

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

Muhammad Adnan Shahid., PhD

Assistant Professor of Horticulture

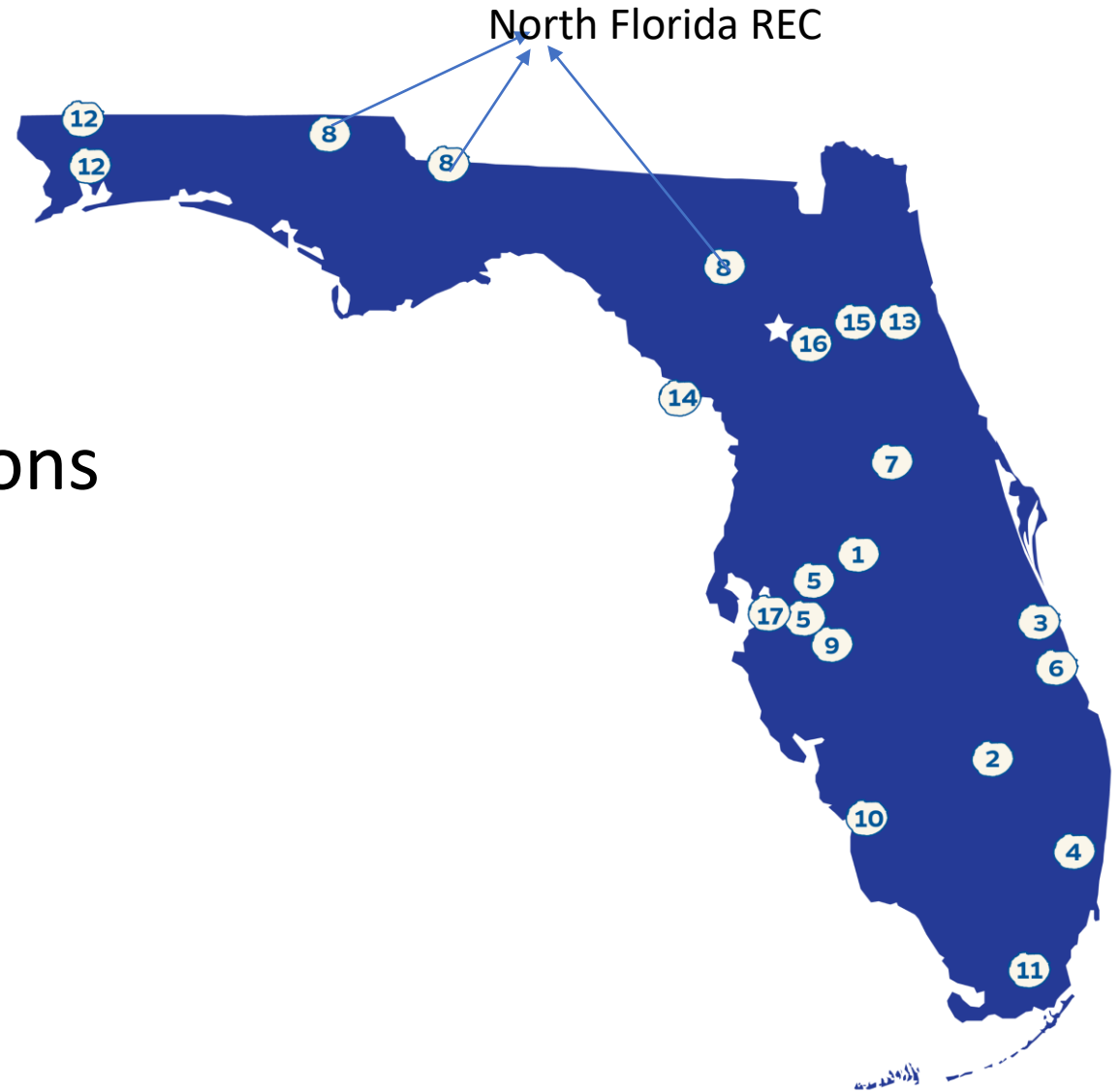
North Florida Research and Education
Center, Quincy

mshahid@ufl.edu



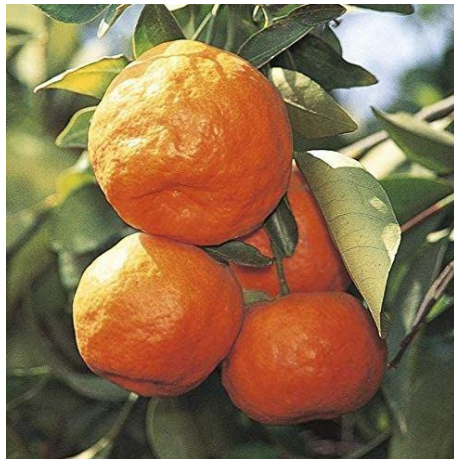
Today's talk.....

- 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

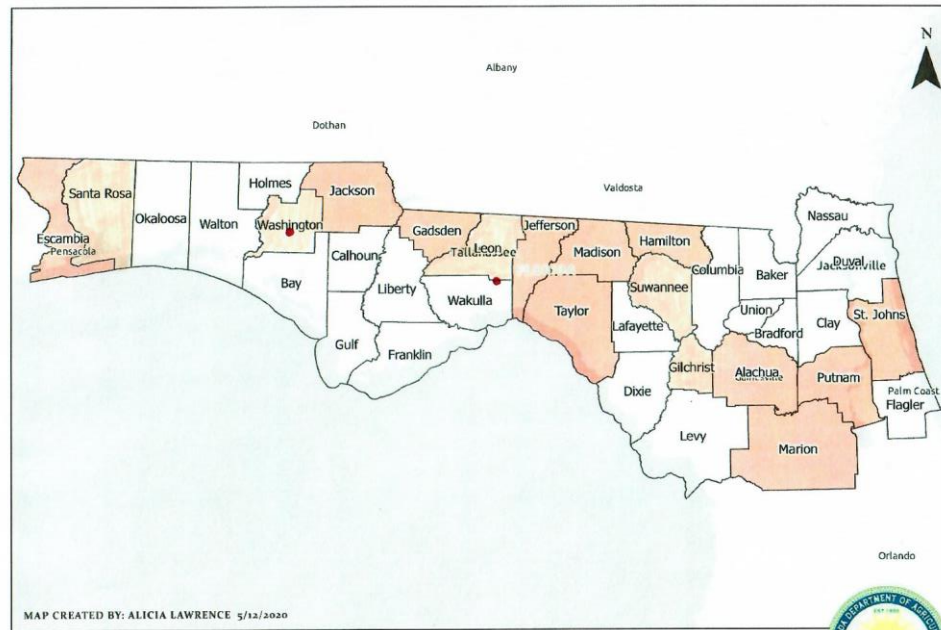
Cold Hardy Citrus: Current Status

- **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

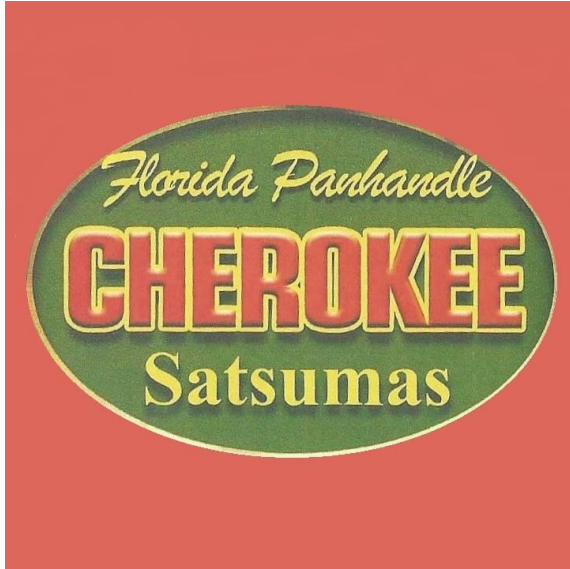


The Cold Hardy Citrus Association (CHCA)

- 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



Packinghouse Visit 2022



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 22nd, 2023

Trees recovery after freeze



August 22nd, 2023

Fruit Yield Loss After Freeze Events



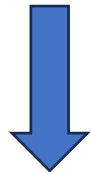
33,000 boxes in 2019



89,000 boxes in 2020



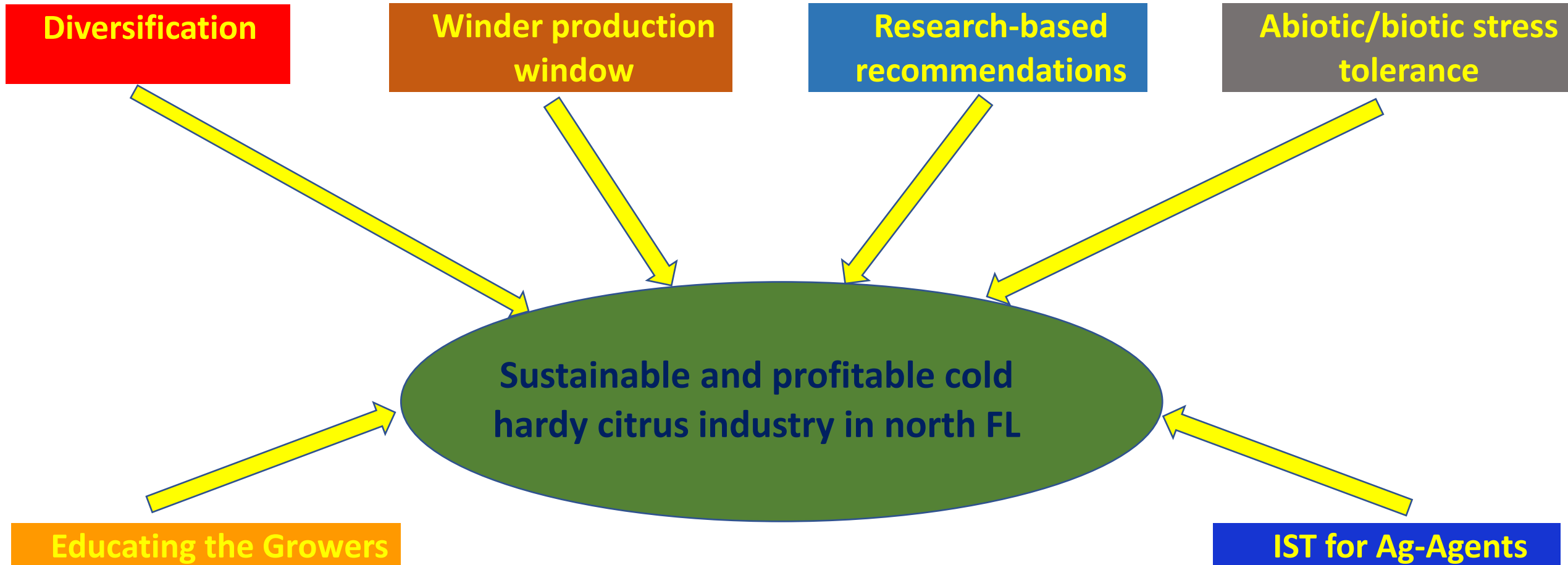
145,000 boxes in 2022



150,000+ boxes in 2023

Freeze caused 70% yield loss in 2023

What we need to need to do????



Diversification

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

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

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
- Brassinosteroids



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



Cold Hardy Citrus Website

COLD HARDY CITRUS



COLD HARDY CITRUS

Acknowledgement

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





mshahid@ufl.edu

