

# THE FUTURE OF OLIVES IN TEXAS



• Monte Nesbitt

TEXAS A&M  
**AGRILIFE**  
EXTENSION



# OLIVES ARE SOIL, DROUGHT AND SALT TOLERANT



*AND WE HAVE AN  
ABUNDANCE OF  
THOSE CHALLENGES  
IN TEXAS*

# IS THERE AN OLIVE HISTORY IN TEXAS?



Illustration by Silia Goetz, wsj.com

# KNOWN OLIVE HISTORY-TEXAS

- Catholic archives in San Antonio indicate Spanish missionaries did not plant olives in Texas as they did in California (Denney, 1982).
- Onderdonk (1900), important Texas nurseryman and fruit explorer wrote favorably of olives in San Luis Potosi, Mexico, but was otherwise silent about them.
- Old trees dated 1920's are reported to exist and bear fruit at places like Asherton & Galveston.
- Mortensen (1938) described olive varieties introduced from California as "fair" for Wintergarden area and better for dooryard than commercial purposes.
- Hartmann (1951) "Twenty-year effort in South Texas has failed to see fruiting" (Weslaco/Brownsville).



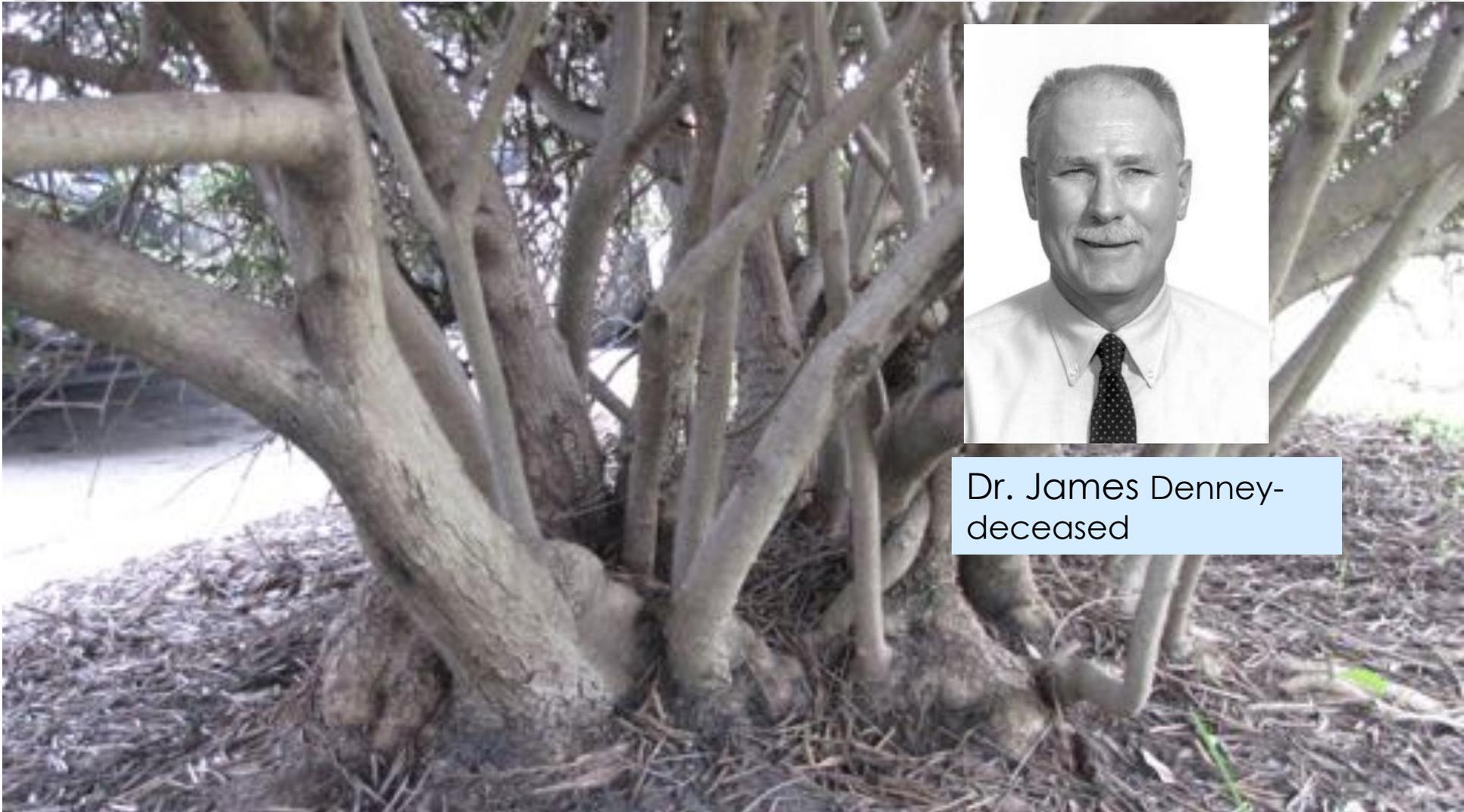
Ernest Mortensen, Winterhaven, TX Exp. Station

# OLIVES ON TEXAS A&M CAMPUS



100's of Manzanilla trees planted in 1974. Produced fruit in 1977, but were damaged by freezes in '78, '80, '81 (Denney, 1982)

Thermal constraints on the productivity of olive (*Olea europea* L.)  
in the climates of olive-producing regions and of Texas, Thesis,  
Texas A&M Dept. of Horticultural Sciences, 1982

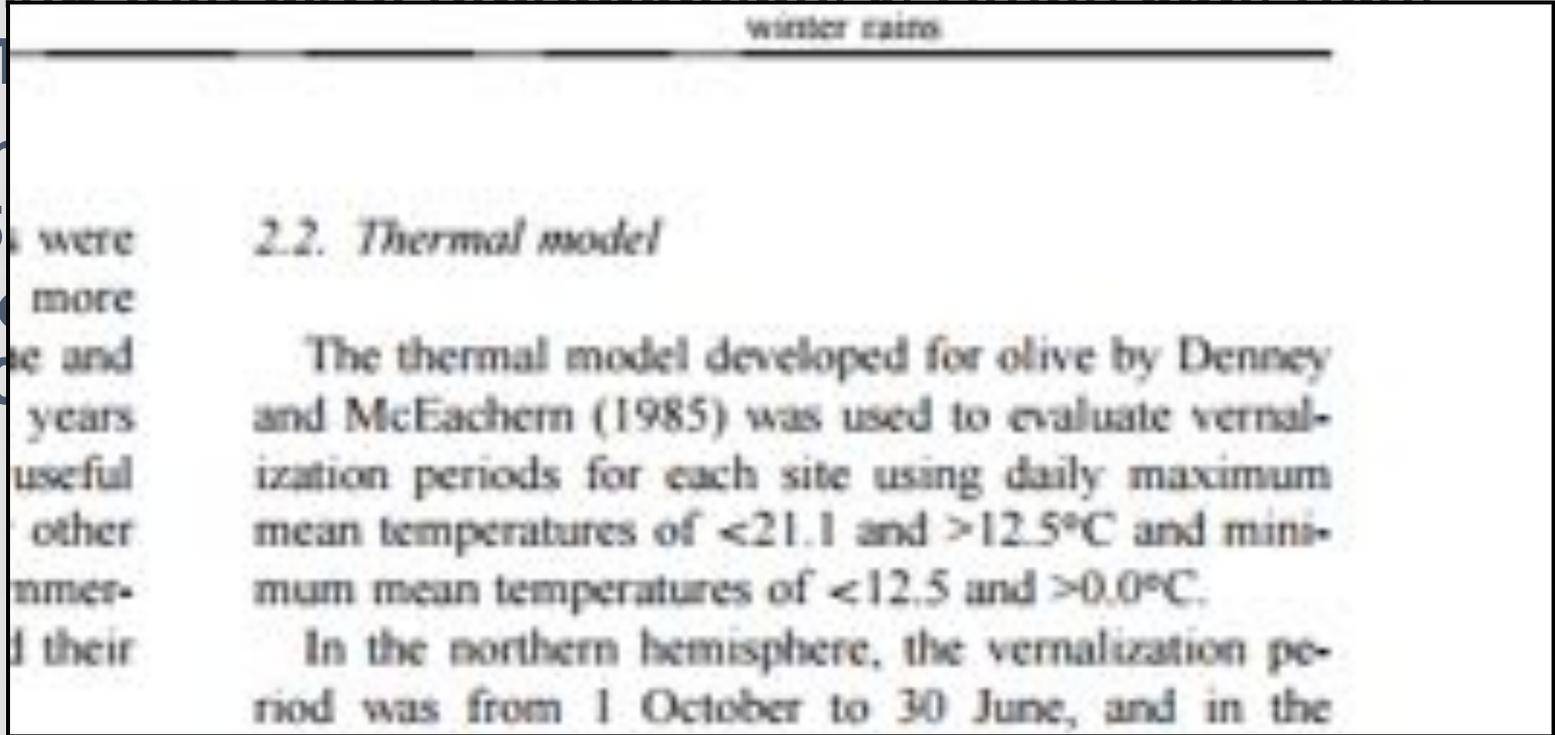


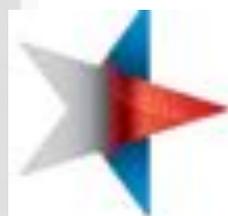
Dr. James Denney-  
deceased

# PUBLICATIONS

- Denney, J.O. and G.R. McEachern. 1983. An analysis of several climatic temperature variables dealing with olive reproduction. *J. Amer. Soc. Hort. Sci.* 1

- Denney, J.O. and G.R. McEachern. 1985. Olive reproduction in California: a review of the literature and a model for predicting the timing and duration of the reproductive cycle. *Oleagineae* 35:30





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## The Great Texas Olive Debate

Friday, October 3, 2008



*Some say it couldn't be done. Others proved them wrong. Trial and error, boom or bust...that's olive 'ranching' in the Lone Star State!*

Some saw the idea of olive orchards in Texas as nothing more than a romantic notion. In the mid-1980s, skepticism over Texas' production grew when researchers from Texas A&M predicted olives would never make it as a commercial crop.

"The experts based their conclusions on nothing more than opinion," says Jim Henry, founding director of Texas Olive Oil Council and Texas Farm Bureau member. "They had no research or scientific data based on specific trees in test orchards."

Undaunted, a number of entrepreneurs set out to prove olives trees could survive and produce fruit in Texas. In 1994, Henry planted his first olive trees in Marble Falls, and Baxter Adams and Trigg Dealey planted 157 trees in Adams' Love Creek Orchard, southwest of San Antonio.

An untimely freeze swept down from the north that first winter, killing most of the trees in the two groves. The three men replanted the following year. Jack Dougherty, Sandra Winokur, and David and Beverly Anderson started their olive groves shortly thereafter.

# DAVID AND BEVERLY ANDERSON ANDERSON RANCH, DILLEY, EST. 1997



Slide/Photos: Karen Henry,  
Texas Olive Oil Council

# BELLA VISTA RANCH FIRST TEXAS OLIVE OIL CO. WIMBERLY, TEXAS

- First Trees Planted, 1998



Photo: Coppage, CW News

SAUNDRA WINOKUR  
SANDY OAKS OLIVE ORCHARD,  
ELMENDORF, FIRST PLANTING, 1998



Slide/Photos: Karen Henry,  
Texas Olive Oil Council

JIM HENRY

TEXAS OLIVE RANCH, CARRIZO SPRINGS,  
EST 2005



Slide/Photos: Karen Henry,  
Texas Olive Oil Council

# FAST FORWARD TO THE LATEST ROMANCE WITH OLIVES IN TEXAS





# TREE DENSITIES & VARIETIES REPORTED, 2014

Tree Spacing	Row Spacing	Trees/Ac	Most Planted	2 <sup>nd</sup> Most Planted	3 <sup>rd</sup> Most Planted
3	8	1815	Arbequina (69%)	Arbosana (23%)	Koroneiki (15%)
5	13	670	Mission (23%)	Arbequina (15%)	Frantoio (7.6%)
5	13	670	Picqual (15%)	Koroneiki (15%)	Manzanillo (7.6%)
5	14	622	Koroneiki (15%)	Manzanillo (7.6%)	Chemlali (7.6%)
6	13	558	Arbosana (7.6%)	Mission (7.6%)	Arbequina (7.6%)
7	30	207	Aglandau (7.6%)		
9	13	372			
10	10	436			
12	16	227			
14	14	222			
20	20	109			
20	20	109			
24	24	76			



Harvesting/milling is equally diverse, eclectic and creative.....

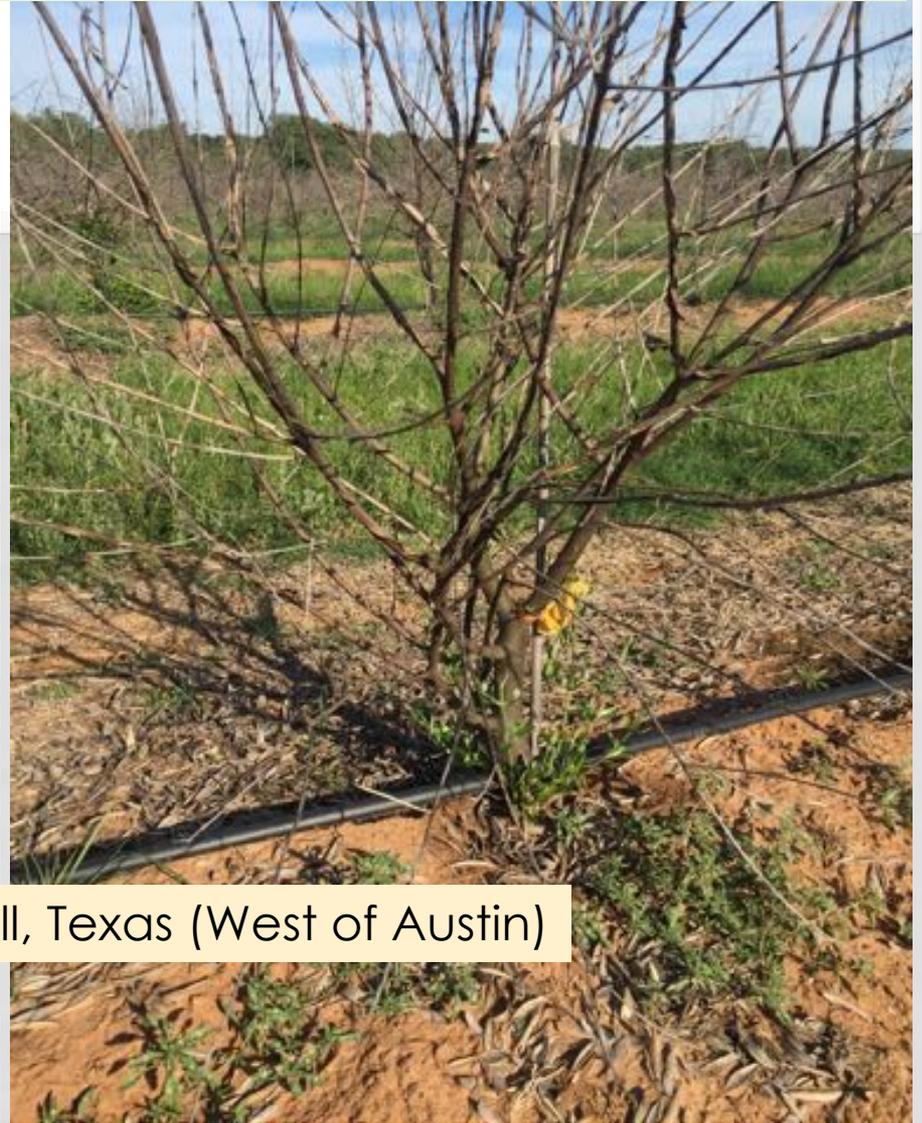


The future of olive production in Texas hinges upon sustainable production.



Koroneiki, Stonewall, Texas (West of Austin)

2016: second growing season

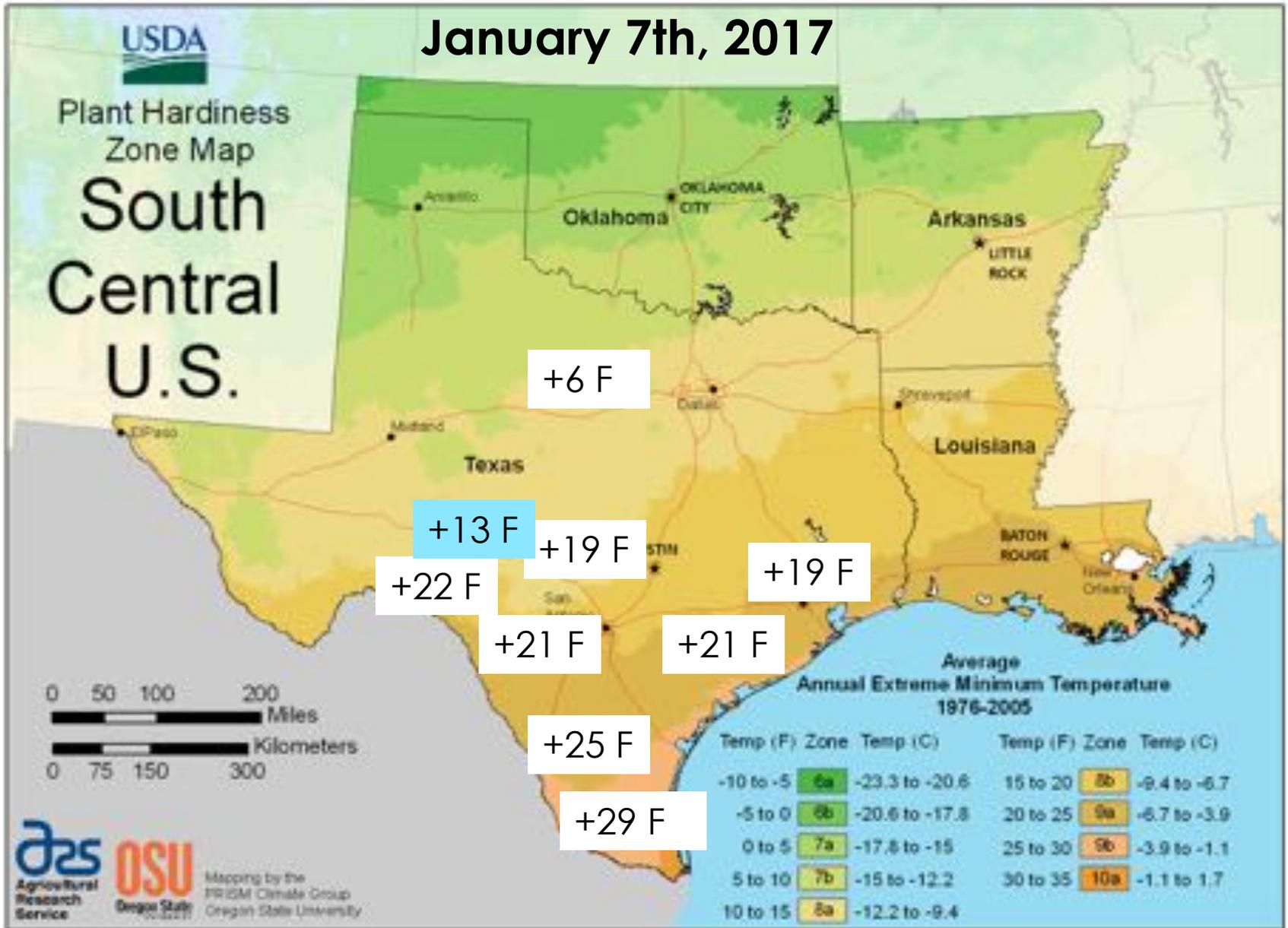


Spring, 2017 after January freeze

USDA

January 7th, 2017

Plant Hardiness  
Zone Map  
South  
Central  
U.S.



+6 F

+13 F

+19 F

+19 F

+22 F

+21 F

+21 F

+25 F

+29 F

Temp (F)	Zone	Temp (C)	Temp (F)	Zone	Temp (C)
-10 to -5	6a	-23.3 to -20.6	15 to 20	8b	-9.4 to -6.7
-5 to 0	6b	-20.6 to -17.8	20 to 25	9a	-6.7 to -3.9
0 to 5	7a	-17.8 to -15	25 to 30	9b	-3.9 to -1.1
5 to 10	7b	-15 to -12.2	30 to 35	10a	-1.1 to 1.7
10 to 15	8a	-12.2 to -9.4			

Source: Natl. Climate Data Center

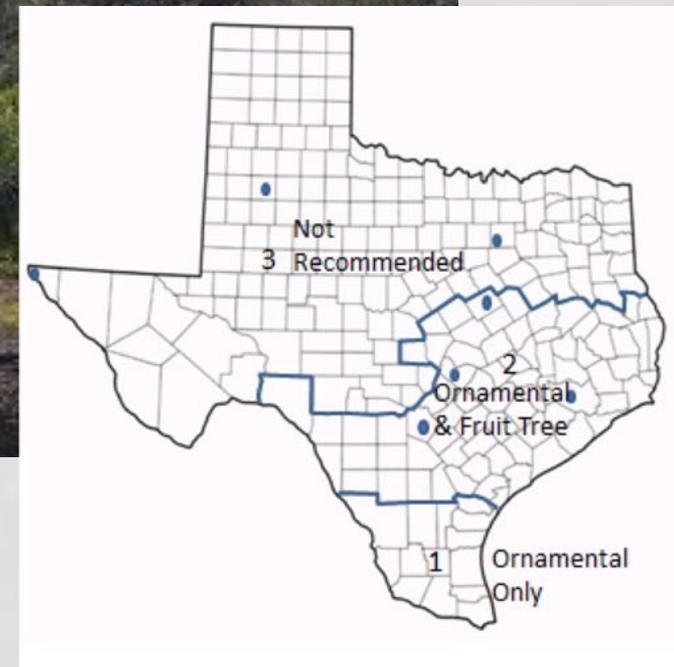
# VARIETAL DIFFERENCE IN FREEZE TOLERANCE

<b>Variety</b>	<b>Provenance</b>	<b>% Canopy Killed</b>
<b>Aglandau</b>	<b>France</b>	<b>63.5</b>
<b>Picual</b>	<b>Spain</b>	<b>74.8</b>
<b>9806-10</b>		<b>77.6</b>
<b>Mission</b>	<b>California</b>	<b>78.5</b>
<b>Koroneiki</b>	<b>Greece</b>	<b>82.3</b>
<b>Empeltre</b>	<b>Spain</b>	<b>82.3</b>
<b>Tosca</b>	<b>Italy</b>	<b>85.0</b>
<b>Picholine</b>	<b>France</b>	<b>86.3</b>
<b>Chiquitita</b>	<b>(Picqual x Arbequina)</b>	<b>90.2</b>
<b>Arbequina</b>	<b>Spain</b>	<b>90.5</b>
<b>Frantoio</b>	<b>Italy</b>	<b>90.7</b>
<b>Arbosana</b>	<b>Spain</b>	<b>90.8</b>
<b>Coratina</b>	<b>Italy</b>	<b>95.2</b>
<b>A</b> <b>Pendolino</b>	<b>Italy</b>	<b>95.7</b>
<b>Hojiblanca</b>	<b>Spain</b>	<b>98.0</b>
<b>Manzanilla</b>	<b>Spain</b>	<b>98.3</b>
<b>Oliana</b>	<b>(Arbequina x Arbosana)</b>	<b>98.7</b>
<b>Chemlali</b>	<b>Tunisia</b>	<b>98.8</b>
<b>Leccino</b>	<b>Italy</b>	<b>100.0</b>

!!Preliminary data, 2<sup>nd</sup> year trees, one location, no statistics!!

Lady Bugg Farm, Wilson County, Texas

# FOLLOWWILL ORCHARD RECOVERY



DeWitt County, June, 2017

# THE OTHER MAJOR TEXAS CLIMATE FACTOR

- Olives are an evergreen tree species with a fruiting mechanism affected by ambient temperatures in the months occurring between growth cessation and anthesis (bloom presentation).
- **Vernalization** (from Latin vernus, "of the spring") is the induction of a **plant's** flowering process by exposure to the prolonged cold of winter, or by an artificial equivalent.

THERE ARE OLIVE ORCHARDS IN TEXAS THAT HAVE NEVER SEEN MORE THAN ONE OR TWO FRUIT IN 10+ YEARS.

- Some of this is poor management—heavy soil, lack of weed control and fertilizer, etc.
- Some of this is winter injury to trees.
- Some of this is frost injury to differentiated flower buds.
- Some of this is varietal and pollination failure.
- Some of this is lack of vernalization from excessive warm temperatures/lack of cool temperatures.



# DENNEY'S COMPARISON OF LOCATIONS

Region	Comp days	Damage Index
Greece	90-180	0.0-0.73
Israel	90-120	0.0-0.18
Spain	120-170	0.05-0.11
California	90-160	0.12-0.28
Weslaco, TX	10	0.37
Kingsville, TX	20	0.65
Carrizo Spgs, TX	60	0.06
Goliad TX	70	0.50
Austin, TX	110	0.41
Lufkin, TX	110	0.64
Fredericksburg, TX	110	1.31



# DEL RIO CASE STUDY

- Grower: Tommy Qualia, Val Verde Vineyard.
- Cultivar: Arbequina, Mission (11-14 years old).
- Began fruiting after third year
- Consistent fruiting every year.....
- Until 2017
- 22 F on Jan 7 knocked off 10% of the leaves

What Happened??

A photograph of a dirt path running through an olive grove. The trees are green but appear to be without fruit. The text "2017—No Crop (no flowers; not one olive)" is overlaid in yellow.

**2017—No Crop (no flowers; not one olive)**

# DEL RIO WEATHER: 2016 VS 2017

	<b>Jan Max Temp</b>	<b>65</b>	<b>70</b>
	<b>Min</b>	<b>39</b>	<b>42</b>
	<b>Avg Daily</b>	<b>52</b>	<b>56</b>
	<b>6-day interrupt</b>	<b>0</b>	<b>0</b>
	<b>Feb Max Temp</b>	<b>75</b>	<b>77</b>
	<b>Min</b>	<b>46</b>	<b>48</b>
	<b>Avg Daily</b>	<b>60</b>	<b>63</b>
	<b>6-day interrupt</b>	<b>0</b>	<b>0</b>
	<b>Mar Max Temp</b>	<b>78</b>	<b>79</b>
	<b>Min</b>	<b>54</b>	<b>58</b>
	<b>Avg Daily</b>	<b>66</b>	<b>69</b>
	<b>6-day interrupt</b>	<b>0</b>	<b>1</b>
	<b>April Max Temp</b>	<b>83</b>	<b>84</b>
	<b>Min</b>	<b>60</b>	<b>60</b>
	<b>Avg Daily</b>	<b>72</b>	<b>72</b>
	<b>6-day interrupt</b>	<b>0</b>	<b>0</b>
	<b>Optimal 61-66</b>	<b>15</b>	<b>8</b>
	<b>Chill hours</b>	<b>460</b>	<b>322</b>
	<b>JD C Days</b>	<b>7</b>	<b>8</b>

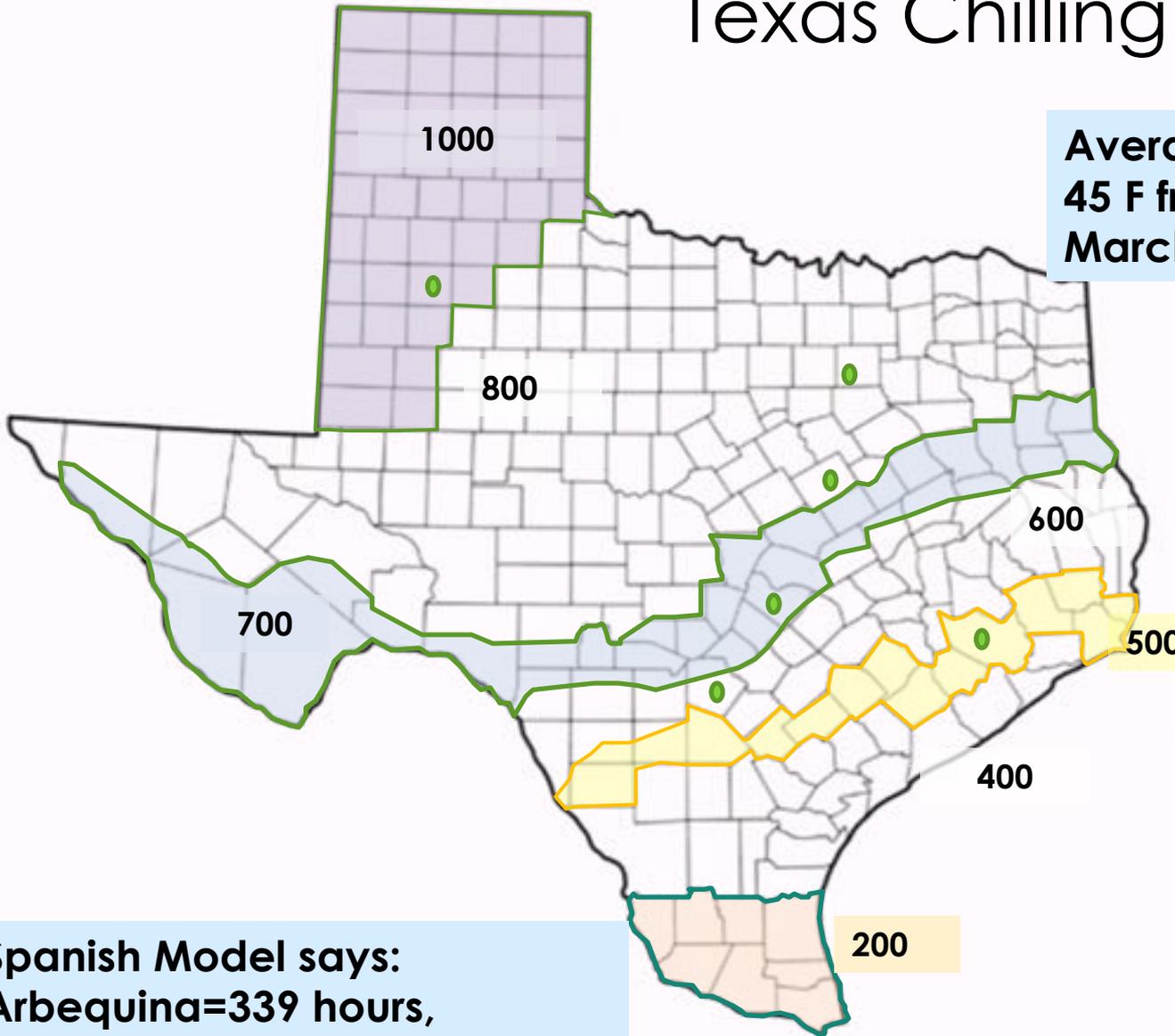
2018=615 hrs to date

# SPANISH MODEL, VERIFIED IN ARGENTINA

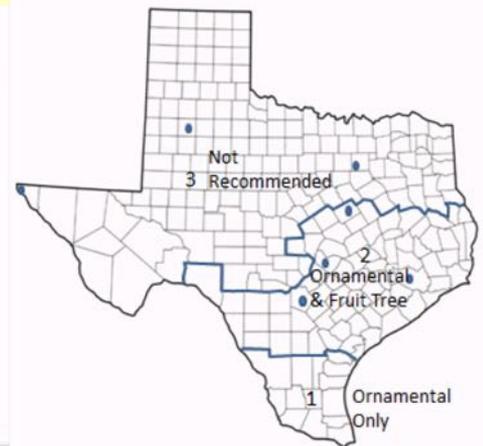
- De Melo-Abreu, J.P., D. Barranco, A.M. Cordeiro, J. Tous, B.M. Rogado, F.J. Villalobos. 2004. Modeling olive flowering date using chilling for dormancy release and thermal time. J. Agric. And Forest Meteorology 125:117-127.
- Chilling is necessary to satisfy dormancy release and heat accumulation to stimulate budbreak.
- Calculate chill hours from October , with an optimum chill temp. of 45 F. At 69+ F, chill units are lost at an X portion/hr. rate.
- Arbequina=339 hours, Picqual=469; Hojiblanca=494
- **If hours of heating after Feb. 1, force bud growth, without adequate chilling, no flowering occurs.**

# Texas Chilling Regions

Average Hours below 45 F from November to March.



Spanish Model says:  
Arbequina=339 hours,  
Picqual=469; Hojiblanca=494

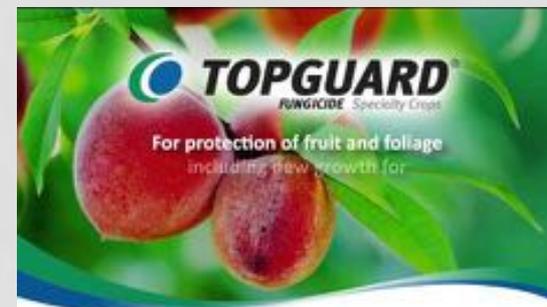


# CONTINUED VARIETY STUDY IS NEEDED

- The “Sisters Olive Trees of Noah” of Becheleah, Lebanon
- Planted 6,000 Years ago at 4,265 ft elevation.
- Collected & Introduced to U.S. by Olive Grove Partners (Texas), propagated by Novavine (CA)



## Cotton root rot, Fayette County, 2016



Labeling for olives  
needed via IR-4.

# PHYTOPHTHORA ROOT ROT



Clay soils, no berms, irrigation at the trunk and heavy rains

# OTHER POTENTIAL PROBLEMS

- Verticillium & Fusarium Wilts—Not confirmed in Texas
- Olive Knot (*Pseudomonas syringae*)—
  - **First Find in 2015-Hays County**
  - **Second Possible Find in 2016**
- Black Scale; first observed in Goliad, July, 2014; since found in numerous orchards



# CONCLUSION

- Texas extra virgin olive oil is a high quality product that competes on the world stage with its health benefits and culinary attributes.
- Harvesting, milling and bottling of olive oil beyond the boutique level is capital-intensive, so consistent production will be essential to sustainability.
- The sustainability of olives in Texas depends on varieties that bear consistent crops in Texas' inconsistent climate.
  
- Email: [MLNesbitt@tamu.edu](mailto:MLNesbitt@tamu.edu)