

COLD HARDY CITRUS CONNECTION



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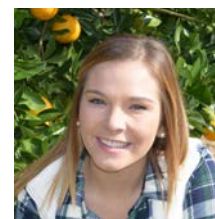
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COLD HARDY CITRUS ASSOCIATION CORNER

Harvest in the region finished up right before Winter Storm Elliott brought several nights of freezing temperatures to our region and we're currently still waiting to determine the true extent of the damage. In this quarter's edition of the Cold Hardy Citrus Connection, you'll find citrus recovery considerations following Winter Storm Elliott, cold damage ratings from the UGA variety trials in Valdosta, and an update from the new Cold Hardy Citrus Association president, Mark Clikas. We look forward to seeing and connecting with everyone at the Citrus Health Forum in Quincy on Thursday, February 23rd and the Georgia Citrus Conference in Tifton on Tuesday, February 28th. If we can help in any way, please, do not hesitate to reach out!



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Post Winter Storm Elliott Citrus Recovery Considerations

By: *Danielle Williams, UF/IFAS Gadsden County, Dr. Muhammad Adnan Shahid, UF/IFAS NFREC Horticulture, and Mujahid Hussain, UF/IFAS NFREC Post-Doc*

Winter Storm Elliott brought freezing temperatures to our region on December 24th that lasted through December 28th, 2022. While we've seen freezing temperatures in years past, none remained below freezing for as long as Winter Storm Elliott did, resulting in significant injury to citrus in our region. Since it's difficult to truly determine the extent of the damage after a freeze, we are currently still in the "wait and see" period.

A few days after the freeze, you may have noticed that trees began to shed their leaves (Figure 1), which is a positive sign as this indicates the wood is likely not damaged or dead whereas leaf retention usually indicates dead wood. In general, green tissue indicates live wood while brown tissue indicates dead wood (Figure 2). As of now, you may even be seeing small new growth on trees, depending on variety. This new growth developing on freeze damaged trees will often dieback later as the wood behind the new growth dies. This may continue through May/June; therefore, proper time should be given for dieback to cease and for new healthy growth to fully expand before pruning. When it's time to prune, cut into live wood, just below dead wood.



Figure 1. Significant leaf loss to Owari Satsuma tree. January 30, 2023.

It's best to also wait until spring before fertilizing. Fertilizer should be applied frequently but the rates should be reduced, depending on the degree of damage. Trees that are severely damaged (50-60% wood loss or more) will most likely not produce fruit this season and their rate of fertilizer should be lowered to promote a slow recovery, whereas trees with 10-15% wood loss, should receive a regular fertilizer program as fruit will be expected.

Citrus Recovery Considerations Continued

Trees with significant damage, may show signs of nutrient deficiency because the leaves require nutrients to regenerate large amounts of new growth necessary to replace lost foliage, therefore, foliar applications of micronutrients will be important for new growth.

Trees will require less water due to leaf loss and transpiration being reduced, therefore, the amount supplied to the tree should be reduced. Over-irrigating in the winter can induce new growth which could be damaged by a later freeze. However, trees with new growth should not be water stressed.

An effective pest management plan to reduce stress from weeds, insects, and disease will be important for recovery. Weeds will compete heavily with trees for nutrients, water, and light and proper management should be implemented. Fungicide applications in the spring to help protect infection of new flushes and next year's crop will be essential.

Again, we are still in the “wait and see” period after Winter Storm Elliott and while it may be hard to do so, it's best to wait until spring to properly evaluate the extent of the damage before pruning. After damage is assessed, following the proper cultural practices to maximize recovery will be crucial. With the proper care, we're hopeful trees will recover.

To learn more about citrus freeze recovery, please visit: [Freeze Damage Symptoms and Recovery for Citrus](#) and join us for the [Citrus Health Forum on February 23 at the UF/IFAS North Florida Research & Education Center](#).



Figure 2. Freeze damaged wood with living tissue (left) vs. freeze damaged wood with dead tissue (right).

Cold Damage Ratings for Owari Satsuma, Tango, and Sugar Belle



UNIVERSITY OF GEORGIA
EXTENSION

By: Jake Price, UGA Citrus Extension Agent

After 5 nights between 16 and 22 degrees from December 24-28, everything suffered cold damage at the UGA Citrus Variety and Rootstock Trials at JL Lomax Elementary School. This freeze event has been the biggest challenge that the northern Florida and southern Georgia citrus industry has faced in the last 10 years. I did not freeze protect the Owari satsumas that were planted in 2014 and 2015. The Sugar Belles planted in 2018 were not protected. I did freeze protect the Tango trial that was planted in 2020.

While it is too early to know what type of damage there is to the wood, there are some differences in foliage shed on the different varieties. The satsumas have retained the most live foliage and the Sugar Belles have retained the least live foliage. The Tangos lost a lot of foliage as well. Being these trees are all on



Figure 1. Freeze damage to Owari satsuma on US-897 rootstock that was unharvested, with a heavy fruit load compared to adjacent Owari satsumas that were harvested in November.

different rootstocks, I rated each tree on January 9 to see how much live foliage was retained. By this time, it appeared the foliage drop was finished. This was a subjective rating so I had 2 other people rate the percentage of live foliage remaining on the trees. I took the average of the three ratings. I wanted to see if there was a difference between foliage retention on the different rootstocks for Owari, Sugar Belle, and Tango. It does appear there will be some damaged wood on the Sugar Belles (which looked the worst of the three) and the Tangos which have a lot of young growth. Fruit load may also be a significant factor in cold hardiness. Unharvested heavily fruited Owari trees adjacent to the harvested Owari trees had significantly more damage (Figure 1).

Cold Damage Ratings Continued

The results in the tables at the end of the article, show the three highest yielding trees, US-942, Cleopatra, and US-852 retained less foliage and the lowest yielding tree, Rubidoux, had the highest foliage retained along with US-812. *One thing to note is that the Owari satsumas on Rubidoux were planted two years afterwards and have never caught up in growth but we know Rubidoux is a good rootstock for satsumas.*

US-812 has a mid-range yield and the highest retained foliage (Figure 2). This is not the first time the US-812 rootstock has appeared to look the best after freezing temperatures. In April of 2015 the trees had been planted for 8 months and survived several non-consecutive nights in the low 20's. Much of the foliage had dropped from



Figure 2. The percentage foliage remaining on US-812 trees (left) was 63% compared to US-942 trees (right) which retained 32% foliage.

many of the trees. Without knowing the rootstock, I had 3 people choose the 10 trees with the most remaining foliage. Each person had 5 of the 6 trees on US-812 in their top 10. The rest of their top 10 trees were other random rootstocks. Could this mean that the US-812 rootstock improves Owari's cold hardiness? With the Sugar Belles, Rubidoux appeared to have retained the most foliage. Again, the highest yielding tree had the lowest percentage of foliage. In both the Owari and Sugar Belles, Rubidoux rootstocks retained the most foliage. With the Tangos, I only harvested half of the crop that was nicely colored with a plan to harvest the others after the freeze but before I could harvest them, they dropped off so I could not get the total yield.

Overall, it appears that satsumas have proven their cold-tolerance compared to other varieties, but it does appear the Sugar Belle and Tango trees will survive. Having other tree variety options is important to the Georgia Industry. Cold tolerance may be greatly diminished on trees with a large fruit load and harvesting fruit as early as possible may improve cold hardiness.

Cold Damage Ratings Continued

I think we are fortunate not to have experienced this cold event at the rootstock trial last year, as the Owari trees had a tremendous crop load. It also appears that Rubidoux rootstock providing cold hardiness does have some merit in satsumas and Sugar Belles. US-812 rootstock may also provide similar cold-hardiness to Rubidoux.

Owari Rootstock	% Foliage Retained	Yield Rank	2022 Yield/Tree
US-812	63	6	231
Rubidoux	63	10	82
Swingle	49	4	258
Kuharski	47	5	252
X-639	45	8	208
Sour Orange	44	9	179
US-897	40	7	228
US-852	34	3	264
US-942	32	1	317
Cleopatra	31	2	281

Sugar Belle Rootstock	% Foliage Retained	Yield Rank	2022 Yield/Tree
Rubidoux	20	2	83
US-852	13	3	13
US-897	9	4	65
US-942	3	1	98

Tango Rootstock	% Foliage Retained
US-1516	30
UFR-17	30
Super Sour #2	26
US-942	25
US-812	25
US-1282	23
UFR-6	22
US-852	19
US-1279	15
Rich 16-6	12

Upcoming Grower Meetings

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Citrus Health Forum - Thursday, February 23rd

8:30AM - 3:00 PM EST

UF/IFAS NFREC-Quincy

[Click Here for More Information and To Register](#)

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Georgia Citrus Conference - February 28th

9AM - 4PM EST

UGA Tifton Campus

[Click Here for More Information and To Register](#)

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Remote Produce Safety Alliance Grower Training - April 4-6th

2:30-5:30 PM EST

Online via Zoom

[Click Here For More Information and To Register](#)

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2023 Citrus Health Forum

Tentative Agenda:

8:30 AM Trade Show & Registration Opens

8:55 – Welcome: Danielle S. Williams, UF/IFAS Extension Gadsden County & Dr. Xavier Martini, UF/IFAS North Florida Research & Education Center (NFREC)

9:00 – Introduction: Dr. Dean Pringle, UF/IFAS NFREC Center Director

9:15 – Leafminer Pheromone Disruption & Update on Asian Citrus Psyllid Situation: Dr. Xavier Martini, UF/IFAS NFREC

9:45 – Increasing Pollinators and Natural Enemies in Groves through the Addition of Flowering Strips: Dr. Angel Chuang, UF/IFAS Citrus Research & Education Center (CREC)

10:15 – Citrus Canker: What You Should Know: Dr. Jeff Jones, UF/IFAS Plant Pathology, Gainesville

10:45 – Trade Show Break

11:15 – Pre- and Post-Harvest Methods to Reduce Post-Harvest Fruit Decay: Dr. Mark Ritenour, UF/IFAS IRREC

11:45 – Citrus Grove Care: What to Do and What Not to Do

after a Freeze Event: Dr. Muhammad Shahid, UF/IFAS NFREC

12:15 – Sponsored Lunch

1:15 – Cold Hardy Citrus Association Meeting

2:00 – Citrus Pruning Demonstration: Dr. Muhammad Shahid & Dr. Fernando Alferez, UF/IFAS SWFREC

**Thursday,
February 23rd 8:30-
3:00 EST**

**UF/IFAS NFREC
155 Research Rd
Quincy, FL 32351**

**To register, scan the
QR code or visit:**
[2023citrushealthforum.
eventbrite.com](https://2023citrushealthforum.eventbrite.com)



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COLD HARDY CITRUS ASSOCIATION CORNER

I had the opportunity to represent the CHCA on December 1st at the New York Produce Show and Conference. It was eye opening to see in-person the number of fruit buyers that were interested in fruit from the Sweet Valley Citrus region. I noticed that the buyers kept commenting on how the appearance of our tree ripened fruit was impressive. My takeaway from the produce show was that we have to continue to educate produce buyers on the fruit texture, color, and harvest window from our region throughout the Eastern US.



Mark Clikas, CHCA President

Members of the Cold Hardy Citrus Association have reported a good 2022 harvest season. Harvest was completed by December 23rd, just prior to Winter Storm Elliot. The initial report from the harvest season has shown that the regional yield has increased and the quantity of #1 fruit is improving now that many groves in the region are reaching production age.

Winter Storm Elliot arrived in our region on December 23rd and was significant for our growers. We saw several nights of lows between 16 – 22 degrees. Most of the growers I talked with ran freeze protection for 4 days and 4 nights or even more over the Christmas weekend and into the following Monday. Post-freeze recovery will be a topic of conversation at the Citrus Health Forum on February 23rd at the UF/IFAS NFREC. I look forward to meeting and talking with growers there!

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