

FLORIDA OLIVE UPDATE – Spring 2021

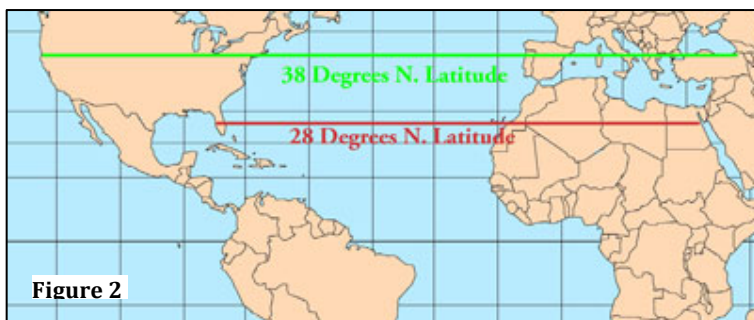
Background: Florida agriculture is struggling. Urbanization, trade, water and disease are issues challenging the Florida farmer. Significantly, Huanglongbing (fatal citrus greening disease) has crippled the Florida citrus industry cutting production by more than 50%. Packing houses and shipping companies are closed. Rural communities suffer disproportionately. Billions lost and thousands of jobs gone. \$300 million spent on research and no cure at hand. Clearly, new crop ideas are needed.

Beginning in 2011, the Florida Olive Council (Council) began a research project to determine if the olive (*Olea europaea*) could be a viable cash crop for Florida farmers. We learned olives were grown on the Turnbull Plantation near New Smyrna Beach in 1768 and J.K. Stickney; the first publisher of the Jacksonville Times-Union newspaper grew olives near Fernandina Beach in 1865. There is a 20-year old producing olive grove in Marianna and 800 acres planted by 80 growers in 25 Florida counties.



Blooming Olive-St. Augustine, FL

2010-2016: Florida Olive Council in partnership with public and private organizations conducted desk and field research throughout Florida and Spain. With support from the Council, multi-variety test plots were installed at 5 UF-IFAS Research and Education Centers (Jay, Quincy, Live Oak, Citra and Wimauma), Hardee County Industrial Development Authority in Wauchula, South Florida College in Sebring, Florida A&M University Agricultural Extension Center (Quincy), Mosaic Corporation in Bowling Green and Lykes Brothers in Lake Wales. In addition, 30 private Florida olive plantations were documented for soil, leaf tissue and oil chemistry in 2017 and again in 2018.



Nursery Stock: Varieties¹ selected for the original tests (2010-2016) were native to the northern Mediterranean (Spain, Italy, Greece and France) oriented to climates in the 38° - 41° N latitude band.), referred to herein as *NoMed* varieties (Fig. 2).

Since most true-to-type olive stock is currently acquired from northern California nurseries (38° N); olive varieties more adapted to southern climates are generally not available from U.S. sources and importation of olive plants is generally prohibited by the United States Department of Agriculture (USDA).

¹ Arbequina, Arbosona, Aglandau, Ascolana, Coratina, Empeltre, Frantoio, Grignan, Kalamata, Koroneiki,

The challenge in Florida is to find olive cultivars that will reliably bloom and fruit throughout the State. The California-sourced NoMed varieties available to Florida growers generally require in excess of 250 chill hours² during winter to bloom and produce fruit. While many NoMed varieties will bloom in northern areas of Florida, particularly the panhandle (NW), most do not generally produce well below 28°N. latitude (Fig. 1).

Early Results: Initial results from surveys suggest Arbequina and Koroneiki generally bloom and fruit fairly well in areas receiving 310 chill hours or more; other varieties (Ascolana, Mission, Manzanilla, Empeltre, Coratina, etc.) will produce farther north in areas receiving 540-700+ chill hours.

While several NoMed varieties bloomed in the Wauchula test plot (27.54° N latitude) with only 200 chill hours in 2021, evaluation of their longer-term potential as commercial varieties is incomplete. These early stage tests had the limited goal of determining which varieties will produce blooms in various parts of the State.

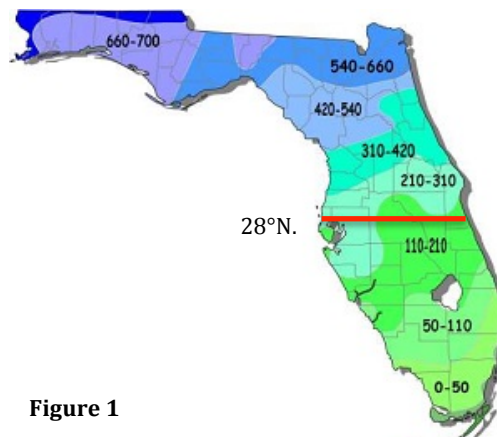


Figure 1

Florida Chill Map

Although soil, leaf and oil chemistry were collected on 30 Florida olive plantations in 2017 and again in 2018; cultivation practices and other variables were not documented in an exhaustive fashion. As potential commercially productive candidates are identified (flowering over several years in a particular location) more research on cultivation practices for those varieties will be conducted.



Grafted Olives-Wauchula

2017-2018: Since five (5) SW Florida counties: DeSoto, Polk, Hendry, Highlands and Hardee account for 66% of all Florida citrus acreage they carry the most significant burden of HLB disease (99% infestation). These counties are the area of focus for the Council's low-chill research.

In 2017, Florida low chill olive research began with twenty-seven (27) varieties from the Middle East and North Africa (MENA), South America

and Southern Australia secured from the USDA Olive Germplasm at University of California (Davis). Since some cultivars require 4-7 years to flower, the research plan included grafting the candidate varieties onto mature (4+ year-old) Arbequina, Koroneiki, Empeltre and other olive varieties at the Hardee County research facility in an attempt to more quickly identify suitable candidates for further research and cultivation.



Low Chill Graft-2019

² One chill hour = one hour between 32° and 45° F. (0° - 7.2° C.)



High Density Hardee Grove

In addition to the low-chill candidate varieties, the Hardee County Research Facility also hosts 2,000 4+ year-old olive trees of 20 primarily NoMed varieties. These include: Arbequina, Arbosona, Ascolona, Barnea, Chemlali, Chiquitita, Coratina, Empeltre, Frantoio, Hojiblanca, Koroneiki, Manzanillo, Mission, Nevadillo, Pendolino, Picholine, Piquel, Santa Caterina, Verdeal and several seedlings of undetermined origin.

Two hurricanes (Irma 2017, Michael 2018) occurred during the low chill experiment with some damage to grafts in Wauchula and the rooting facility at LaCrosse, north of Gainesville. After the 2018 storm, the original 27 varieties plus 14 additional varieties were selected from the USDA Germplasm, grafted at the Hardee County facility and rooted at LaCrosse.

A "budding" technique was used for grafts and based on experience from first grafting in 2017, a larger diameter scion (3-5 cm) was used in 2018. The larger diameter proved superior for budding and a total of 371 grafts from 41 varieties were successful.



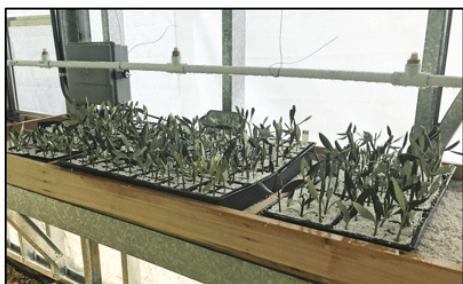
Rooted Cutting-2019

In the rooting process, a total of 360 cuttings from the 41 varieties were dipped for 8 sec. in 1:4000 IBA solution and rooted in 100% vermiculite. Greenhouse environment was maintained at 75-85 degrees and 60-80% humidity. Results were mixed. Some varieties rooted quickly and well, others were much more hesitant. Many factors could be involved, concentration/type of IBA solution, immersion time, medium, temperature, moisture, etc.



Larger Diameter Scion-2018

2019-2020: Total chill hours at Wauchula test site 12-1-20/3-1-20 were 202.69. While this level of chill would generally be less than required for most NoMed varieties, several blooms were observed.



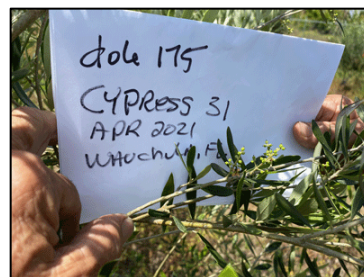
LaCrosse Rooting Facility

For the most part, these were not flush blooms covering the tree but small groups of blooms primarily on the sun side of the tree. The Wauchula trees are planted in a high-density fashion.

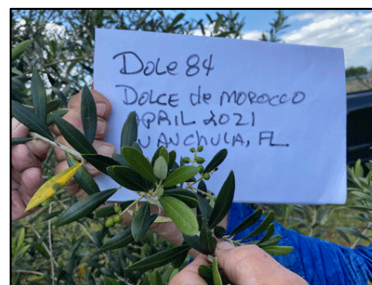


Chiquitita Bloom- Hardee

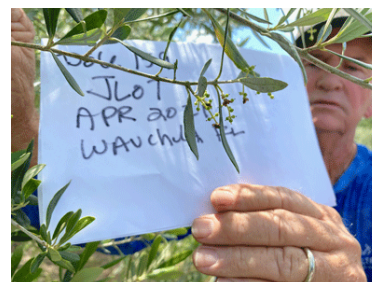
The plantation had been topped and side dressed but not thinned, therefore some reduced light might explain the sparse bloom-set. Varieties blooming on mature trees at Wauchula in 2021 included: Arbequina, Koroneiki, Chiquitita, Chemlali and Picholine. All of these specimens were 5-6 years old. Some are blooming for the first time. Perhaps selected NoMed varieties need more time to become mature in the lower latitudes? More research is needed to answer this question.



Approximately 300 of original 371 low chill grafts were viable in 2020. While most did not bloom, several individuals produced flowers and fruit in 2021. These included: Dole 84-Dolce del Marocco (Morocco); Dole 159-Jlot (Syria); Dole 164-No. 12 Sevillano (Cyprus); Dole 166-Nabali (Israel); Dole 168-No. 63 (Cyprus); Dole 175-Cypress 31 (Cyprus).



The rooting process was less successful with 109 of 360 cuttings successfully rooted. Of those cuttings, 67 trees (23 varieties) are currently viable (36"-60" high). These include: Dole 36-Toffahi of Egypt (Egypt); Dole 161-Toffahi of Syria (Syria); Dole 166-Nabali (Israel); Dole (PI104328)-Meski (Tunisia); Dole (PI86754)-Picholine Marocaine; Dole 34-Mission (Egypt); Dole 44-Ascolana tenera; Dole 8-Azapa (Peru, Chile); Dole 91-Chetoui (Tunisia-Calif.); Dole 27(PI63862)-Leccino (Tuscany); Dole 119-Azapa (Chile); Dole 86-Azapa (Peru); Dole(PI50974)-Bouquetier (So. Australia); Dole 175-Cypress 31 (Cyprus); Dole 169-65A (Cyprus); Dole 125-Cucca (Argentina); Dole 137-Androuppa (Cyprus); Dole 54-Ascolana dura (?); Dole 80-Karydolia (?); Dole 164-No. 1 Sevillano (Cyprus); Dole 180-Mixani (Albania); Dole 164-No. 12 Sevillano (Cyprus); Dole 165-No. 31 Sevillano (Cyprus).



2021: Winter weather was good this year with many parts of Florida experiencing good chilling. While chilling below the I-4 corridor (27° N) was 200 chill hours or less – there were nevertheless some blooming. Many NoMed varieties were reported blooming in the Panhandle and several varieties bloomed in north Florida, particularly Koroneiki. Northwest Florida (Panhandle) growers reported the following varieties in bloom:: Arbosona, Koroneiki, Empeltre, Piquial, Arbequina, Coratina, Leccino, Frantoio, Ascolana (many blooms this year) and Mission.

In addition to the grafting and rooting research. Early work is underway at UF-IFAS exploring the use of CRISPRs Cas 9 gene editing techniques to identify genes involved in olive flowering and adaptation to warmer winter climates. The Florida olive harvest is anticipated to start in August and continuing through October.

The Florida Olive Council, LAA is a non-profit <501.c.3> agricultural research and advocacy organization supported by your generous tax-deductible donations. Please donate [HERE](https://www.floridaolive.org). Contact: Michael O'Hara Garcia - michael@floridaolive.org - (202) 246-2001 www.floridaolive.org