

## Florida Low-Chill Olive Research Note-July 2022

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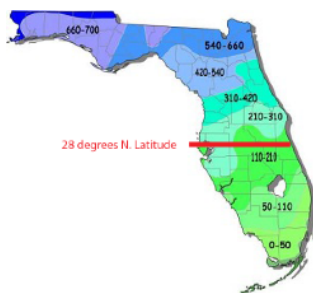
Statement of Problem: The Florida citrus industry is in a deep depression. According to USDA, Florida citrus growers had 407,348 acres under active cultivation in 2021. That figure is down from 857,687 acres in 1996. Production has plummeted from 200 million boxes (2000) to less than 58 million (2021).

There are several reasons for the drop in production. These include a diminished retail demand in favor of energy, designer water and low carb drinks; as well as trade policies encouraging competition from low-wage foreign competitors. But the most significant cause for the drop in production is Haunglongbing (HLB) or "fatal greening disease."

First confirmed in 2005, the disease infects 99% of Florida citrus groves and has resisted a cure. After spending over \$250 million on research, no satisfactory solution has surfaced. Prudence suggests exploring alternative crops, particularly those that benefit from the use of existing citrus infrastructure, are compatible with Florida climate and soils and produce a similar dollar/acre return. Olives are a worthy candidate.

### Olives (*Olea europaea*)

Olives have been cultivated in Florida for 300 years. Currently there are approximately 800 acres under cultivation by 60-80 growers in 26 counties. There are several olive mills and olive oil is produced in small quantities throughout the State. However, Council research over 10 years suggests commercial production of olive oil, using currently available cultivars (Arbequina, Koroneiki, Arbosona, etc.), while not unknown, is difficult below 30° N. latitude (Green Cove Springs - Perry).



Olives cultivated in the U.S. are principally drawn from stocks native to the Northern Mediterranean (NoMed) basin at 38-41° N. latitude (Spain, Greece, Italy, etc.). As such, they are acclimated to vernalize (enable blooming) using 300+ chill hours<sup>1</sup>. While these varieties do well in northern, particularly northwestern Florida where chill hours exceed 600, the NoMed varieties struggle further south.

South Central Florida, where most fallow citrus grove land is available, receives only 110-210 annual chill hours annually.

Since olives adapt to environments, it is postulated that olive cultivars from latitudes similar to Florida's might vernalize using fewer chill hours and enable commercial olive cultivation where most grove land is available.

<sup>1</sup> Chill Hour = 1 hr. between 32° and 45° F. (0° - 7.2° C.)



In that regard, the Council and partners evaluated several SoMed varieties with a view to discovering or developing an olive variety that would reliably bloom and fruit south of the I-4 corridor (28° N.). Below is a brief report on the varieties that bloomed/fruited and narrative from the USDA germ plasm and other

sources discussing various characteristics of each variety.

## Blooming Varieties

Background: During 2017 and 2018, the Council, in partnership with UF-IFAS, the Hardee County Industrial Development Authority and South Florida College propagated 40 varieties (accessions) from true-to-type mother trees native to the Middle East/North Africa, South Australia, South America and Mediterranean islands. The stock was secured from the USDA Germ Plasm at University of California at Davis (UC Davis).



Hardee County Research Farm-Wauchula



Budded Graft

Most of the varieties selected were from latitudes similar to Florida's. We refer to these varieties as southern mediterranean or *SoMed* varieties. The 40 SoMed varieties were grafted onto mature (3+ years) Arbequina and Koroneiki trees at Wauchula, FL (27° 32' 06" N / 81° 48' 52" W) and rooted at Council facilities St. Augustine, FL (29° 46' 55" N / 81° 15' 36" W.) During 2021 and 2022 several varieties in the graft trial and the rooting trial demonstrated blooming and fruiting at Wauchula and St. Augustine.



## Azapa 8 (USDA\_GRIN DOLE-8)



Azapa is a new name. The cultivar name, *Mostazal*, was changed due to re-identification based on a combination of the 2005-2008 morphological data, the 2008 micro-satellite data and analysis of the endocarps. Hartmann Imported from Chile in 1950. "Azapa is a new variety grown in northern Chile. It is a table olive with fruits reported to be as large as the Sevillano."

The origin of this hardy variety is uncertain. It appears to match the 'Arauco' variety of Argentina and the 'Sevillana' of Peru. It has a medium rooting ability and it comes into bearing early. It is partially self-compatible, flowering is intermediate and abundant pollen. The fruit ripens late.

The Azapa 8 productivity is medium and alternate and it is affected by exogenous factors such as El Nino, which heightens alternate bearing. It has a low oil content and it is clingstone. It is used for green or black pickling although it can also be considered dual-purpose. It is very resistant to drought and salinity." (Ref: [USDA](#))

## Azapa 119 (USDA\_GRIN DOLE-119)

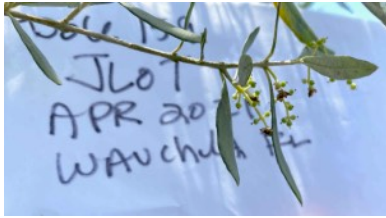


Imported from Chile in 1950. Azapa is a new variety grown in northern Chile. It is a table olive with fruits reported to be as large as the Sevillano. The origin of this hardy variety is uncertain. It appears to match the 'Arauco' variety of Argentina and the 'Sevillana' of Peru.

It has a medium rooting ability and it comes into bearing early. It is partially self-compatible. Azapa 119's time of flowering is intermediate and it produces abundant pollen. The fruit ripens late.

Its productivity is medium and alternate and it is affected by exogenous factors such as El Nino, which heightens alternate bearing. It has a low oil content and it is clingstone. It is used for green or black pickling although it can also be considered dual-purpose. It is very resistant to drought and salinity." (Ref: [USDA](#))

## Jlot (USDA GRIN\_DOLE 159)



The cultivar name was changed based on a combination of the 2005-2008 morphological data, the 2008 micro-satellite data and analysis of the endocarps but the name can not be confirmed without further analysis. Information on this variety from Bulletin 720, Olive Varieties in California, by Hartman and Papaioannou, California Agricultural Experiment Station, University of California, Berkeley,

February 1951: Imported from Syria in 1949. Also known as Ja hlut and Jallut, this variety is reasonably productive in Syria. The fruit is said to be larger than the Sevillano and to make an excellent-quality black-ripe olive. Ref: USDA

## Chemlali (USDA GRIN\_DOLE 89)



Information on this variety from Bulletin 720, Olive Varieties in California, by Hartman and Papaioannou, California Agricultural Experiment Station, University of California, Berkeley, February 1951: Collected at the Citrus Experiment Station, Riverside. Imported from North Africa, this variety has several strains. It is widely grown in Tunisia and is common use for oil in Algeria. The tree usually bears heavy crops in alternate years. The fruit is borne in clusters on long peduncles and ripens unevenly. The shape of the olive is oblong or

ovoid, with a slight protrusion at one side. The base is narrow - often slanted at one end; the apex is usually rounded. The surface of the fruit may be smooth but occasionally has small wart-like projections. Ref: USDA

## Chiquitita (AKA SIKITITA) (USDA GRIN\_DOLE N/A)



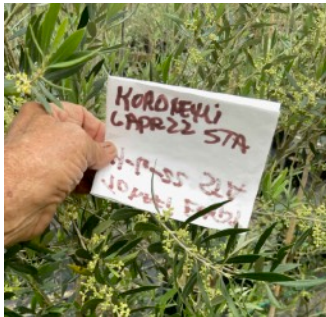
The original seedling of 'Chiquitita' (progeny UC-I 8-7) was derived from a cross between 'Picual' (female) and 'Arbequina' (male) carried out in 1991. The seedling was planted in the field in 1994 at the experimental farm of IFAPA Centro Alameda del Obispo of Córdoba. The first crop was obtained in 1996 and seedling evaluation was carried out for three consecutive harvest seasons. The original seedling of 'Chiquitita' was selected mainly on the basis of their early crop (short juvenile period) and high oil content, showing also compact and weeping growth habit. Dr. Luis Rallo developed the variety (Ref: ASHS)

## Cyprus 31 (USDA GRIN\_DOLE 89)



Cyprus 31 is a Sevillano olive which derives its name from Sevilla, the province in Spain where it originated. It is grown there in large quantities, which are exported as Spanish-green fermented olives. This variety is also grown commercially in France, Palestine, Argentina, Portugal, Algeria, Chile, and Australia. Sevillano was brought into California about 1885. Mature Sevillano trees vary considerably in size. With favorable soil and climatic conditions, they often attain a height of 25 to 35 feet. In poor soil, they remain quite small. Because their tendency is to spread rather than to upright, harvesting is relatively easy. Unlike other commercial varieties, Sevillano fails to root satisfactorily from cuttings. It is usually propagated by grafting onto seedlings of other varieties. Soft-wood cuttings, however, have been grown successfully when treated with certain root promoting substances. Although Sevillano is resistant to peacock spot, it is quite susceptible to olive knot. This variety is susceptible also to three other diseases ("soft nose," "split pit," and "shotberry"). (Ref: [USDA](#))

## Koroneiki (USDA GRIN\_DOLE 149)



Koroneiki is a tree of medium vigor with a spreading habitat and open canopy. Other names of this cultivar are 'Psilolia', 'Lianolia' or 'Korani'. It is widespread in the main olive-producing districts of Greece (i.e. Crete, Peloponnese, etc.) and is expanding in other areas of the world too. In recent years this cultivar has started to be grown in the form of super-dense plantings all over the world (e.g. Australia, Italy, Spain). Koroneiki has been a consistent bloomer in Florida. (Ref: [Santa Cruz Nursery](#))

## Mission (Egypt) (USDA GRIN\_DOLE 34)



Mission (Egypt) - Misidentified cultivar name. The cultivar name, Hamid, was changed due to re-identification based on a combination of the 2005-2008 morphological data, the 2008 micro-satellite data and analysis of the endocarps. Donated 24 May 1957 at Wolfskill Experimental Orchard. Flowers in late May, and beginning of bearing is intermediate. Mission is considered hardy because of its resistance to cold. It is considered sensitive to olive leaf spot and verticillium wilt but it is resistant to olive knot. (Ref: [Santa Cruz Nursery](#))

## Nabali (USDA GRIN\_DOLE 166)



Small fruit; good oil producer. Information on this variety from Bulletin 720, Olive Varieties in California, by Hartman and Papaioannou, California Agricultural Experiment Station, University of California, Berkeley, February 1951: Imported from Palestine in 1947 and 1948. Nabali, one of the important varieties grown in Palestine, bears irregularly, alternating somewhat from year to year. The fruit is medium to large in size and is used for both pickling and oil. The oil content is relatively high - 27 to 33 per cent. (Ref: [USDA](#))

## Sevillano #1 (USDA GRIN\_DOLE 163)



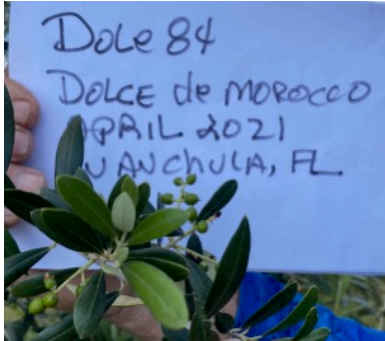
Sevillano derives its name from Sevilla, the province in Spain where it originated. It is grown there in large quantities, which are exported as Spanish-green fermented olives. This variety is also grown commercially in France, Palestine, Argentina, Portugal, Algeria, Chile, and Australia. Sevillano was brought into California about 1885. When the emphasis of the California olive industry shifted in 1910 from oil to pickling, this variety was widely used in top-working trees of the small-fruited oil types, especially in the Corning area. Mature Sevillano trees vary considerably in size. With favorable soil and climatic conditions, they often attain a height of 25 to 35 feet. (Ref: [USDA](#))

## Tohaffi (Egypt) (USDA GRIN\_DOLE PI 66193)



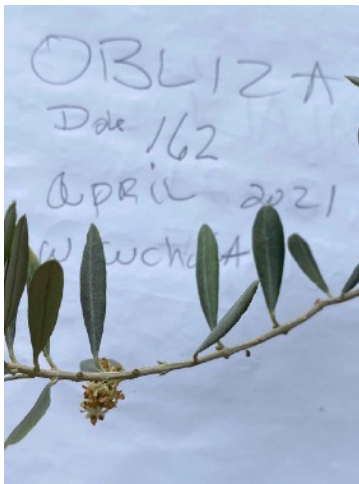
Imported from the island of Mytiline, Greece, in 1926. The tree sets good crops regularly. Its characteristics are almost identical with those of Tafahi. It has a higher ratio of fruit to pit. The pit is practically identical with that of Tafahi. This variety may have commercial possibilities for processing by the Spanish-green method. It does not make a satisfactory product when processed by the black-ripe method because it fails to attain the desirable black color, remaining more of a grayish-brown. The flavor, too, is poor when processed by this method. Ref: [USDA](#)

## Dolce de Morocco (USDA GRIN\_DOLE 84)



Imported from Italy in 1925. The tree is vigorous, with an upright tendency of growth and large, broad leaves. It bears fairly heavy crops most years but occasionally fails to set fruit. The fruit grows singly or in clusters on variably sized peduncles. It matures in November, becoming a reddish-black with prominent bloom and obscure lenticels. The shape of the olive is oblong and narrow, erect, and often slightly curved, protruding at one side. This variety is rather small for pickling; it may, however, have some value for oil. Ref: USDA

## Obliza (USDA GRIN\_DOLE 162)



Imported from Dalmatia about 1892. It is grown at the present time in Yugoslavia. Very few trees are now found in California. The tree is medium in size with prominently spreading top; the upper terminal shoots have an upright growth tendency. It bears good crops in most years. The fruit sets singly or in clusters on variably sized peduncles. At maturity, the fruit is reddish-black. Small lenticels are conspicuous early in the season but are almost obscure at time of maturity. The shape of the olive is irregularly ovate, usually slightly curved base-half, distinctly protruding at one side. The surface is rough with This variety is believed by some growers to have commercial possibilities as a canning olive because of its good bearing characteristics. Ref: USDA

## Oliana (USDA GRIN\_DOLE U/K)



A variety with less vigor for the SHD system. Natural benefit: ease of pruning renovation. High yield and exceptionally early production. Late ripening, between that of Arbequina and Arbosana. Tolerant to leaf spot disease and more suitable for low temperatures than Arbequina. Corresponds to a sweet type of virgin oil, well balanced and with good harmony at the aromatic level. Presents a medium to high level of fruitiness, light in bitterness and somewhat more intense in spiciness. (Ref: Agromillora)

## Ormond (USDA GRIN\_DOLE U/K)



This specimen is of undermined origin. It was discovered in the yard of a 90 year old woman in Ormond Beach, FL who declared she planted it when she was in her late 20's suggesting the tree is at least 50 years old. Root cuttings were harvested in 2015 and potted for grow out at St. Augustine, FL. It first bloomed in May 2022.



## PsuNati (USDA GRIN\_DOLE U/K)



This is a greek variety often found on Crete. It is also referred to as referred also as Athinolia or Tsounati. It is used as a table olive and for its oil. It has a lemon-like shape and weighs between 2 and 3 grams. Its olive oil content varies from 20% to 30%. It is a moderately productive and cold resistant variety. It is very sensitive to the olive fly. It resists cold and adverse weather conditions and its yield in olive oil is high. Tsounati oil demonstrates bitterness and spiciness of medium intensity, and its olives are qualitatively good when collected and ground correctly. (Ref: Kreta-Crete)

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### Acknowledgements

The author would like to acknowledge the assistance provided by Jenny Smith at the USDA Germ Plasm at UC Davis, Bill Lambert and Myles Albritton at Hardee County Industrial Development Authority, Drs. Kevin Folta, Jeff Williamson, Lorenzo Rossi, Wes Wood and Mack Thetford at the University of Florida's Institute of Food and Agricultural Sciences and Dr. Luis Rallo, University of Cordoba, Spain.

For additional information on olive cultivation in Florida refer to the [Florida Olive Council website](#). The Florida Olive Council is a non-profit (501c3) organization established in 2011 and dedicated to developing a commercial olive industry in Florida. We invite interested parties to join the Council in support of research and educational activities.



## Appendix A. List of accessions for Florida Low Chill Olive Project

| 2018 USDA_GRIN Order      | Origin       | 2017 USDA_GRIN Order              | Origin          |
|---------------------------|--------------|-----------------------------------|-----------------|
| DOLE 8-Azapa              | Peru         | DOLE 160- Memeli                  | TURKIA          |
| DOLE 31-Dwarf D           | u/k          | DOLE 176- 880333-subsp. Cuspidata | Pakistan        |
| DOLE 34- Mission          | Egypt        | DOLE 169-65A                      | Cyprus          |
| DOLE 42-Menera            | U/K          | DOLE 165-Sevillano No 31.         | Cyprus          |
| DOLE 44-Acoolana Tenera   | U/K          | DOLE 164-Sevillano No. 12         | Cyprus          |
| DOLE 54- Ascolana Dura    | Cyprus       | DOLE 163-Sevillano No. 1          | Cyprus          |
| DOLE 65 - Barnea          | Israel       | DOLE 161-Tohaffi of Syria         | Syria           |
| Pi 104328 Meski           | Tunisia      | DOLE 159-Jlot                     | Syria           |
| DOLE 80- Karydolia        | Greece       | DOLE 158-Massabi                  | Syria           |
| DOLE 84-Dolce del Marocco | Morocco      | DOLE 145-Balady                   | Egypt           |
| DOLE 86-Azapa             | Peru         | DOLE 137-Adrouppa                 | Cyprus          |
| DOLE 89-Chemlali de Sfax  | Tunisia      | DOLE 131-Aggezi Shami             | Egypt           |
| DOLE 91- Chetoui          | Tunisia      | DOLE 121-Zoragi                   | Tunisia         |
| DOLE 111-Barouni          | Italy        | DOLE 113-Nab Tamri                | North Africa    |
| DOLE 113- Nab Tamari      | North Africa | PI 5097-Bouquetier                | South Australia |
| DOLE 119-Azapa            | Chile        | DOLE 91-Chetoui                   | Tunisa(CA)      |
| DOLE 121-Zoragi           | Tunisia      | DOLE 89-Chemlali di Sfax          | Tunisa          |
| DOLE 125-Cucca            | Argentina    | DOLE 84-Dolce de Morocco          | Morocco         |
| DOLE 129-Azapa            | Peru         | PI 104328-Meski                   | Tunisia         |
| DOLE 131-Aggezi Shami     | Egypt        | DOLE 5Ascolana Dura               | Cyprus          |
| DOLE 137-Adrouppa         | Cyprus       | PI 86754-Picholine Marocaine      | Morocco         |

|   |                    |                                      |          |
|---|--------------------|--------------------------------------|----------|
| DOLE 145-Balady                           | Egypt              | PI 12684-Meski                       | Tunisia  |
| DOLE 156-UC 49-14<br>(Asoclano x Barouni) | U/K                | DOLE 8-Azapa                         | Peru     |
| DOLE 158-Massabi                          | Syria              | DOLE 177-880336                      | Pakistan |
| DOLE 159-Jlot                             | Syria              | DOLE 168- No. 63<br>subsp. Cuspidata | Cyprus   |
| DOLE 161-Tohaffi of<br>Syria              | Syria              | DOLE 180-Mixani                      | Albania  |
| DOLE 162-Obliza                           | Delmatia (Croatia) | PI 66193-Tohaffi of<br>Egypt         | Egypt    |
| DOLE 163-No. 1<br>Sevillano               | Cyprus             |                                      |          |
| DOLE 164-No.12<br>Sevillano               | Cyprus             |                                      |          |
| DOLE 165-No.31<br>Sevillano               | Cyprus             |                                      |          |
| DOLE 166-Nabali                           | Israel             |                                      |          |
| DOLE 167-Merhavia                         | Israel             |                                      |          |
| DOLE 168-No. 63                           | Cyprus             |                                      |          |
| DOLE 169- No. 65A                         | Cyprus             |                                      |          |
| PI 66193-Tohaffi of<br>Egypt              | Egypt              |                                      |          |