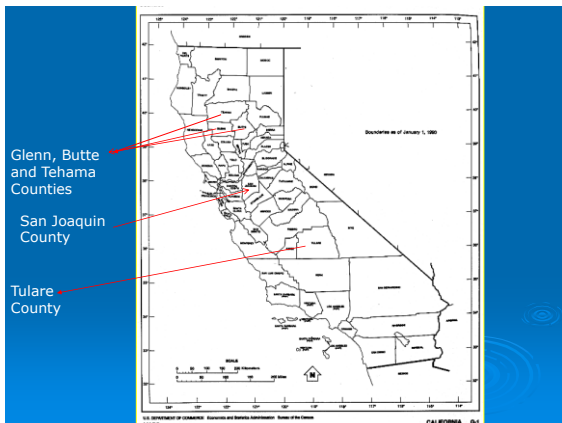


# Olives 101 September 2011

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## Characteristics of the California Olive Industries

- California produces 99% of US Olives 16,000 to 165,000 tons per year
- 25,000 acres in the Central Valley, declining.
  - 2/3 in the San Joaquin Valley (Tulare County).
  - 1/3 in the Sacramento Valley (Tehama, Glenn and Butte Counties).
- 25,000 acres table vs. 25,000 oil
- 95% of table olive are black ripe style



## Climatic Considerations

- Mild Winters- less than 20 degrees F can result in winter injury
- Long, warm dry summers – rain during the summer can result in leaf diseases
- Winter temperatures between 35 and 65 are ideal for supplying necessary winter chilling



## Propagation

- Leafy cuttings with hormone treatment and misting
- 12 to 18 months
- Micro propagation – 12 months
- Truncheon- wood 1-3 inch dia by 6 inches



## Freeze Injury

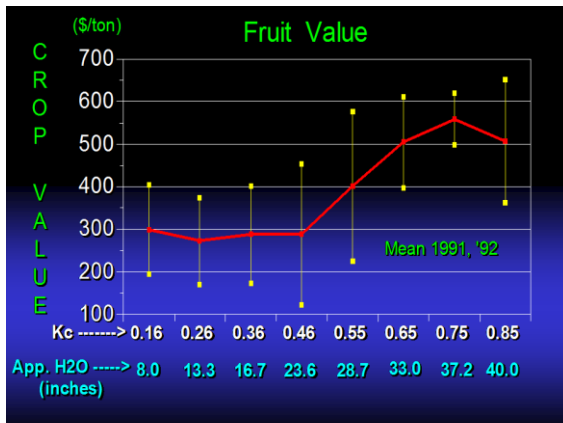


## Factors Effecting Freeze Severity

- Cold temperatures and the duration of freezing
- Acclimatization
- Variety- **Manzanillo** most susceptible followed by Sevillano, Ascolano, Baroni and Mission
- Tree age
- Irrigation
- Time of Pruning
- Previous Crop load

## Irrigation

- Traditional
  - Flood
- Currently
- Micro irrigation
  - Drip
  - Micro sprinklers
- Crop coefficient – Kc .75 of reference ET<sub>o</sub>



## Olive oil Irrigation Summary

- ✓ To optimize olive oil production, don't fully irrigate trees
- ✓ Oil production is optimized between 40 and 70% ET<sub>c</sub>
  - Best production is at the high end of this range
  - Best oil quality is at the lower end
- ✓ Full irrigation increases pumping costs, promotes unnecessary vegetative growth, can reduce flowering, and increases pruning costs

## Bearing Habit fruit born on last years shoots

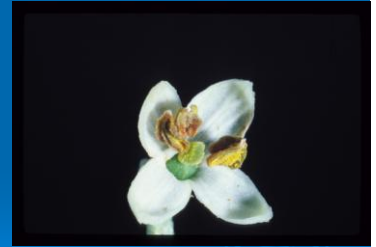


## Pruning to Control Alternate Bearing



## Pollination

Many Olive Varieties are partially self compatible, they will benefit from cross pollination when conditions are less than ideal for example isolated Manzanos will benefit from cross pollination from Sevillano



## Parthenocarpic Fruit Set



## Fertility

- Nitrogen- 100 to 150 lbs N per Acre per year (1/2 to 1.5 lbs/tree).
- Potassium deficiency, rare, corrected with annual or mass doses of K<sub>2</sub>SO<sub>4</sub> or KCl- 5 to 20 lbs/tree banded on soil surface
- Boron deficiency-rare (foothills) corrected with soil or foliar application

## Nitrogen Deficiency



## Potassium Deficiency







### Boron Deficiency ---

- Defective fruit, a "monkey face" symptom
- Premature fruit drop



### Olive Knot *Pseudomonas syringae, pv. savastoni*



### Developing Olive Knot



## Hail Damage



## Olive Knot Variety Susceptibility

- **Very susceptible** – **Manzanillo**, Arbequina
- **Susceptible** – Empeltre, Sevillano, Hojiblanca, Koroneiki, Moraiolo, Penedolino, Picual
- **Resistant** – Ascolano, Blanqueta, Frantoio, Leccino, Mission

## Peacock Spot symptoms



## Peacock Spot Variety Susceptibility

- **Very susceptible** – **Mission**, Blanqueta, Cornicabra, Empeltre, Picual
- **Susceptible** – Aglandou, **Arbequina**, Sevillano, Manzanillo, Pendolino, Picudo
- **Resistant** – Beauteillan, Cayon, Coratina, Leccino, Maurino, Moraiolo
- **Very Resistant** – Frantoio, **Arbosana**, **Koroneiki**

## Control-Continued

- Use same materials for both diseases
- Copper Sprays
- Timing-preventative
- More sprays are better
- Central Valley recommendation- 2 sprays, fall and spring.
- Fall for Peacock Spot spring for olive knot
- Spray after injury which creates openings

## Verticillium Wilt

•Soil borne fungus

•Survive in the soil as microsclerotia – 30 yrs. Moved with soil or infected plant part

•Grow into root and plug vascular tissue resulting in wilt

•Infections in cool moist soil in winter

•Symptoms in spring and summer





## Verticillium Wilt Variety Susceptibility

- **Very susceptible** – Arbequina, Cornicabra, Hojiblanca, Picual, Picudo
- **Suceptible** – Kalamata, Leccion, Manzanillo, Mission, Maraiolo, Pendolino
- **Resistant** – Aglandou, Ascolano, Koroneiki
- **Very resistant** – Oblonga, Empeltre, Frantoio

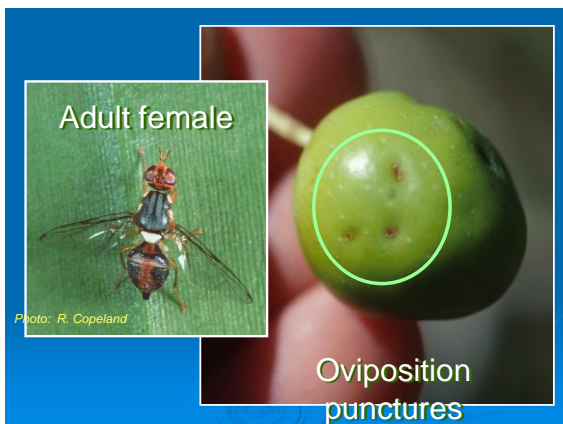
## Insects

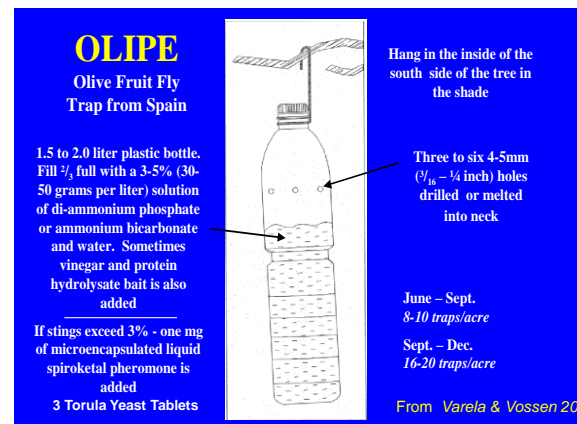
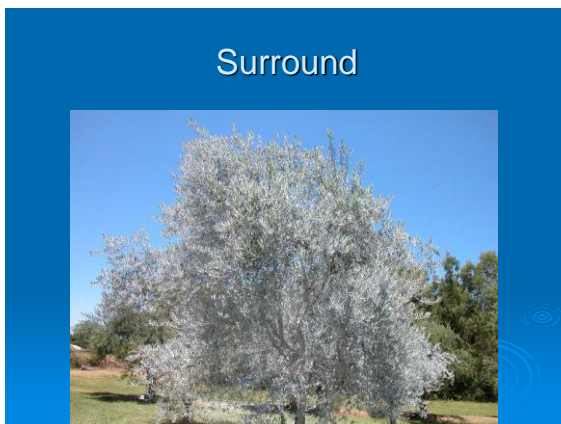
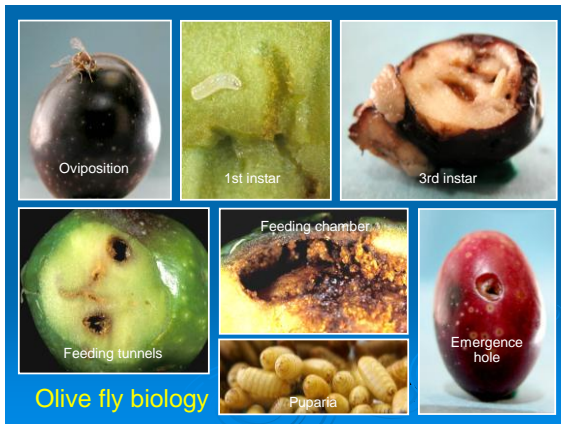
- Olive Fly
- Black Scale



## Olive fly in California

- First detected in 1998 in Los Angeles County
  - **Blue:** 1998
  - **Yellow:** 1999
  - **Orange:** 2000
  - **Green:** 2001
  - **Purple:** 2002





## Black Scale Damage

- Suck sap from tree- honeydew
- Sooty mold
- Reduces photosynthesis and respiration
- Can reduce fruit bud formation, cause leaf drop and dieback



## Black Scale Crawlers



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## Pre-ovipositional-rubber stage



15.8

## Control

- Biological
  - Don't disrupt
  - Promoted by open airy canopy
- Spray crawlers with oil
  - Monitor for crawler emergence with 2 sided sticky tape

## Biological Control

*Scutellista cyanea*



Control ants-deny access to tree  
Cool environment is preferable

*Metaphycus helvolus*



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## Oil/ and or Insecticide Treatment

- Crawler emergence (July 1) to Aug. 1
  - To prevent damage to subsequent crop
- Post Harvest
  - Until scale develops to rubber stage
  - Light to moderate populations

## Varieties

- Manzanillo
- Sevillano
- Ascolano
- Mission
- Barouni
- Kalamata

## Manzanillo

Spain - 1875  
 Low spreading growth  
 Frost sensitive  
 Susceptible to olive knot disease  
 Alternate bearing  
 Roots easily-rooted cuttings on own root  
 Partially self incompatible



## Manzanillo Fruit

Most popular variety  
 Oval and uniform in size  
 Medium size ave. 4.8 grams, 6/oz.  
 Freestone  
 Good flesh to pit ratio 8.2 to 1  
 20% oil



## Manzanillo Uses

- Lye cured – black and green ripe
- Spanish style – Lye + fermentation
- Fermented
- Oil



## Sevillano (Gordal)

- Spain (Seville) 1885
- Approximately 20% of acreage
- Moderate vigor
- Moderately susceptible to olive knot
- Resistant to peacock spot
- Difficult to root – grafted tree (Mission)
- Alternate bearing
- Used to pollinate Manzanillo

## Sevillano Fruit

Ovate to elongated oval  
 Large – ave. 13 grams, 2 -3/oz.  
 Harvest green – Oct.  
 Clingstone  
 Flesh to pit ratio 7.3 to 1  
 Parthenocarpic fruit set – Shot berries  
 Low oil – 12%  
 Soft when ripe



## Uses for Sevillano

- Canned ripe (Lye cured) – black or green
- Green
  - Lye + fermentation – Spanish
  - Fermented – Sicilian
- Oil for blending

## Ascolano

Italy – 1885  
 Vigorous rounded shape  
 Cold hardy  
 Regular bearer  
 Disease resistant  
 olive knot  
 peacock spot  
 some resistance to verticillium wilt  
 Vegetatively propagated – own root



## Ascolano Fruit

Round to oval  
 Large 10-11 grams, 2.5 to 3/oz.  
 Freestone  
 Good flesh to pit ratio 8.2 to 1  
 Soft fruit shows bruises  
**Uses-** black and green ripe  
           fermented green ?  
           oil



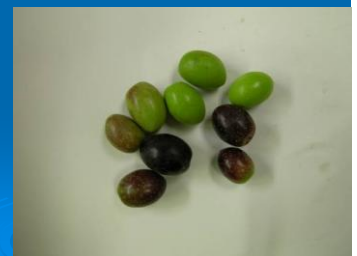
## Mission

Selected at Spanish missions  
 Brought from Mexico in 1769  
 Vigorous upright tree  
 Cold hardy – has survived lows of 8 degrees F.  
 Susceptible peacock spot  
 Resistant to olive knot  
 Medium rooting- propagated by cuttings on own root



## Mission Fruit

Broad oval, elongated slightly pointed  
 Small to medium size – ave. 4.1 grams, 6 to 7/oz.  
 Flesh to pit ratio 6.5 to 1  
 Late maturing – Nov. to Dec.  
 Firm when ripe and bitter  
 Freestone  
 22 % oil



### Mission Uses

- Green and black ripe
- Salt dried
- Oven dried
- Naturally fermented
  - Green
  - Black
- Oil



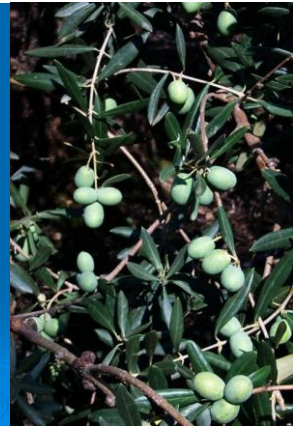
### Barouni

**Tree** – small and spreading, cold resistant, Regular bearing, susceptible to olive knot Somewhat resistant to peacock spot

**Fruit** – oval to elongated, large, Flesh to pit ration 6.8 to 1 Oil content 16.5%

Harvest- mid Oct. to early Nov.

**Uses** – fresh market for home curing, Black ripe, green fermented?



### Kalamon (Kalamata)

Source – Greece

Upright extremely vigorous tree

Susceptible to peacock spot and moderately susceptible to olive knot

Medium cold hardiness

Flowers later than Manzanillo, Sevillano and Mission

Mediumn to low rooting – propagated on rootstock – Mission or Frantoio



### Kalamon Fruit

Medium size

Asymmetric and elongated and pointed

Firm fruit holds up in processing

Freestone

Harvest when black – Nov. to Dec. depending on crop load.

Risk – light frost can cause the fruit to shrivel

Oil – medium per cent



### Kalamon – Uses

- Greek style black olive brine cured fermented
- Oil



### Arbequina Olives



Spain  
Small  
Clingstone



