Cold Hardy Citrus in North Florida: Current Status and Measures after Christmas Freeze 2022

Muhammad Adnan Shahid., PhD
Assistant Professor of Horticulture
North Florida Research and Education Center, Quincy
mshahid@ufl.edu
Today’s talk........

• History
• Current status
• Challenges
• Recommendation and suggestions
• Research
What is cold hardy citrus?????

• Increased frost and freeze tolerance
• Can tolerate below freezing up to 15F
• Edible - Satsuma mandarin, kumquat, Changsha mandarin etc.
• Inedible – Trifoliate orange, Ichang papeda, Citrange etc.
Cold Hardy Citrus: History & Resurgence in US

• **1565** – sweet orange, lemon, lime and pummelo came to St. Augustine FL from Spain

• **1700s** – Jesuits introduced Satsuma in Louisiana

• **1800s** – Satsuma (Owari) was introduced from Satsuma Japan and established throughout the lower Gulf Coast States

• **1894 & 1899** – Severe freeze events eliminated citrus

• **1920s** – Satsuma acreage rebounded and Jackson county with 23,000 acres of satsuma (Sugar Sweet) was billed as “Satsuma Capital”

• **Until 1990s** – Again, Satsuma industry was eliminated due to the combined effect of freezes, hurricanes, and lack of labor due to World War-II
Cold Hardy Citrus: Current Status

• Resurgence
  • Mild winters during last three decades
  • Development of microsprinklers in early 1990

• Acreage
  • 2,500 acres (more than 16 counties)
What Citrus We Grow in North Florida

Satsuma (Nov-Jan)

Tangos (Jan-Mar)

Shiranuis (Nov-Jan)

Cara Cara (Dec-Mar)
Satsuma mandarin

• **Fruit**
  • Medium to small,
  • Shaped as flattened sphere,
  • Seedless
  • Sweet in taste
  • Easy to peel with 10-12 segments
  • reddish orange flesh
  • Taste and color develop excellent in regions with cool winters and hot summers
  • Looseness of the rind requires that fruit be clipped at harvest to avoid plugging or tearing
Satsuma mandarin

• **Bearing season**
  • Harvesting starts from Nov-Dec,
  • Fruit hold poorly on the tree after maturity,

• **Cold tolerance**
  • Highly cold tolerant (survived minimum temperatures of 14°F to 18°F)

• **Production area**
  • Narrow strip extending along the Gulf of Mexico across North Florida, Alabama, Mississippi, and Louisiana into eastern Texas and Joaquin Valley basin of California
Satsuma Products
The Cold Hardy Citrus Association (CHCA)

- Established in 2017
- CHCA members include:
  - growers
  - packers
  - processors
  - industry suppliers
  - nurseries
  - consultants
  - homeowners & academia
- Florida, Georgia, Alabama, Louisiana, and Mississippi
Packinghouse in North Florida
Challenges to Cold Hardy Citrus Industry

- Freeze and frost
- Lack of research-based recommendations
- Saturation and short harvest window
- Pest and diseases
- Lack of trained citrus ag-agents
Christmas & Late Freeze Events
Christmas & Late Freeze Events

Before Freeze (December 15th, 2022)

After Freeze (January 7th, 2023)
Christmas & Late Freeze Events

Late freeze event on March 22\textsuperscript{nd}, 2023
Trees recovery after freeze

August 22nd, 2023
Fruit Yield Loss After Freeze Events

- 33,000 boxes in 2019
- 89,000 boxes in 2020
- 145,000 boxes in 2022
- 150,000+ boxes in 2023

*Freeze caused 70% yield loss in 2023*
What we need to need to do????

Diversification
Winder production window
Research-based recommendations
Abiotic/biotic stress tolerance

Sustainable and profitable cold hardy citrus industry in north FL

Educating the Growers

IST for Ag-Agents
Diversification

- Florida Foundation Seed Producers Inc.,
- 30 scion cultivars and 20 rootstocks

<table>
<thead>
<tr>
<th>Gator bites</th>
<th>N11-7</th>
<th>Lisbon lemon seedless (Aug-Dec)</th>
<th>18-A-4-35</th>
<th>RBB7-34</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dec-Jan</td>
<td>Oct-Feb</td>
<td></td>
<td>Oct-Nov</td>
<td>Dec-Jan</td>
</tr>
<tr>
<td>RES-19-56</td>
<td>1859</td>
<td>Limon hybrid</td>
<td>KE-3-15</td>
<td>C-7-12-9</td>
</tr>
<tr>
<td>Oct-Nov</td>
<td>Nov-Jan</td>
<td>Sep-Dec</td>
<td>Sep-Oct</td>
<td>Mid Sep-Oct</td>
</tr>
<tr>
<td>1924</td>
<td>C2-5-3</td>
<td>950</td>
<td>Greenie</td>
<td>Sugar belle</td>
</tr>
<tr>
<td>Nov-Feb</td>
<td>Mid Sep-Oct</td>
<td>Nov-Jan</td>
<td>Oct-Nov</td>
<td>Mid Nov-Late Dec</td>
</tr>
</tbody>
</table>

UF/IFAS UNIVERSITY OF FLORIDA
Research-based Recommendations: Nutrients, Irrigation, Plant Care

• **Nutrient Management**
  • Efficacy of different N and P sources
  • Application rate
  • Application time
  • Slow-release vs conventional fertilizer
  • Biostimulants
Research-based Recommendations: Nutrients, Irrigation, Plant Care

• **Water Management**

• Effective and efficient irrigation for getting optimum yield
Standardization of Freeze Protection Techniques
Improving Cold Tolerance through Exogenous Application of Growth Hormones/Regulators

- Silicon
- K
- ABA
- Methyl Jasmonate
- Brassinosteriods
New Production Systems

• High density plantation
• Good strategy to increase per acre yield
• Currently we have 116-145 tree/acre
Educating the Growers and Ag-Agents
Acknowledgement

• My team
• Farm Crew
• Extension team
• Cold Hardy Citrus Association
• UF/IFAS and USDA citrus breeding program
• FDACS
• USDA
• Citrus Growers