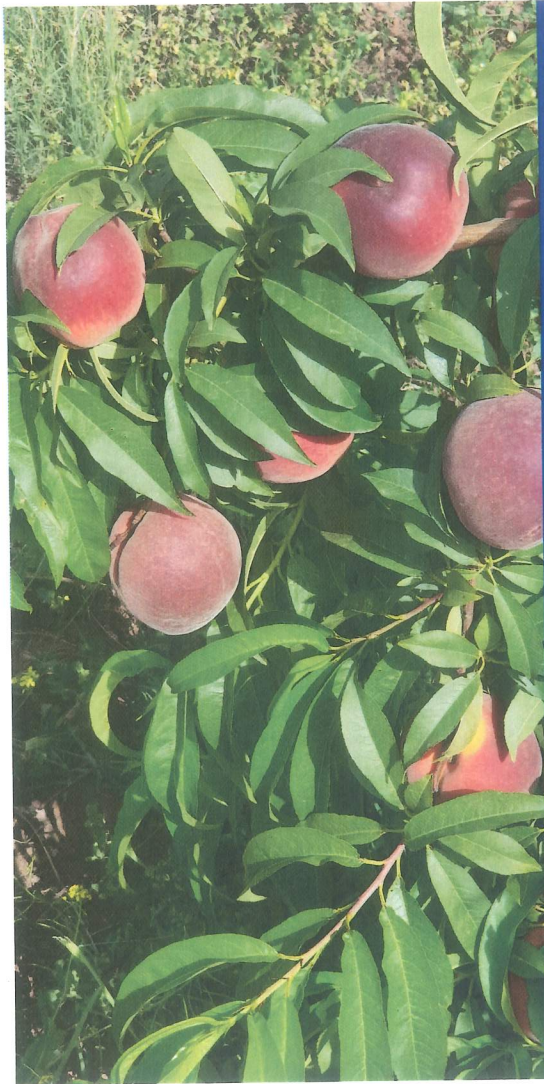
White flesh

Non-melting Flesh

Brix 10-13

Fla. 10-01C

CHILL 200 Hours
HD 4/20-4/30
SIZE 133 Grams
Blush 80%
Yellow flesh
Non-melting Flesh
Brix 11-13



Dr. Thomas Beckman

- **Stonefruit Breeder at USDA-ARS, Byron Georgia, ~30 years**
- **Gulfking, Gulfcrest, Gulfcrimson, Gulfprince, GulfAtlas, Gulfsnow, MP29, Sharpe, Guardian**

Thank You