

A stylized, colorful illustration of a landscape. The background features wavy bands of blue and white, suggesting a sky or water. In the foreground, there are rolling green hills with a dark brown path winding through them. On the left, there are two trees: one with green foliage and one with purple foliage. A small red bird is flying near the top left. The text 'Loving our Citrus' is written in a large, brown, serif font, and 'How to care for our trees' is written in a smaller, brown, sans-serif font below it.

# Loving our Citrus

## How to care for our trees

Maggie O'Neill  
Lemon Blossom Heritage Farm  
Claremont Garden Club  
Sept 13, 2017

# Lemon Blossom Heritage Farm



- Keeping history alive for future generations
- Educate the public
- Feed my family
- My test garden

Carrying on the traditions of our  
grandparents, and great grandparents  
and so on







# San Bernardino County Master Gardeners

- ❖ Part of Agriculture and Natural Resources Division (UCANR)
- ❖ Volunteers educating the public by sharing peer reviewed research done by Univ. of Cali and other universities on a wide variety of topics





- Citrus action group, invasive pests
- San Bernardino Regional Seed Library(SBRSL )
- Answer any questions you may have

# Today's talk

- Healthy citrus, how to get there and how to maintain it
- Citrus greening disease

# Healthy citrus

- Selecting and Planting
- Watering
- Nutrients
- Mulching
- Pruning

# Selecting

- Size considerations, can get dwarf, semi dwarf, full sized
- Temperatures...less sugar in fruit, less cold tolerant
- Ripe fruit for every season?!





# Planting

- Dig hole approx. 2xs the size of pot
- Add some compost, don't make plant tooo comfy!
- Keep soil level at previous level
- Face “dog leg” north
- Plant in “N” to “S” orientation for row style planting
- Don't plant right now at all???









# Watering

- New trees: every 3 to 4 days
- Every 7 to 10 days, 14 if its cool
- Every day? Figure out ET rate, and divide(or call master gardeners and have them do it for you!!)

# Watering cont.

- Do not let young trees get dry
- Don't go into the summer or winter "dry"
- Keep water in mind when planting citrus next to something, like grass









# The “old “ days





Lawns rob citrus of water and nitrogen...







Don't give up!!  
It can live!

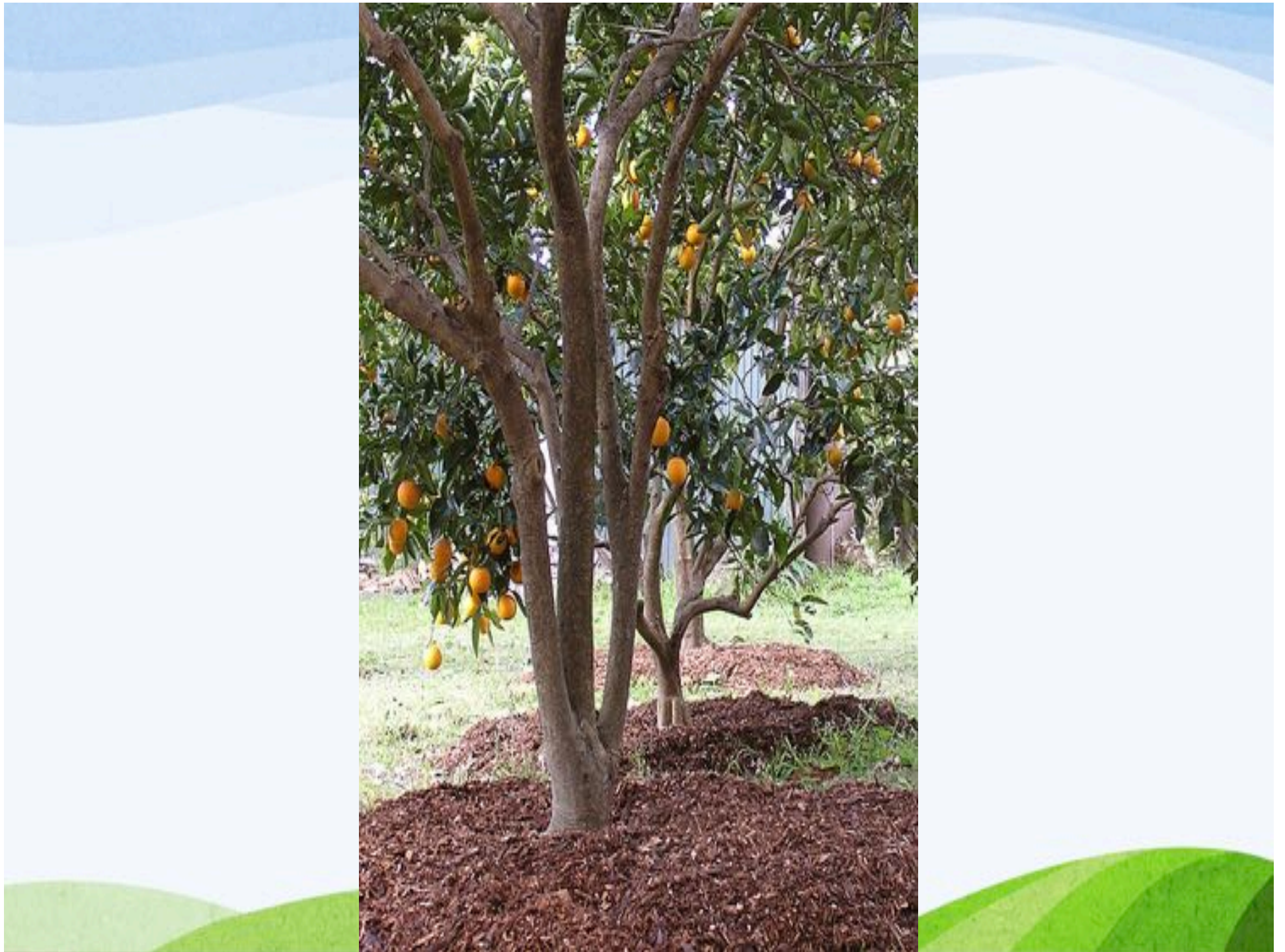




# Mulch!!!







# Pruning:

- Shape tree as it is growing
- Cut out dead and diseased wood
- Keep center of tree open, but be careful cutting outside and letting too much light in
- Can shape tree to desired size, hedge.....etc.
- Clean clippers between cutting, and when cutting diseased wood









# Cut out “suckers”

- Grow below the graft union
- Will grow quickly
- Have large thorns
- Often have “trifoliate” leaves









# Cut out “water sprouts”

- Grow very quickly
- Do not have good structure, so will not support fruit
- Takes energy away from rest of tree



# Of Special note:

- Mandarins and some others will produce well alternate years.....its not just your imagination!!!
- Can trim to reduce this effect

# Feeding

- Sulfate of ammonia, ammonia sulfate
- Separate micronutrients
- N-P-K
- Chemical or Organic fertilizer



# Feeding cont.

- Feed in the early spring and fall, before it gets hot/cold
- Feed evenly at drip line
- Do not feed stressed tree
- Don't feed when it is too hot or cold

# Nutrient deficiencies

- Nitrogen(N)
- Phosphorus (P)
- Potassium(K)
- Micronutrients: Iron, Zinc, Calcium, magnesium, manganese



# Nitrogen(N) Deficiency

overall pale yellow on older leaves, less fruit, smaller trees, less blossom



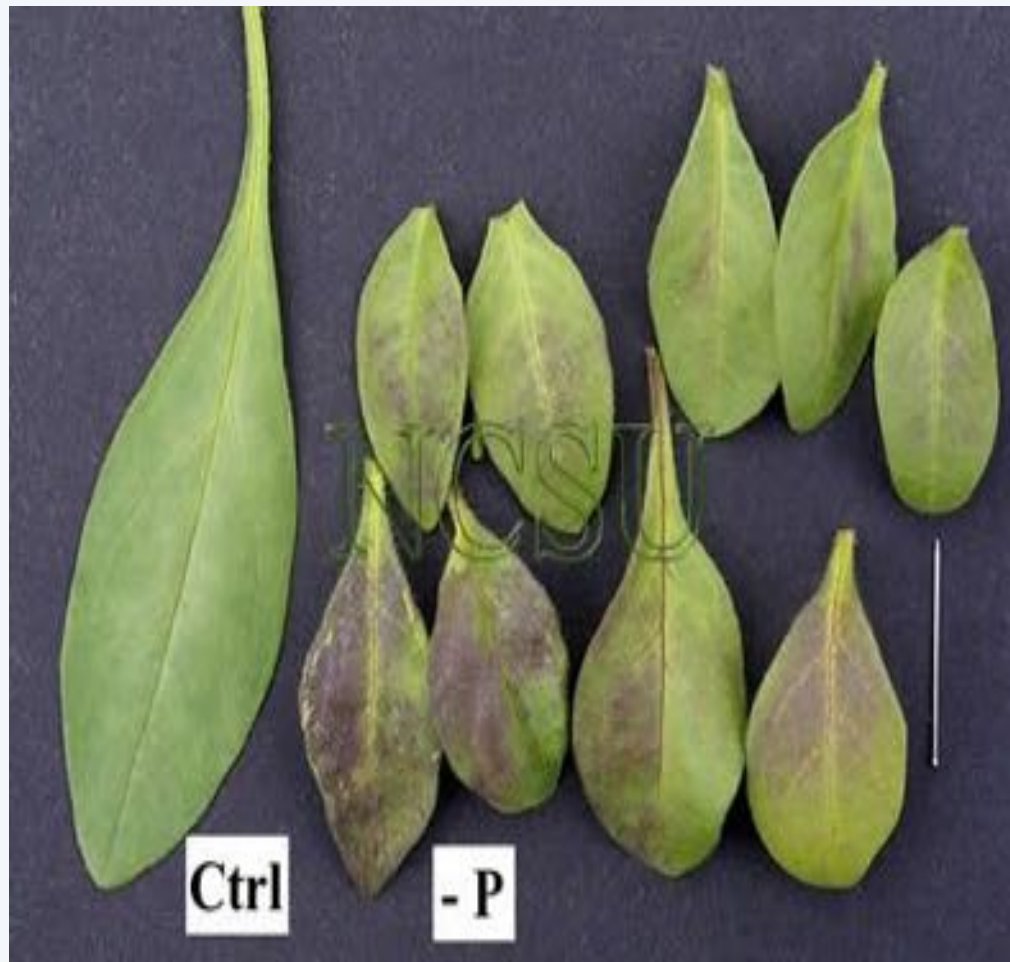
# Nitrogen deficiency





# Phosphorous (P) deficiency

appears in older leaves-small, bronze, margin die back ....less common in mature trees



# Potassium(K) deficiency

yellowing/bronzing on leaves with corkscrew like curling





# Manganese deficiency

green veins and pale areas in between



# Iron deficiency

yellowing between small green veins, newer growth



# Zinc deficiency

yellow mottling in between terminal leaves



UC Statewide IPM Project  
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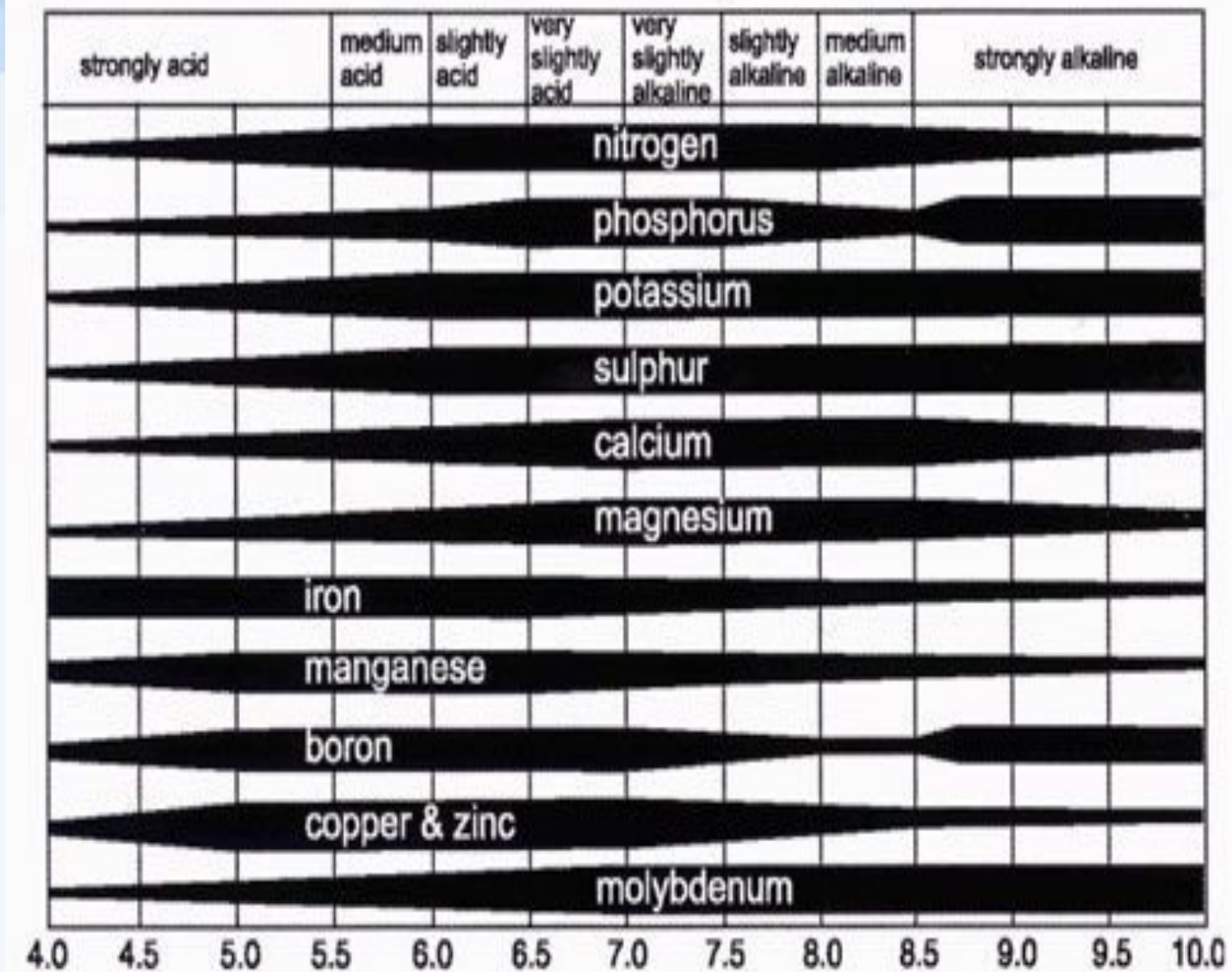
- Zinc, Iron and Manganese are immobile and deficiencies are seen on new growth.....symptoms appear very similar

# Calcium deficiency









# Common diseases:

- Quick decline, citrus tristeza virus
- Black spot
- Citrus canker
- Citrus scab

# Citrus quick decline





# Black spot



UGA1263092

# Citrus canker





# Citrus scab



# Common pests

- Leaf miners
- Scale red, black
- Mealy bug
- White flies
- Asian citrus psyllid
- Ants
- Mites

# Leaf miner





# Red and Black Scale





# White Fly





# Citrus mealybug





# Spider mites







# Rodents



# Master Gardeners can Help!!

- Contact your local county UCANR master gardeners, Los Angeles or San Bernardino county
- Ask questions about pest and disease identification and how to deal with it in the least toxic manner, using an IPM approach
- Ask questions about ET(evapotranspiration) rate and how much water your citrus really needs
- **Call their helpline or send them an email**

# Beneficials

- Lady bugs
- Lacewings
- Parasitic wasps
- .....and more, pollinators, birds....



# Citrus greening disease

- What is the disease
- How is it spread
- History of disease
- Where we stand right now
- What's happening in riverside
- What should we do in Claremont
- Why we shouldn't give up!???

# Citrus greening disease

- Huanglongbing disease, yellow dragon disease
- HLB
- Bacteria, Candidatus Liberibacter
- Originated in China

Kills trees within 3 to 5  
years of infection





# Fruit becomes misshapen and bitter





Fig. 11. Asymmetrical "lopsided" sweet orange fruit from São Paulo, Brazil.

Fig. 12. Mandarin from Fujian Province, China (PRC) displaying stylar end "lack of coloration," the characteristic leading to the common name for the disease "greening."



Gottwald et al. (2007)



# Huanglongbing (HLB) disease

## Huanglongbing in fruit



## HLB in trees







Hilda Gomez, USDA



**Healthy**



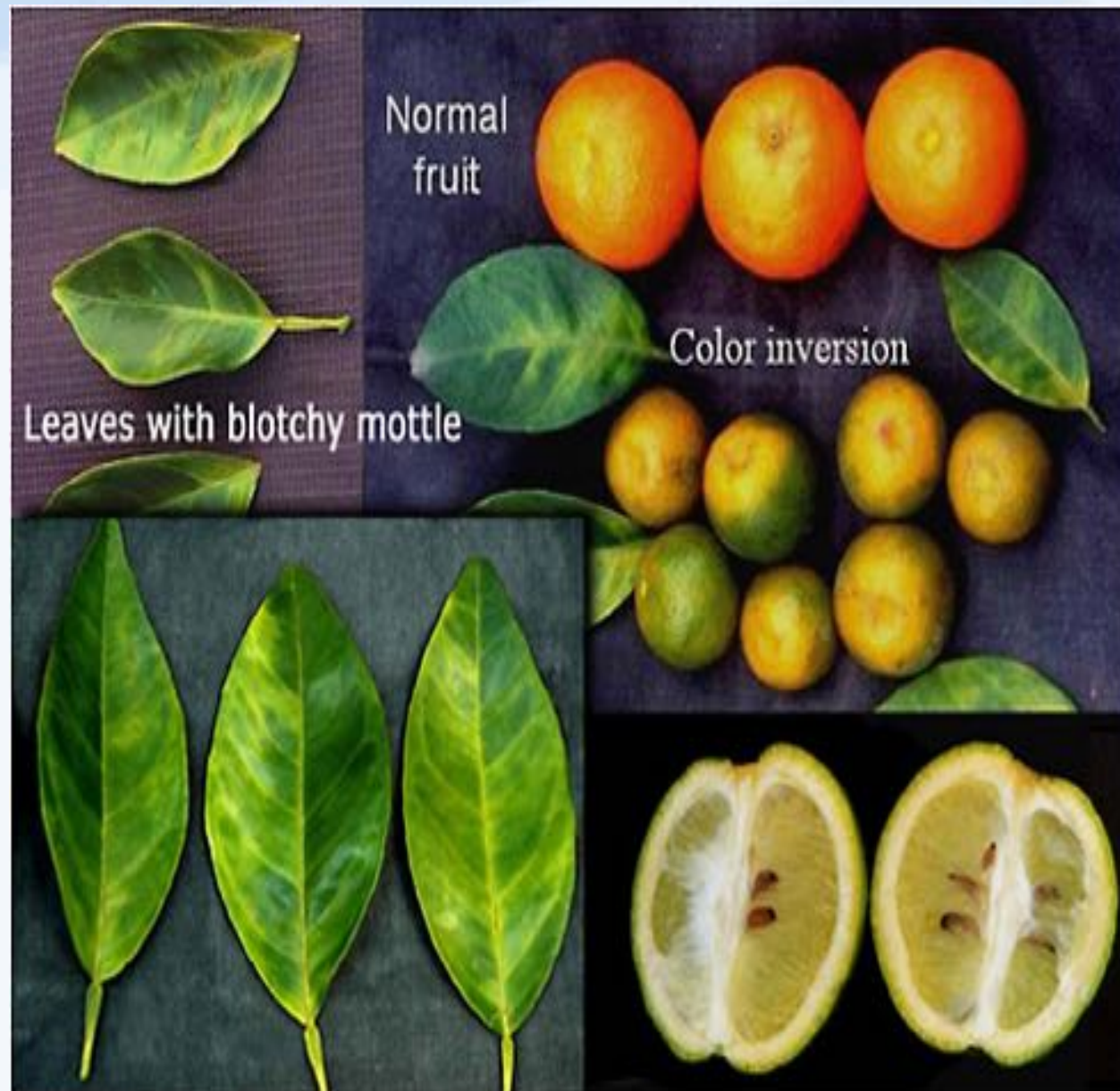
**HLB**



**Zn Deficient**



**HLB & Zn Deficient**





# Disease infects all citrus

- Oranges
- Lemons
- Limes
- Kumquats
- Tangerines
- Grapefruits
- Citrons
- **Alsoooooo.....Orange Jasmine and Indian Curry Leaf**

# Asian citrus psyllid

- ACP, *Diaphorina citri*
- Relative of the aphid
- Pierces and feeds on fluid from plant tissue
- Lays eggs on new growth
- Nymphs feed on new, possibly infected, growth
- Harmless, **except** for transmitting the deadly disease



UGA5007004







USDA-ARS

UGA5006085



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# Parasitic Wasp, *Tamarixia Radiata*



# Citrus greening around the world

200 to 300 years ago: first appeared in China, first reported so china

1921: disease reported in Philippines

1928: disease in south Africa

1960s: HLB appears Thailand

1998: ACP arrived in FL

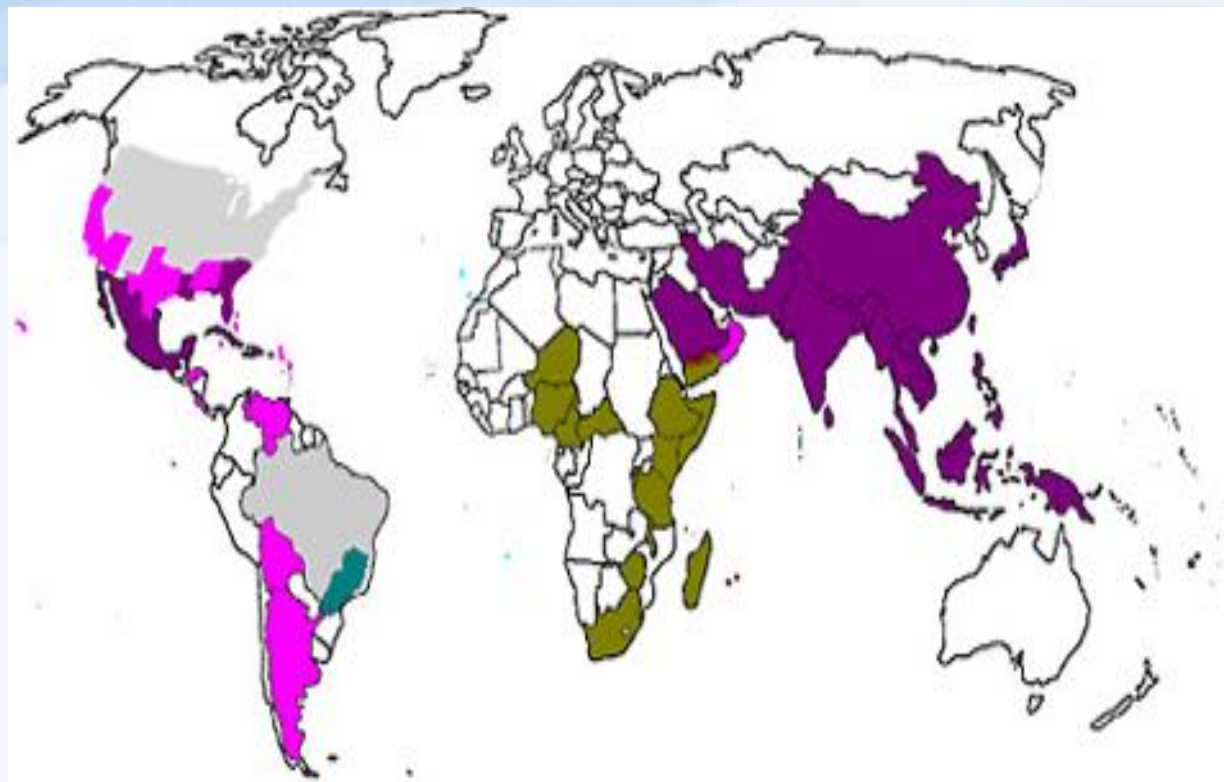
2004: disease in Brazil

2005: disease in FL

2012: first appeared in CA, Hacienda Heights mega graft!

Also moving through Texas, Arizona, Caribbean, Mexico and now Gerogia





- Candidatus Liberibacter africanus* and *Trioza erytreae*
- Candidatus Liberibacter asiaticus* and *Diaphorina citri*
- Candidatus Liberibacter asiaticus*, *Candidatus Liberibacter americanus*, and *Diaphorina citri*
- Candidatus Liberibacter africanus*, *Candidatus Liberibacter asiaticus*, *Diaphorina citri*, and *Trioza erytreae*
- Diaphorina citri* only
- Trioza erytreae* only

# Citrus greening poses threat to Florida groves



Leaves yellowed from the veins out are a symptom of citrus greening. The tree will produce smaller, misshapen and bitter fruit, and the tree itself could die.

PHOTO / USDA



The Asian citrus psyllid is about  $\frac{1}{8}$  inch long. The psyllid lays eggs in the foliage and spreads the HLB bacteria.

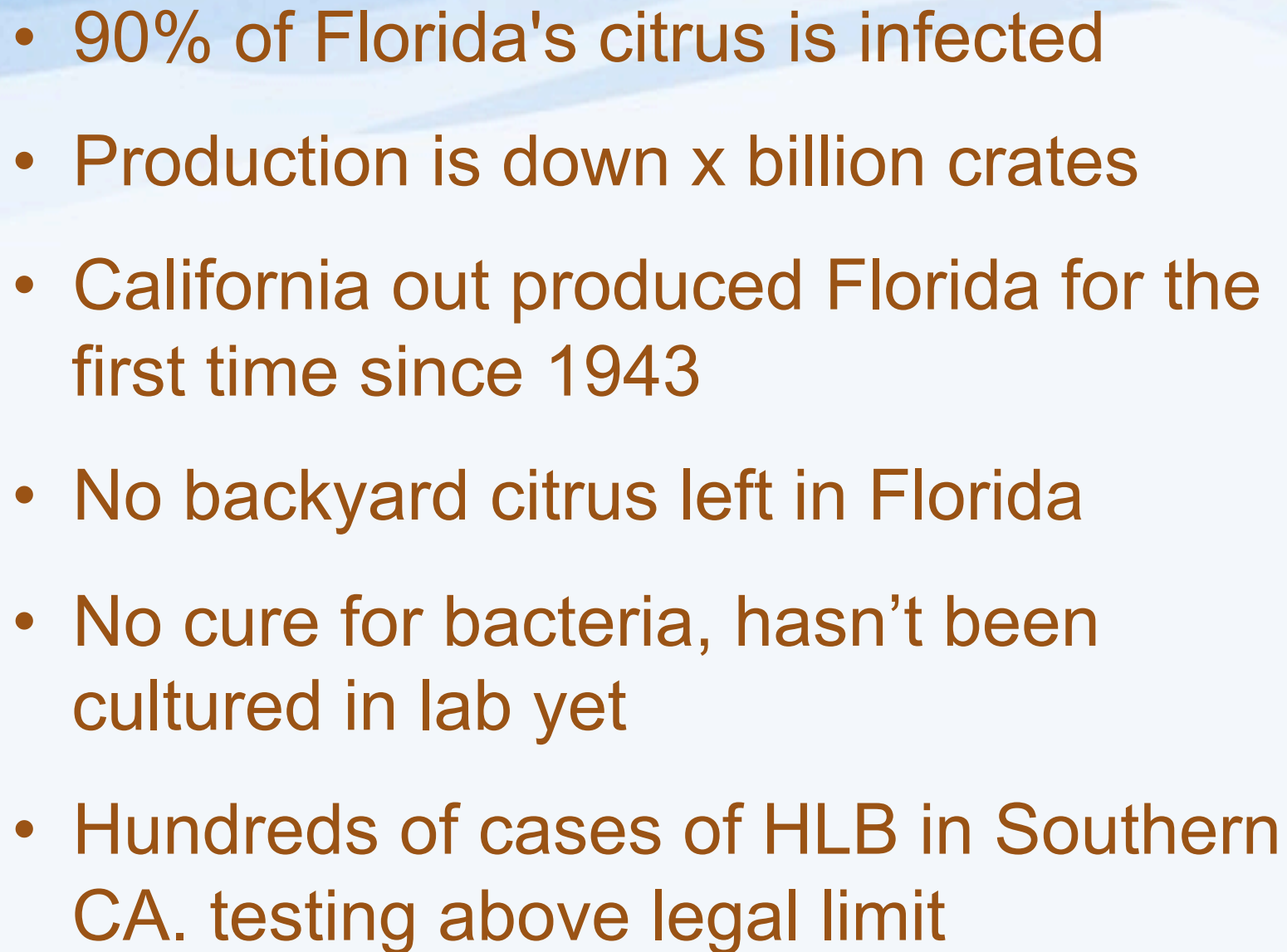
PHOTO / UNIVERSITY OF CALIFORNIA  
INTEGRATED PEST CONTROL

## Citrus greening in Florida

- 37 counties with HLB
- Reported areas of HLB

Citrus greening is an insect-borne bacterial disease called huanglongbing (HLB) which attacks the vascular system of plants. HLB spread across Asia and Africa beginning in the 1940s, and first appeared in the U.S. in Miami-Dade County in 2005. It has since spread to 37 Florida counties and 9 other states.



- 
- 90% of Florida's citrus is infected
  - Production is down x billion crates
  - California out produced Florida for the first time since 1943
  - No backyard citrus left in Florida
  - No cure for bacteria, hasn't been cultured in lab yet
  - Hundreds of cases of HLB in Southern CA. testing above legal limit



# Where do we stand in CA?

- Over 100 confirmed cases
- Psyllids found as far north as Placer county, and all along the 5 and 99, ACP quarantines in central valley
- Quarantine area for ACP in **ALL** southern California counties
- HLB quarantine in Los Angeles County, also in Orange county
- HLB quarantine in Now in Riverside county

# 2016 Asian Citrus Psyllid (ACP) Quarantine Boundaries

Highway 99

Quarantine Boundary  
Approved 08/03/2016  
55,265 sq miles

Map created by: [illegible]  
Revised: 11/2/2016

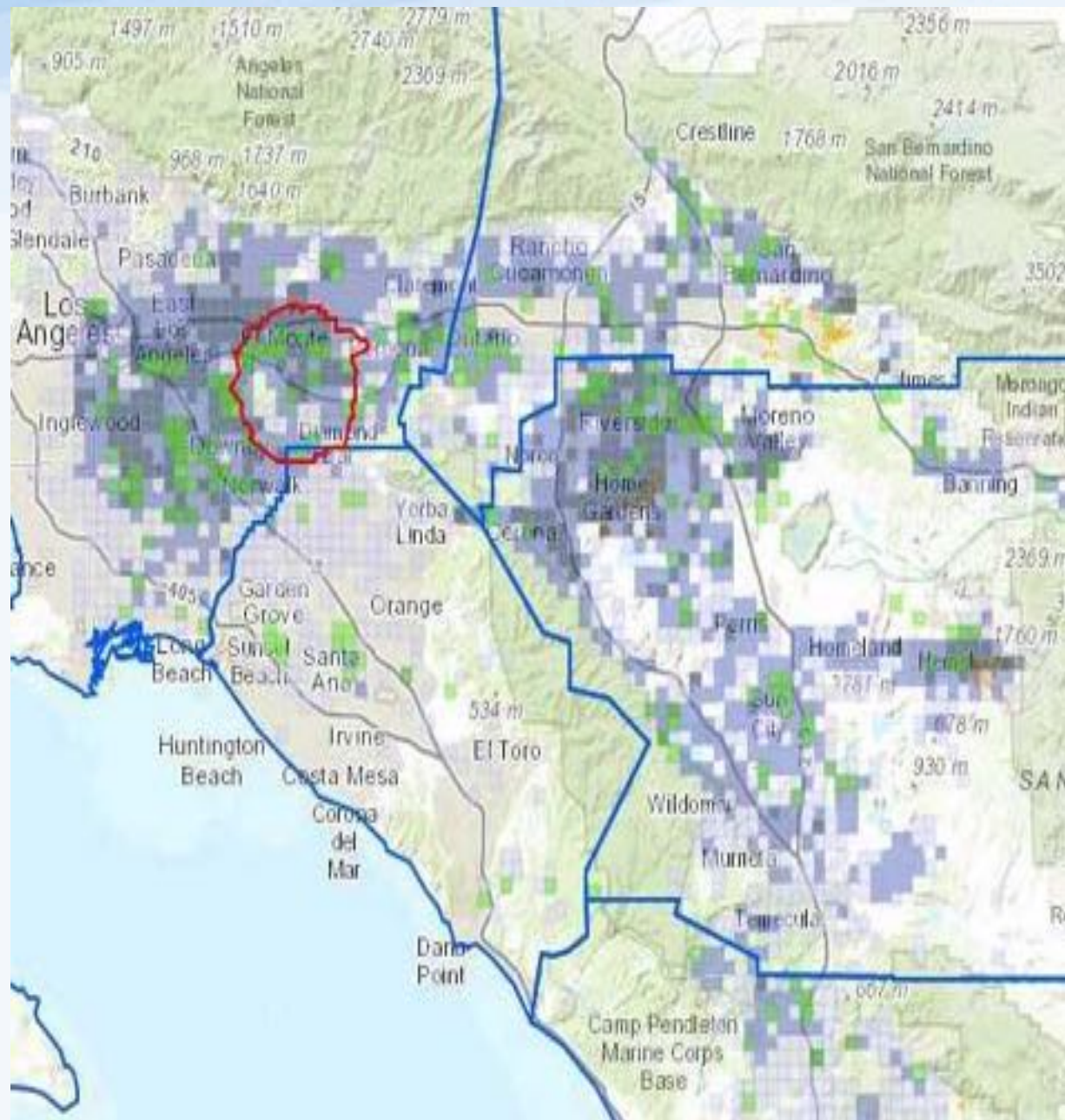


California Department of Food and Agriculture

## 2017 Candidatus Liberibacter (HLB) Overview - Grid Pages







# What is happening in riverside HLB quarantine area

- All non commercial fruit must be consumed on property
- Residents can be fined for violating quarantine
- No citrus for sale in HLB quarantine area
- Needing to track movements of green waste
- Commercial properties are getting treated 4 or more times a year
- All produce must be tarped
- Mandatory spraying of citrus within (800m) of infected trees
- Mandatory removal of infected trees
- Bag all citrus waste

# What do we need to do

- Be on the look out for ACP
- Look for symptoms of HLB
- Contact Agriculture Commissioner if you think you have citrus greening disease
- Tell your friends and neighbors
- Support citrus industry efforts to protect our states citrus



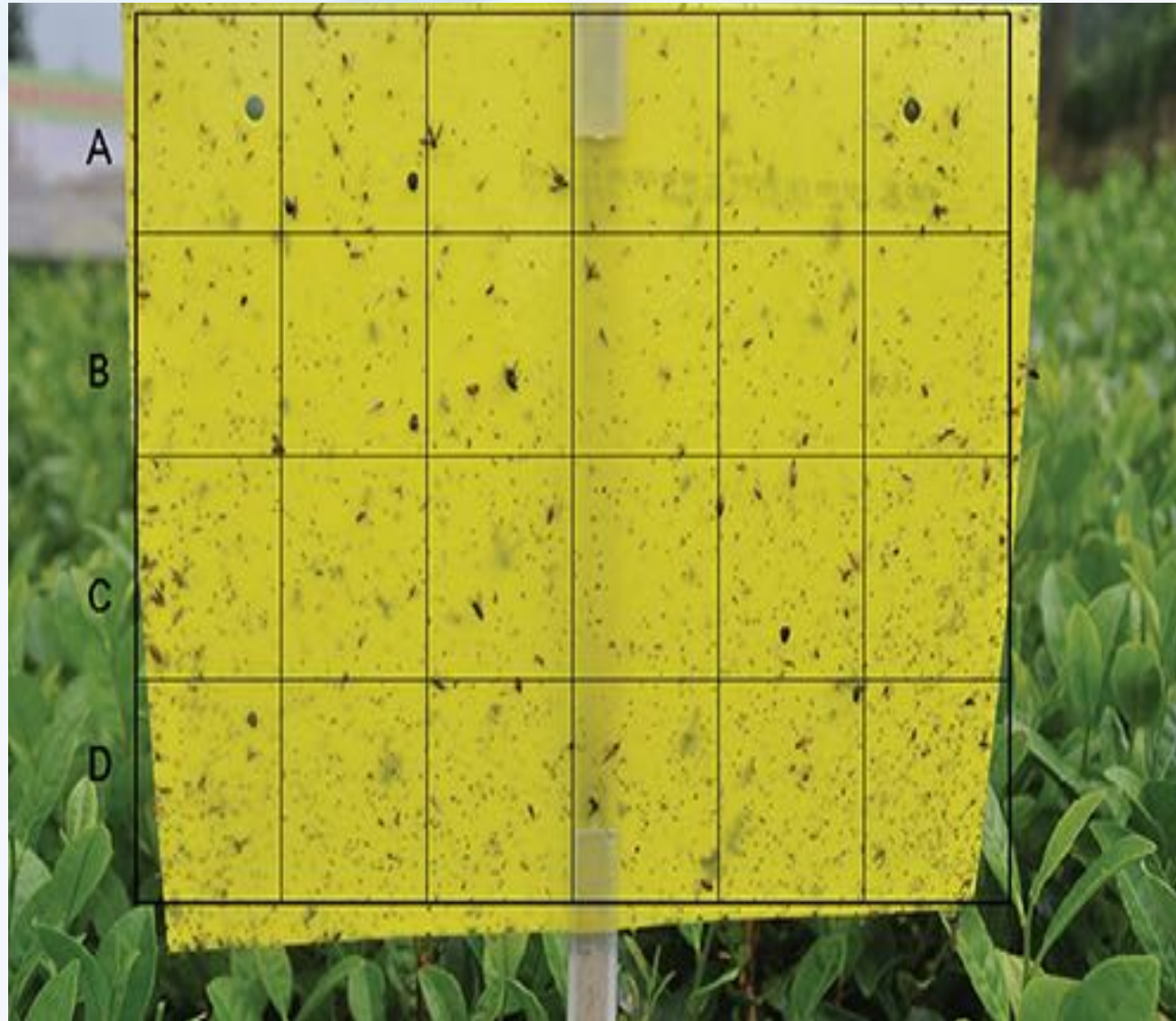
# Treat trees with ACP

- Organic options
- “Chemical” Options

Both organic and synthetic treatments can be found at your local nursery

- “Spot” treat small trees
- Ant control
- Remove unwanted trees

# Yellow sticky traps



CaliforniaCitrusThreat.org



Citrus Pest & Disease Prevention Program



# What should we do in Claremont?

- Inform the public
- Inspect trees, look for Insects and disease symptoms
- Keep our trees well watered
- Keep trees well fed and mulched
- Remember they are dealing with a drought too!!

# Don't.....

- Don't share citrus foliage, and teach others about the reason
- Don't share unwashed citrus fruit
- Don't buy citrus from out of the area, or move
- Don't move uncertified cuttings/graft material around at all.....!!!!
- Don't forget to clean your clippers between pruning!

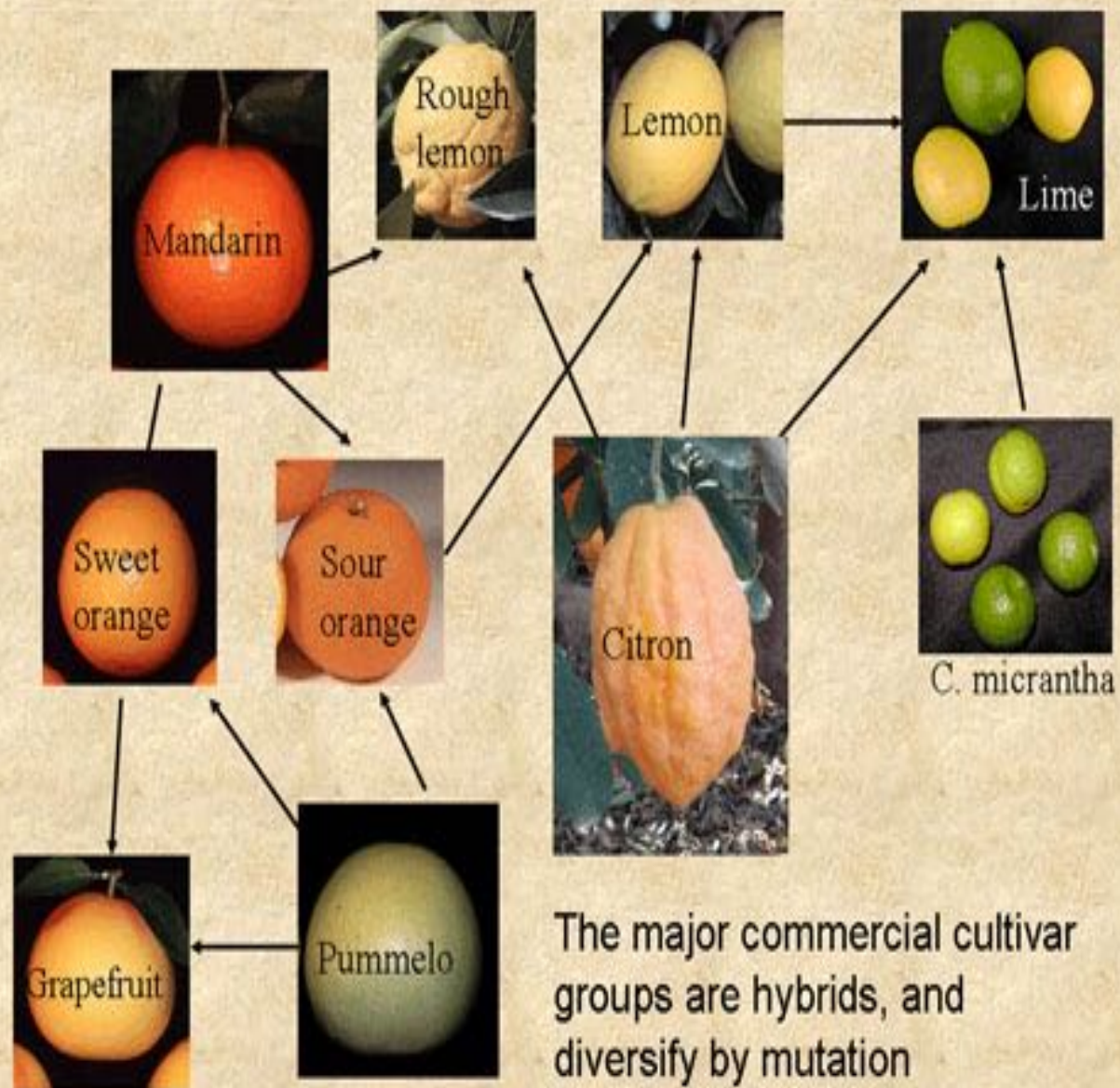
# What hope is there?

- Disease resistant root stocks?
- Greenhouses?
- GMO citrus?

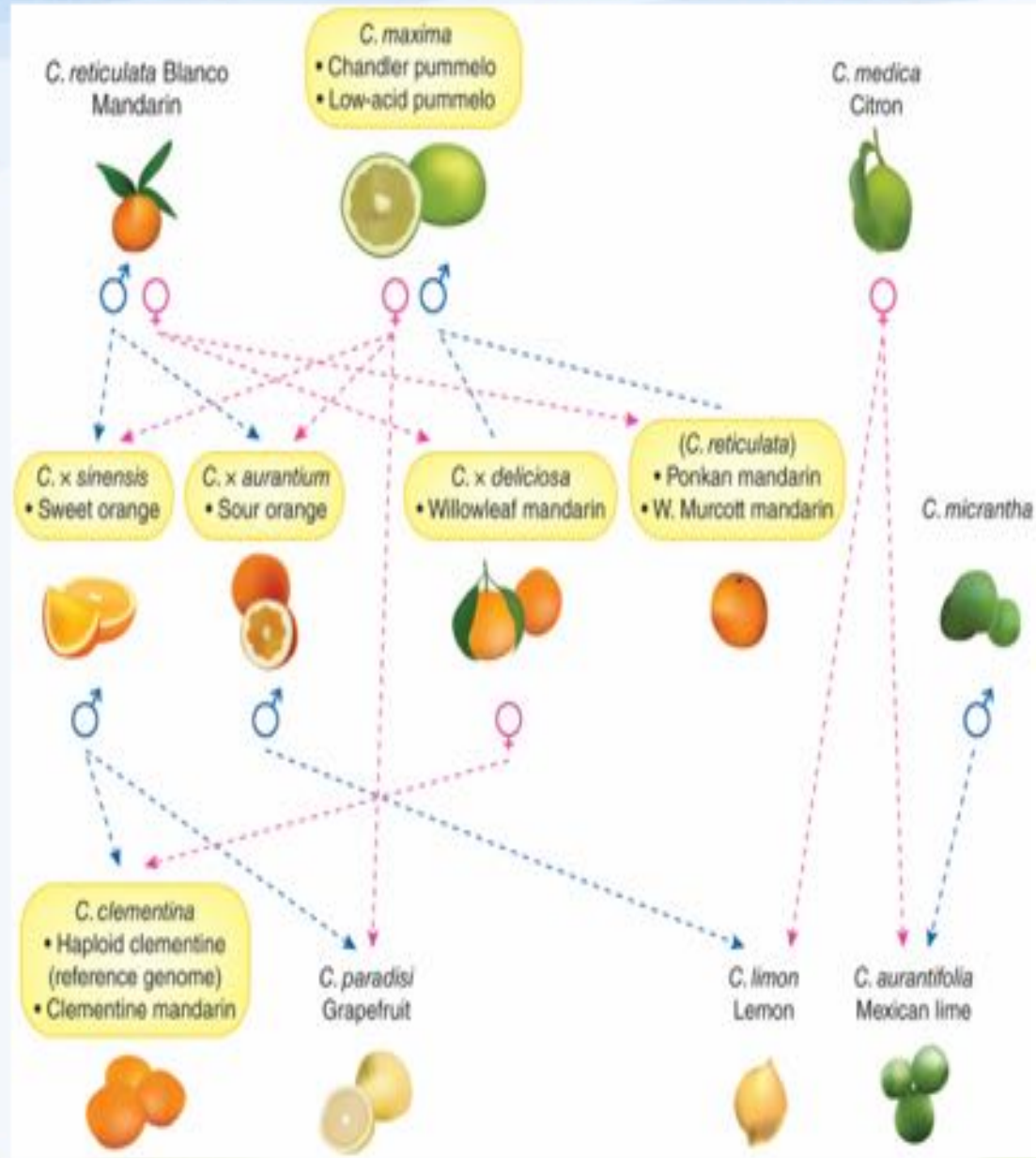


Lets look at some  
soothi

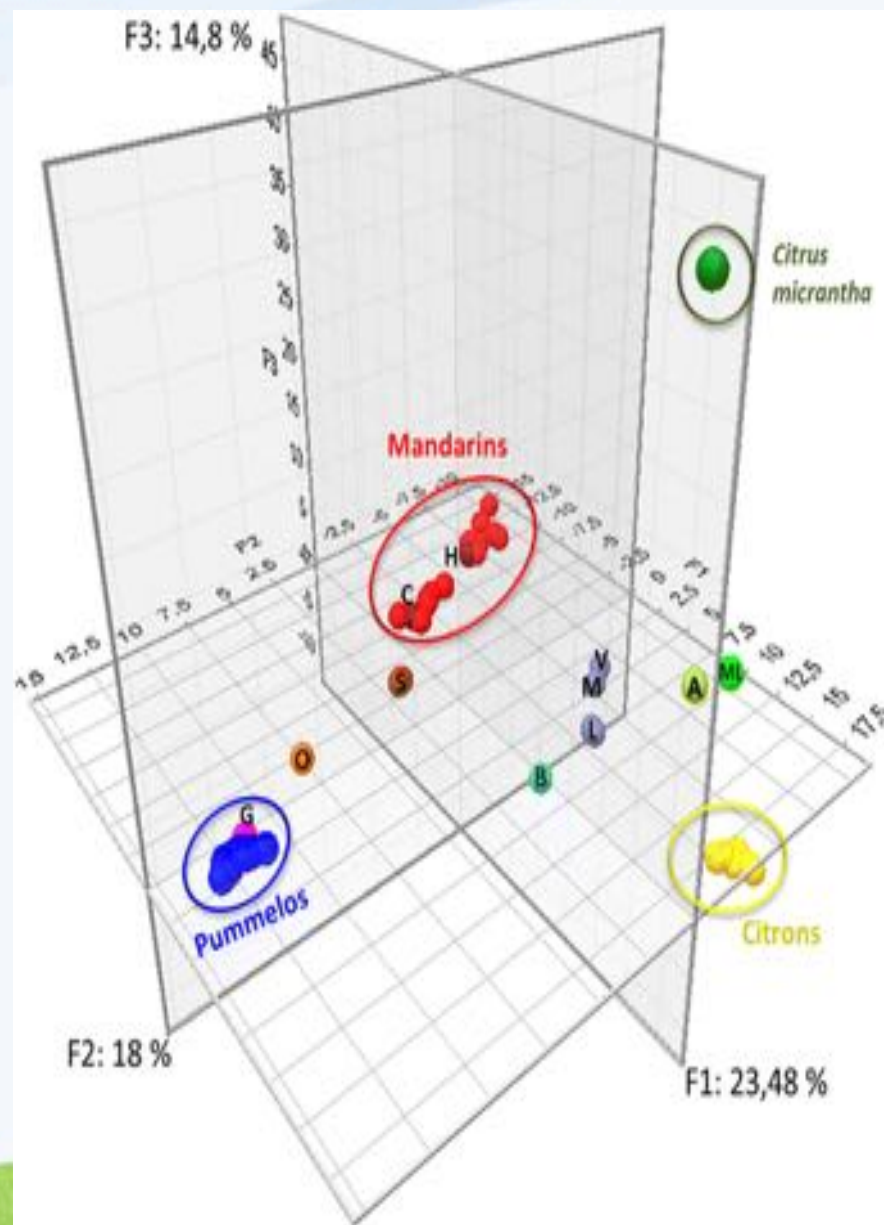




The major commercial cultivar groups are hybrids, and diversify by mutation









# Lemons





# Limes









© west-crate.com



Sooo  
many  
Oranges.....



# Buddhas hand





# Variegated pink lemonade lemon





# Australian Finger Lime





grapefruit







# References

- Beth Grafton-Cardwell/UC ANR web page
- California Citrus Threat
- California Citrus Mutual
- Citrus Matters
- Citrus Insider
- *Tried and True or something new?* Toni Siebert, Tracy Kahn Nov 2011  
Article

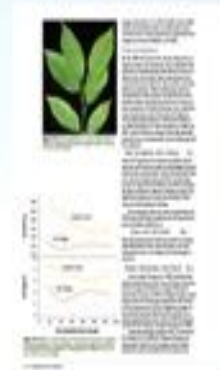
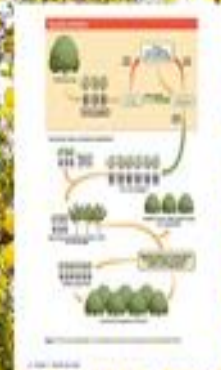
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
AVOCADO											Bacon	
	Fuerte											
	Hass											
					Lamb Hass							
								Mexicola				
									Pinkerton			
						Reed						
	Sir Prize											
					Wurtz							
	Zutano											
CHAMPAGNE	Oro Blanco											
	Rio Red											
	Star Ruby											
LEMON	Melwa											
	Nagami											
LEMON	Eureka											
	Lisbon											
	Meyer											
	Bear											
LIME	Mexican											
	Sweet Lime											
MANDARIN	Algerian											
	Gold Nugget											
	Pole											
	Satsuma											
	Tango											
	W. Murcott											
ORANGE	More Blood											
	Cara Cara											
	Lane Late											
	Washington											
	Valencia											
OTHER	Pummelo											
	Calamondin											
	Minneola Tangelo											





**NEW!**

## *Citrus Production Manual*





# Thank you for coming

Please contact me with any  
questions, or if you would like me to  
present on this, or related topics:

**[Magoneill@aol.com](mailto:Magoneill@aol.com)**