



Growing Olives in Texas

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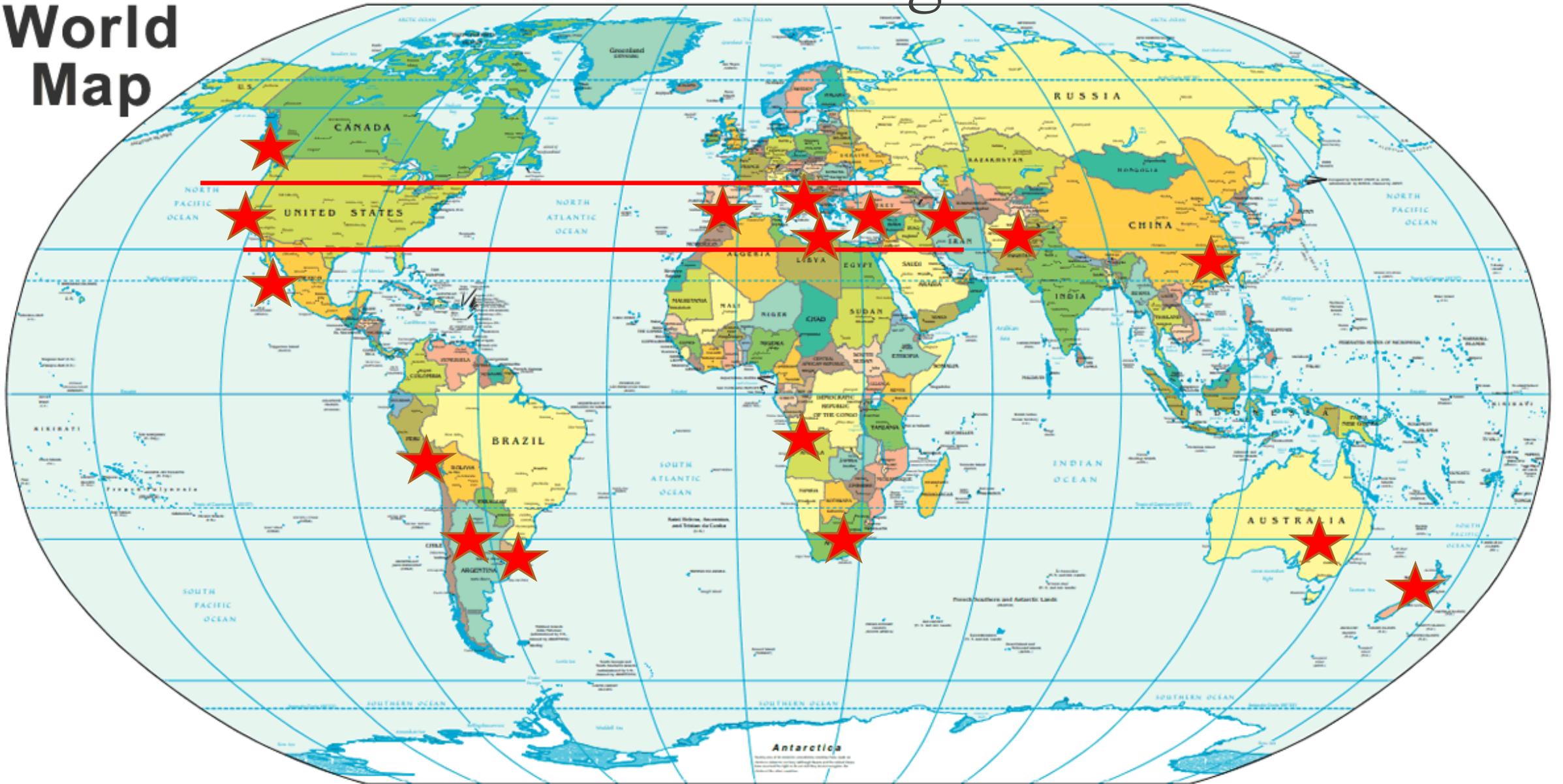
EXTENSION PROGRAM
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TEXAS A&M AGRILIFE
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DEPARTMENT OF
HORTICULTURAL SCIENCES

Where are olives grown?

World Map



Growing Olives in Texas

This is a Mediterranean tree

WE DO NOT HAVE A MEDITERRANEAN CLIMATE

- However, work by Denney suggests we might have a climate somewhat suitable, but could expect damage, depending on location.

The way olives are grown in Spain, California etc. WILL NOT WORK HERE.

The streets of
Davis, California...



Plenty of Challenges

- Freezing weather
 - Made worse by warm temperature interruptions
 - *“The average frequency of kill damage for these sites is 0.03, suggesting a mathematical - though not necessarily a climatological -- risk of tree death down to the crown once every 33 years.” Denney, 1984*
- Cotton Root Rot
- Inconsistent fruit set
 - Why?
 - Vernalization? Warm temp interruption? Poor farming?

But plenty of reasons for optimism

- We lack many problems faced by olives in traditional production areas:
 - NO olive knot disease
 - NO peacock spot disease
 - NO olive fly
 - Very few insect and disease pests
- Reasons for optimism:
 - Cheaper land
 - Available water
 - Fewer regulations
 - GOOD CROPS HAVE BEEN PRODUCED HERE

Basics of Growing Olives

➤ Soil:

- well drained

- pH 5.5 - 8.0

- Olives seem to prefer higher pH, more calcium

- Plant on berms unless VERY well drained

Not terribly
deep-rooted

Grown from
rooted cuttings





Vernalization needs

- ❑ “Chilling” vs. Vernalization
- ❑ Publications around the world claim olives need “chilling.”
 - ❑ This is incorrect
 - ❑ If it were, olives would fruit somewhat consistently in the Rio Grande Valley

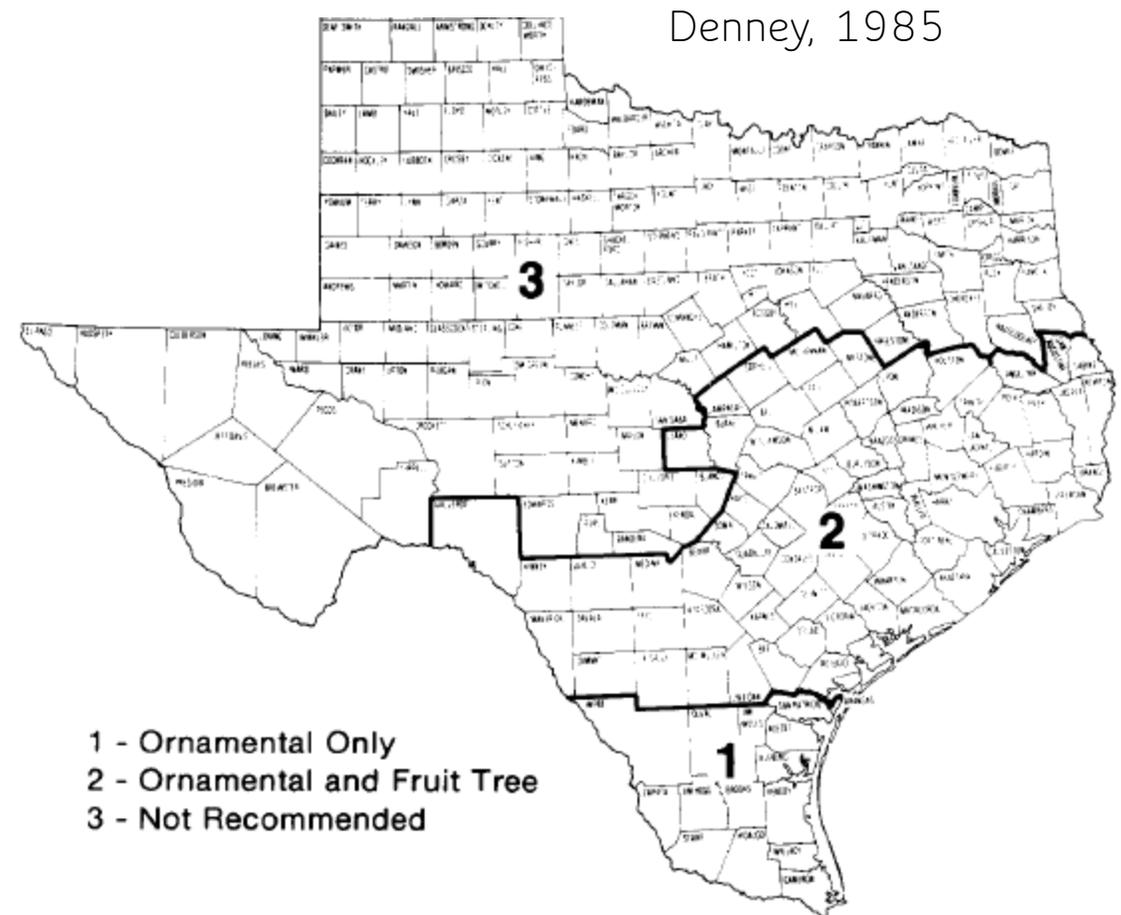


Fig. 7. Recommendations by counties for olive culture in Texas based on thermal adaptability model only.

Modelling olive flowering date using chilling for dormancy release and thermal time

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- ❖ Accurate for Arbequina in Portugal
- ❖ Mostly accurate for Arbequina in Argentina
- ❖ Applied to Texas, winter of 19-20
 - ❖ Predicted NO FLOWERING

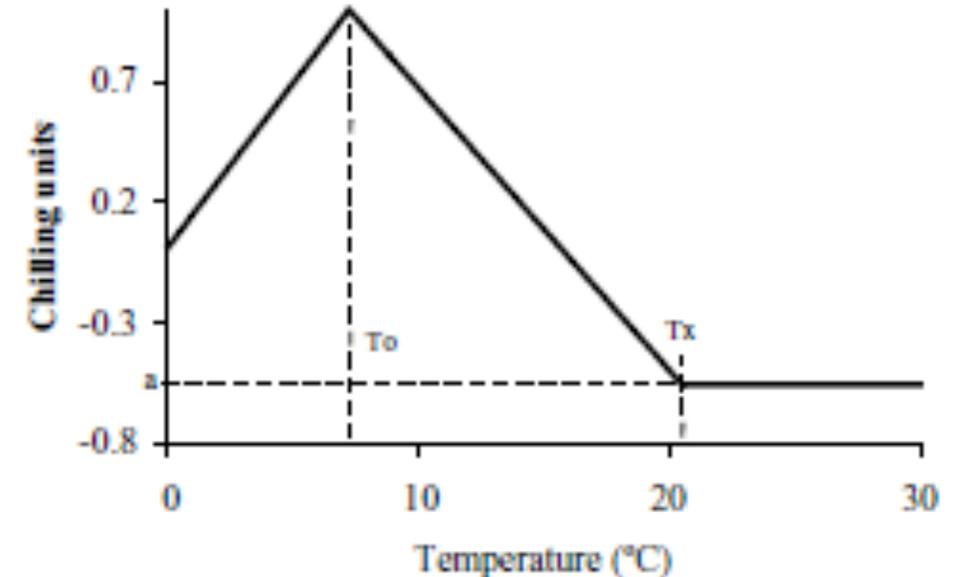


Fig. 1. Proportion of a chilling unit in response to an hour at different air temperatures (°C), according to Model 1.

Water

Olives are drought tolerant

Xerophytes/Drought endurers/ tolerate desiccation

- Plants that can tolerate dehydration, sometime for very long periods.
- Examples: mosses, some ferns, resurrection plant (*Selaginella lepidophylla*), some desert grasses, olive tree, sagebrush, and creosote bush.

– <http://www.youtube.com/watch?v=2ebZao6-GiY>



Drought tolerance mechanisms

Trichomes on leaves



Research paper

Correlations between morpho-anatomical changes and radial hydraulic conductivity in roots of olive trees under water deficit and rewatering

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The effects of prolonged drought were studied on olive (*Olea europaea* L.; drought-sensitive cultivar Biancolilla and drought-tolerant cultivar Coratina) to examine how morpho-anatomical modifications in roots impact on root radial hydraulic conductivity

Suberization of roots

Water needs

- ET = Evapotranspiration
- Reference ET: mowed grass sod
- Mature olive orchard: ~75% ET
- Regulated Deficit Irrigation (~60-70% olive ET) during oil synthesis
 - After pit hardening
 - Reduced vegetative growth?

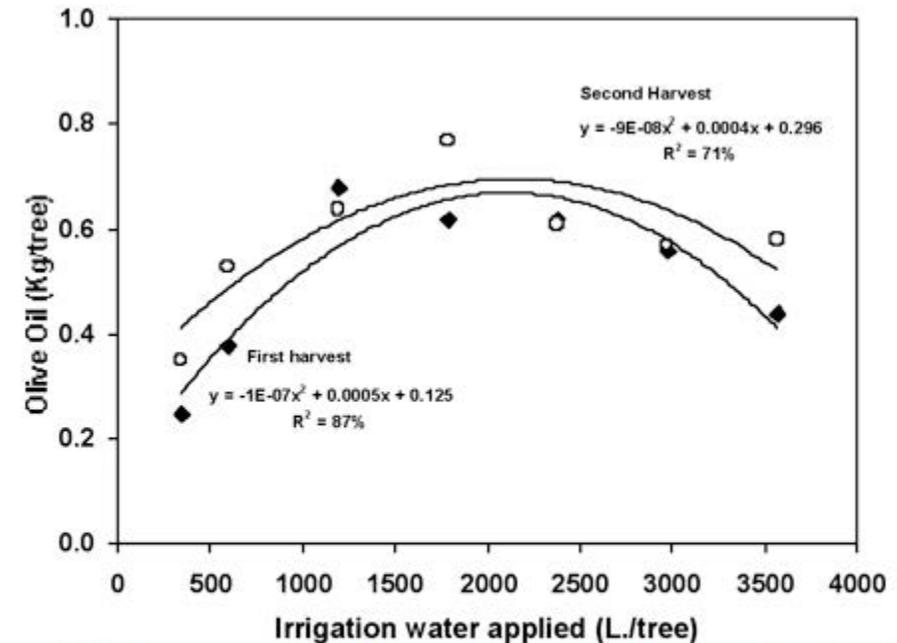


Fig. 2. Figure 2. Total olive oil production per tree is optimized roughly between 40 and 70% ETC.

Source: [Grattan et al, 2006.](#)

How much should I irrigate my trees?

- IT DEPENDS
 - On your soil
 - Tree age
 - Weather
 - Fruit load
 - Your irrigation system
- Million dollar question: How much water does your irrigation system apply?
 - If you don't know, you can't know how to irrigate.

Texaset.tamu.edu

[Why create a profile?](#)

Yesterday's Weather Summary

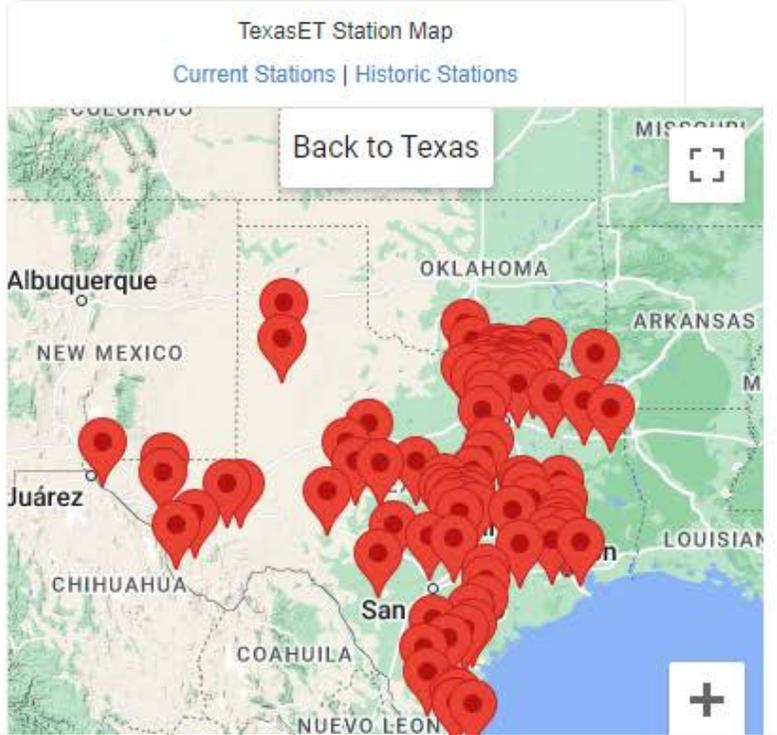
| Station | ETo (in) | Max Temp (f) | Min Temp (f) | Min RH (%) | Solar Rad. (MJ/m2) | Rainfall (in) | Wind 4am (mph) | Wind 4pm (mph) | Battery (v) |
|-----------------------|----------|--------------|--------------|------------|--------------------|---------------|----------------|----------------|-------------|
| Coastal Bend | | | | | | | | | |
| Corpus Christi | 0.21 | 88 | 64 | 35 | 20.51 | 0.00 | 3.69 | 6.05 | |
| Dickinson | 0.16 | 80 | 65 | 26 | 19.93 | 0.00 | 1.46 | 3.60 | |
| Driscoll | 0.19 | 89 | 61 | 32 | 19.67 | 0.00 | 0.00 | 10.29 | |
| Freer* | 0.21 | 88 | 63 | 25 | 22.93 | 0.00 | 4.83 | 3.28 | |
| Garwood* | 0.20 | 87 | 56 | 26 | 22.45 | 0.00 | 2.25 | 5.46 | |
| Goliad* | 0.18 | 89 | 57 | 24 | 22.49 | 0.00 | 0.66 | 4.15 | |
| Hebbronville* | 0.11 | 88 | 61 | 29 | 0.00 | 0.00 | 4.85 | 5.21 | |
| Houston | 0.16 | 84 | 60 | 22 | 20.14 | 0.00 | 3.03 | 2.07 | |
| Jersey Village | 0.18 | 85 | 65 | 17 | 21.10 | 0.00 | 0.01 | 3.16 | |
| Kingsville* | 0.21 | 89 | 61 | 29 | 23.52 | 0.00 | 3.17 | 1.78 | |
| Refugio* | 0.13 | 88 | 57 | 33 | 22.87 | 0.00 | 0.00 | 0.00 | |
| Richmond North | 0.16 | 84 | 56 | 22 | 19.78 | 0.01 | 0.00 | 2.86 | |
| Richmond South | 0.14 | 85 | 62 | 20 | 20.69 | 0.00 | 0.20 | 2.62 | |
| Sinton* | 0.22 | 88 | 57 | 0 | 22.86 | 0.00 | 3.56 | 4.82 | |
| Spring | 0.14 | 84 | 62 | 20 | 21.35 | 0.00 | 0.00 | 3.70 | |
| Victoria County West* | 0.18 | 89 | 60 | 23 | 22.25 | 0.00 | 2.68 | 0.64 | |
| East Texas | | | | | | | | | |
| Ben Wheeler* | 0.20 | 78 | 58 | 30 | 22.03 | 0.00 | 4.23 | 5.97 | |

Current stations:

Select a station ...

Historic stations:

Select a station ...



Water

- One thing is certain:
 - Olives must have plentiful water starting 6-8 weeks prior to bloom and through fruit-set

Olive Fruiting Behavior

1953

**soil moisture during floral development studied
for possible effect on fruitfulness in olive trees**

H. T. Hartmann and R. M. Hoffman



Fertility

- ❖ California: no deficiencies except nitrogen and potassium
- ❖ Texas: sulfur, zinc, magnesium, phosphorus, potassium, nitrogen deficiencies
- ❖ Most important: Nitrogen, potassium, calcium, boron
- ❖ Suggest elevating boron to the higher end of the sufficiency range

Olive leaf nutrition sufficiency levels—*adapted from multiple sources***

| Element | Sufficient | Excessive |
|----------------|--------------|-----------|
| Nitrogen (N) | 1.5 to 2.0 % | >3.0% |
| Phosphorus (P) | 0.10-0.30% | >0.50% |
| Potassium (K) | 0.70-1.25% | >2.0% |
| Calcium (Ca) | 1.0-1.70% | >3.00% |
| Magnesium (Mg) | 0.10-0.30% | >0.70% |
| Sulfur (S) | 0.08-0.16% | >0.32% |
| Sodium (Na) | | >0.20% |
| Chlorine (Cl) | | >0.5ppm |
| Copper (Cu) | 6-20 ppm | >80 ppm |
| Boron (B) | 19-150 ppm | >185 ppm |
| Zinc (Zn) | 10-30 ppm | >80 ppm |
| Manganese (Mn) | 20-50 ppm | >164 ppm |
| Iron (Fe) | 50-200 ppm | >400 ppm |

*Values presented here have been assimilated from California and other countries (Spain, North Africa).

Basic Farming

- Weed control
- Scouting for pests
- Checking irrigation system



Farming olives for Texas

- Addressing the challenges

- Freezing

- Cotton root rot

- Inconsistent production

Farming olives for Texas

- Freezing

- Variety selection

- Location selection

- Farming:

- In late summer:

- NO more water

- NO more fertilizer

- NO pruning





Farming olives for Texas

- ❖ Cotton Root Rot
 - ❖ Location selection
 - ❖ Flutriafol?

Farming olives for Texas

- ❖ Inconsistent production

- ❖ Warm temp interruption?
- ❖ Loss of dormancy?
- ❖ Poor farming

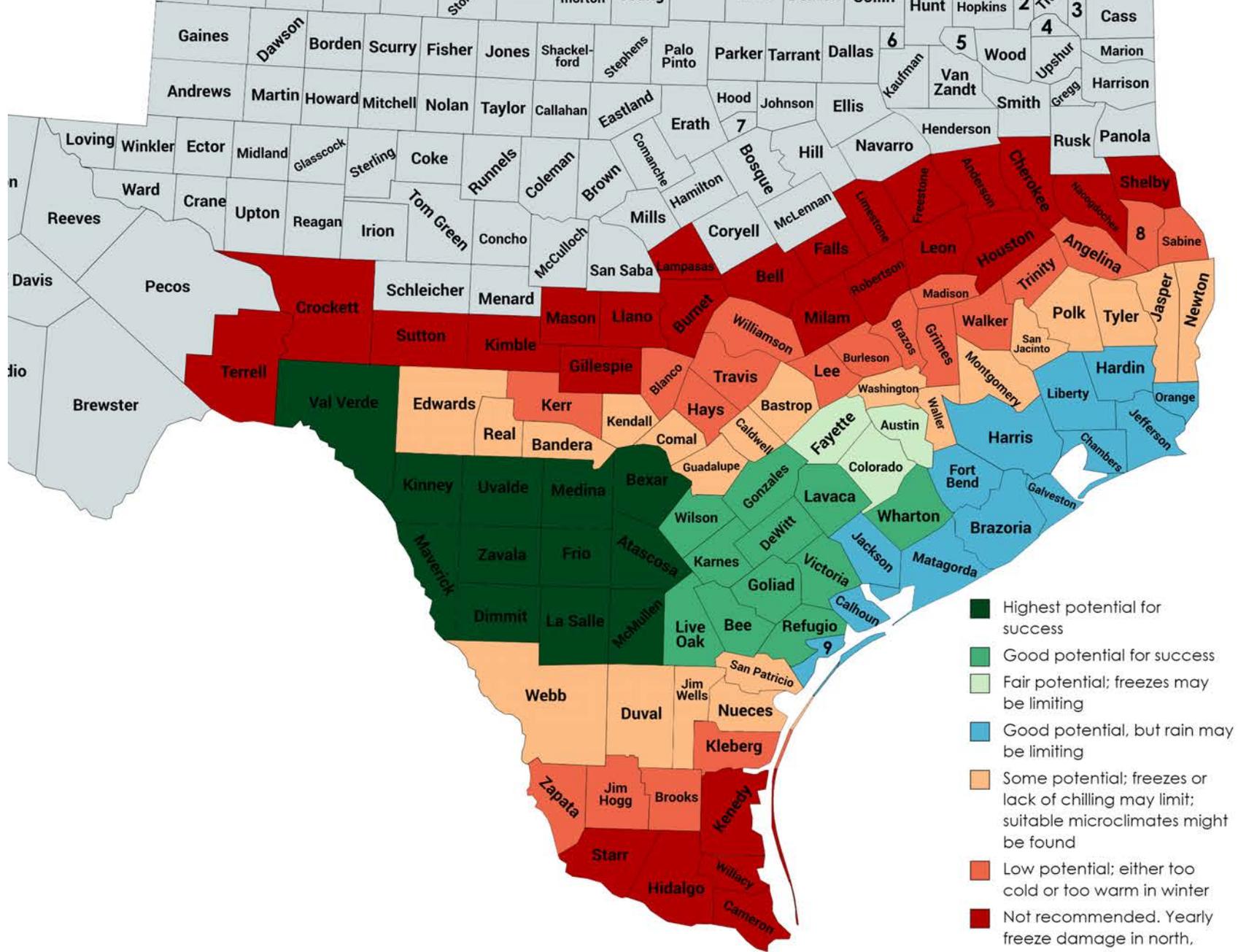
- ❖ You must help the olive tree go dormant

- ❖ No water
- ❖ No fertilizer
- ❖ No pruning
- ❖ Stress?



Ma Nature will throw curveballs

How will you handle it?



- Highest potential for success
- Good potential for success
- Fair potential; freezes may be limiting
- Good potential, but rain may be limiting
- Some potential; freezes or lack of chilling may limit; suitable microclimates might be found
- Low potential; either too cold or too warm in winter
- Not recommended. Yearly freeze damage in north, winters too warm in south

Opinion

Outlook

- The last two years were tough. Outliers?
- Seemed promising prior to 2021
- Many are still optimistic
- On the cusp of much more research, investment in TX olives?
 - Next
- AgriLife Extension cannot say for certain that olives can be sustainable and profitable in Texas.
 - More work is needed
- Based on what I've seen and my scientific knowledge, I believe it can be.



Photo courtesy of: Texana Olive Ranch