Beyond Citrus

Fruit Tree Options for Los Angeles and Southern California

UNIVERSITY OF CALIFORNIA
Agriculture and Natural Resources
UC Master Gardener Program

Temperate Zone Fruit

Stone Fruit (*Prunus spp.)*

- Apricot
- Cherry
- Peach & Nectarine
- Plum
- Interspecific hybrids

Mulberries

Low-chill cherry

- Fig
- Jujube
- Mulberry
- Paw Paw
- Persimmon
- Pomegranate

Pome Fruit (rose family)

- Apple
- Pear
- Quince

Low-chill quince

Stone Fruit Interspecific Hybrids

- **Aprium®** (plum x apricot)
- **Cherry plum** (cherry x plum)
- **Nectaplum** (nectarine x plum)
- **Peach-Plum** (peach x plum)
- **Peachcot** (peach x apricot)
- **Peacotum** (peach x apricot x plum)
- **Pluerry** (plum x sweet cherry)
- **Plum-cot** (plum x apricot)
- **Pluot®** (plum x apricot)

Pluot® and aprium® are registered trademarks of Zaiger Genetics for hybrids of plum and apricot

Subtropical and Tropical Fruit

Citrus

- Grapefruit
- Kumquat
- Lemon
- Lime
- Mandarin
- Orange
- Pomelo
- Tangerine

Australian finger lime

- Avocado
- Banana
- Dragon Fruit
- Cherimoya
- Date
- Guava
- Lychee
- Longan
- Mango
- Papaya
- Passion Fruit
- White Sapote

Jaboticaba

Los Angeles metropolitan area has Mediterranean climate, which is a type of dry subtropical climate

UNIVERSITY OF CALIFORNIA
Agriculture and Natural Resources
UC Master Gardener Program

Difficult (but not Impossible) Tropicals

- Breadfruit
- Durian
- Custard apple
- Jackfruit
- Mangosteen
- Miracle Fruit
- Soursop
- Sugar apple
- Starfruit

Star Fruit (top) & Miracle Fruit (bottom)

Jackfruit

Cold Hardiness

Cold hardiness is the ability of a plant to withstand low temperatures

Critical temperatures for selected fruit trees

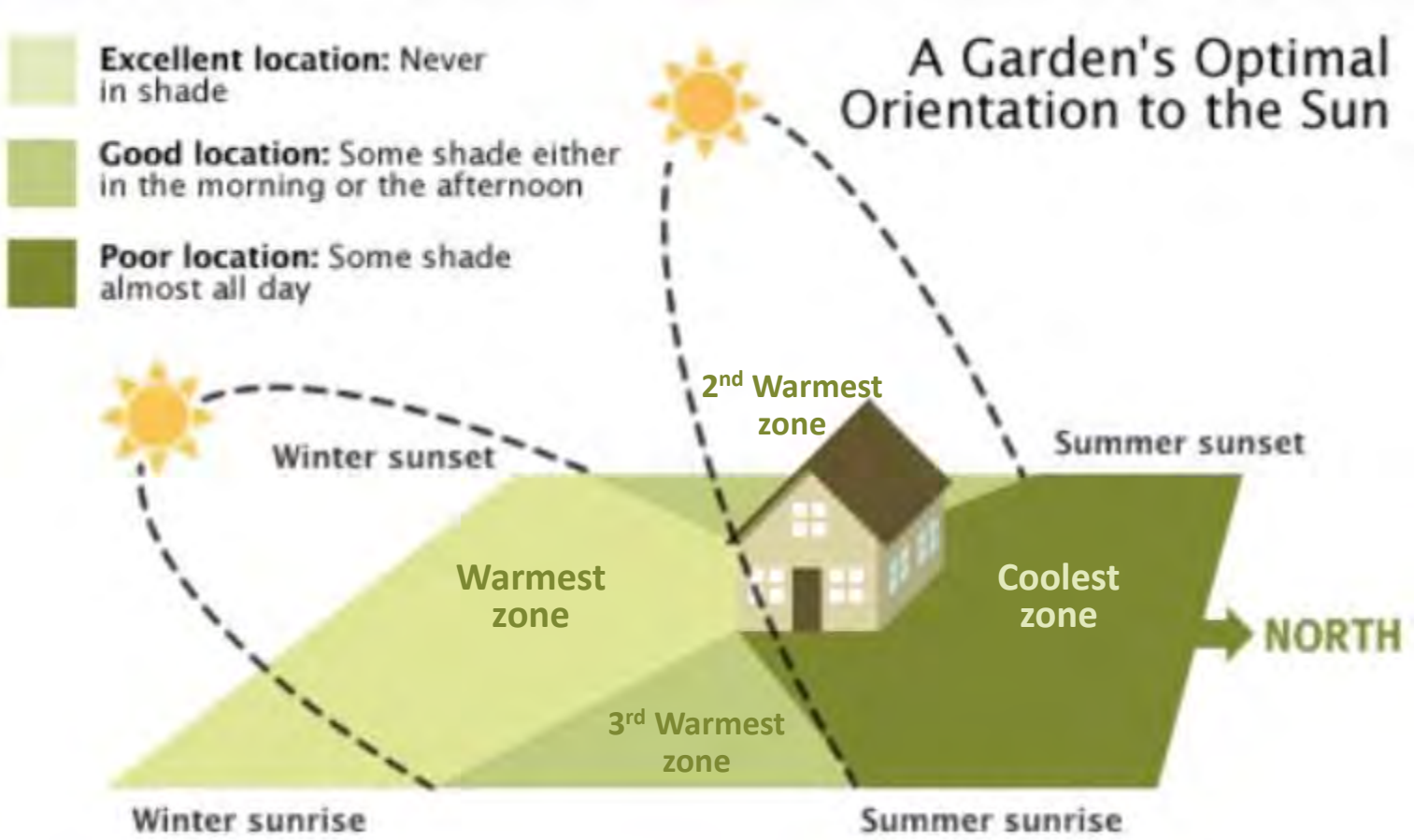
Papaya	31 °F
Limes	29 °F
Lemons and grapefruit	26 °F
Meyer lemon, oranges & mandarins	22 °F
Mangos	25 °F
Avocados	20 °F
Loquats	10 °F
Peaches	-20 °F
Apples	-40 °F

USDA Plant Hardiness Zones

Hardiness zones are based on the average annual minimum winter temperature

UNIVERSITY OF CALIFORNIA
Agriculture and Natural Resources
UC Master Gardener Program

Site Selection and Microclimates



Source: Amir 2014 Garden Manual

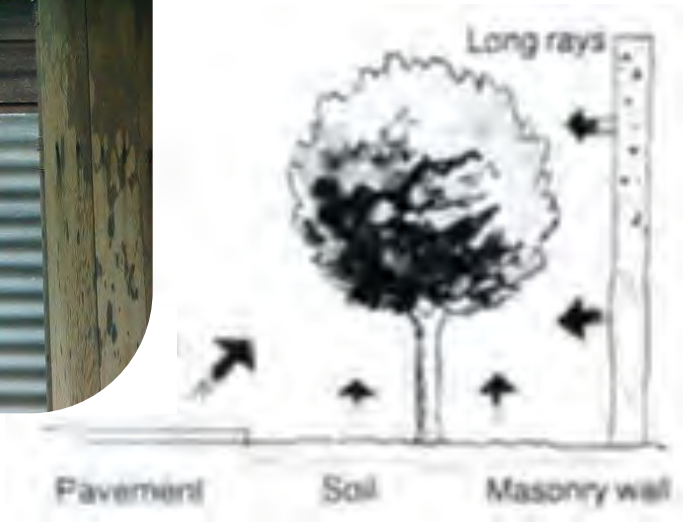
Cold hardiness of selected fruit trees	
Apples	Zones 3 – 9
Pears, Quince, Peaches, Nectarines, Apricots and Apriums	Zones 4 – 9
European Plums	Zones 4 – 10
Sweet Cherries	Zones 5 – 7
Asian Plums and Pluots	Zones 5 – 9
Figs	Zones 5 – 10
Persimmons	Zones 7 - 10
Pomegranates	Zones 7 – 10 Zones 5 – 6 possibly
Citrus	Zones 8 - 10

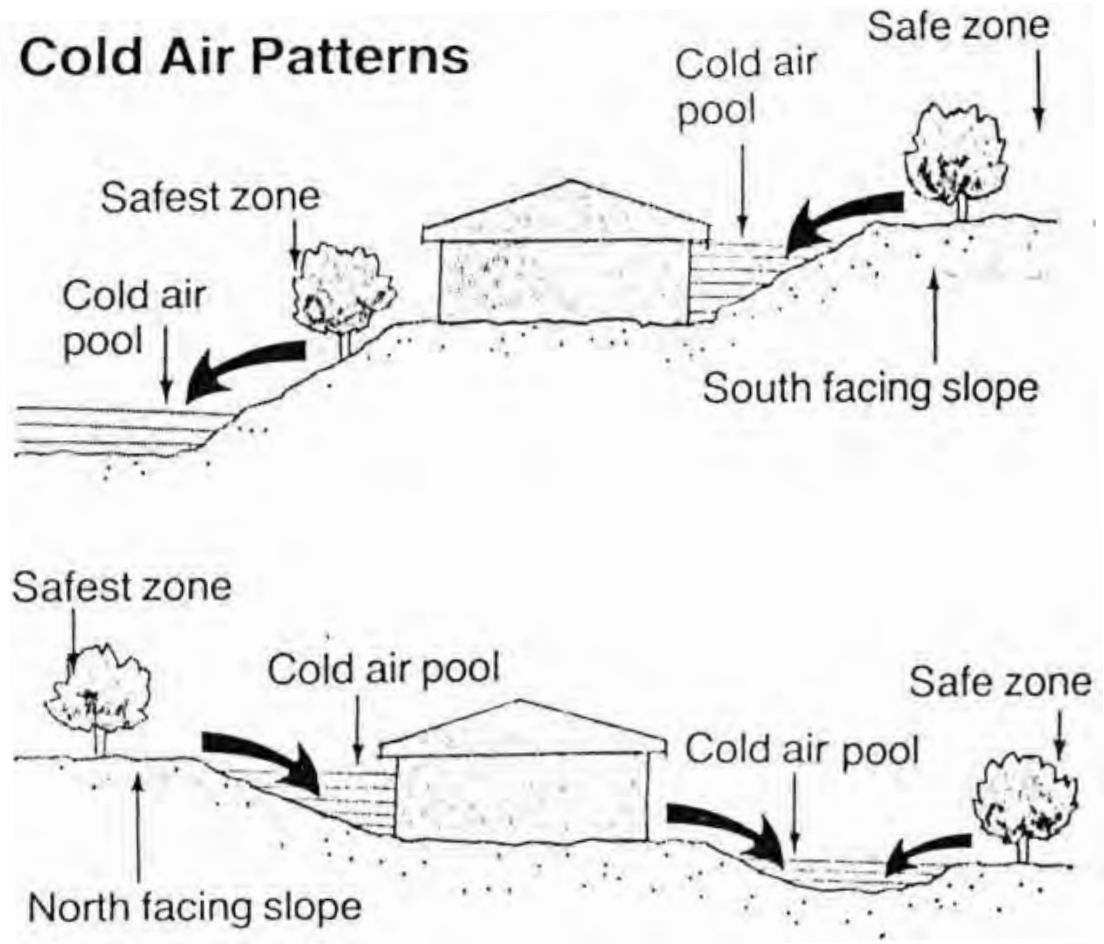
Best Locations for Cold Sensitive Plants

Buildings and hardscaping absorb & reflect heat during the day and radiate it back at night

Papaya tree

Espaliered Lemon Tree





Cold air flows like water, accumulating in low spots

UNIVERSITY OF CALIFORNIA
Agriculture and Natural Resources
UC Master Gardener Program

Temperate Zone Fruit Trees Need Winter Chill

A selection of low-chill varieties for Southern California

Apples
- Anna (200)
- Beverly Hills (250)
- Dorset Golden (100)
- Fuji (<500)
- Pink Lady (300-400)

Pears
- Flordahome (400)
- Hood (100-200)
- Pineapple (200)
- Southern Bartlett (400)

Cherries
- Minnie Royal (200-300)
- Royal Lee (200-300)
- Royal Crimson (200-300)

Plums
- Burgundy (300)
- Santa Rosa (300)

Nectarines
- Arctic Star (300)
- Double Delight (300)
- Snow Queen (250-300)

Peaches
- Donut (200-300)
- Eva's Pride (100-200)
- Mid Pride (250)
- Red Baron (250-300)

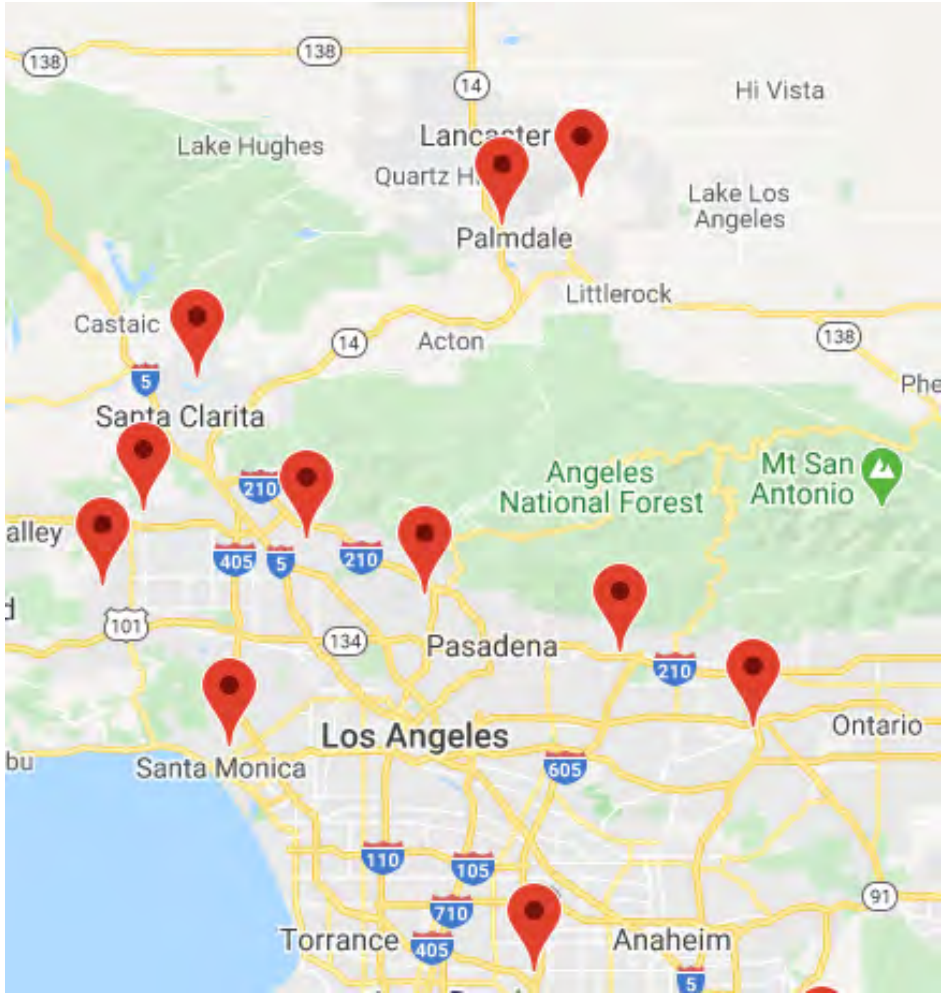
Necta-plum
- Spice Zee (200-300)

Figs, persimmons, pomegranates and jujubes typically require less 200 hours of winter chill

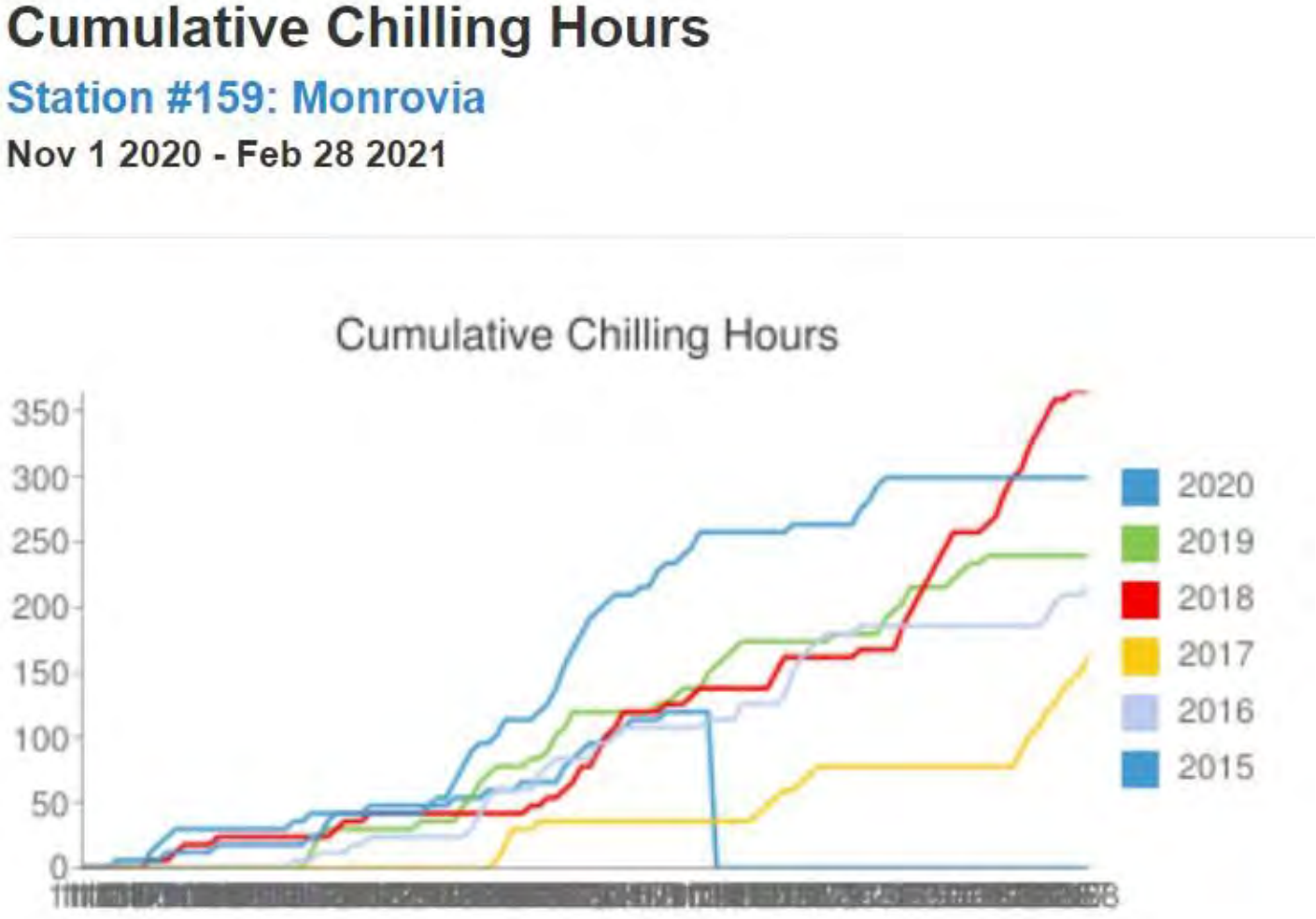
Cumulative Chilling Hours = total number of hours below 45 F (but above 32 F) accumulated during the dormant period between autumn leaf fall (**Nov 1**) and spring bud break (**Feb 29**)

UNIVERSITY OF CALIFORNIA
Agriculture and Natural Resources
UC Master Gardener Program

Cumulative Chilling Hours



11 weather stations in LA County track chilling hours



https://ucanr.edu/chillcalc/?

UNIVERSITY OF CALIFORNIA
Agriculture and Natural Resources
UC Master Gardener Program

Cumulative Chilling Hours

Monitoring Stations in Los Angeles County

City	Station #	2020 (1/15/21)	2019	6-yr Avg	6-yr Min	6-yr Max
Arleta	216	177	480	247	74	480
Chatsworth	215	131	480	219	74	480
Glendale	133	*NA*	*NA*	300	131	576
Long Beach	174	372	418	278	152	418
Monrovia	**159**	**120**	**237**	**234**	**125**	**365**
Palmdale	197,220	665, 638	1103	993	832	1122
Pomona	078	330	395	337	188	422
Santa Clarita	204	215	480	398	244	535
Santa Monica	099	8	24	38	24	48
West Hills	219	91	120	173	6	332

https://ucanr.edu/chillcalc/?

A pluot variety that requires 700-800 chilling hours

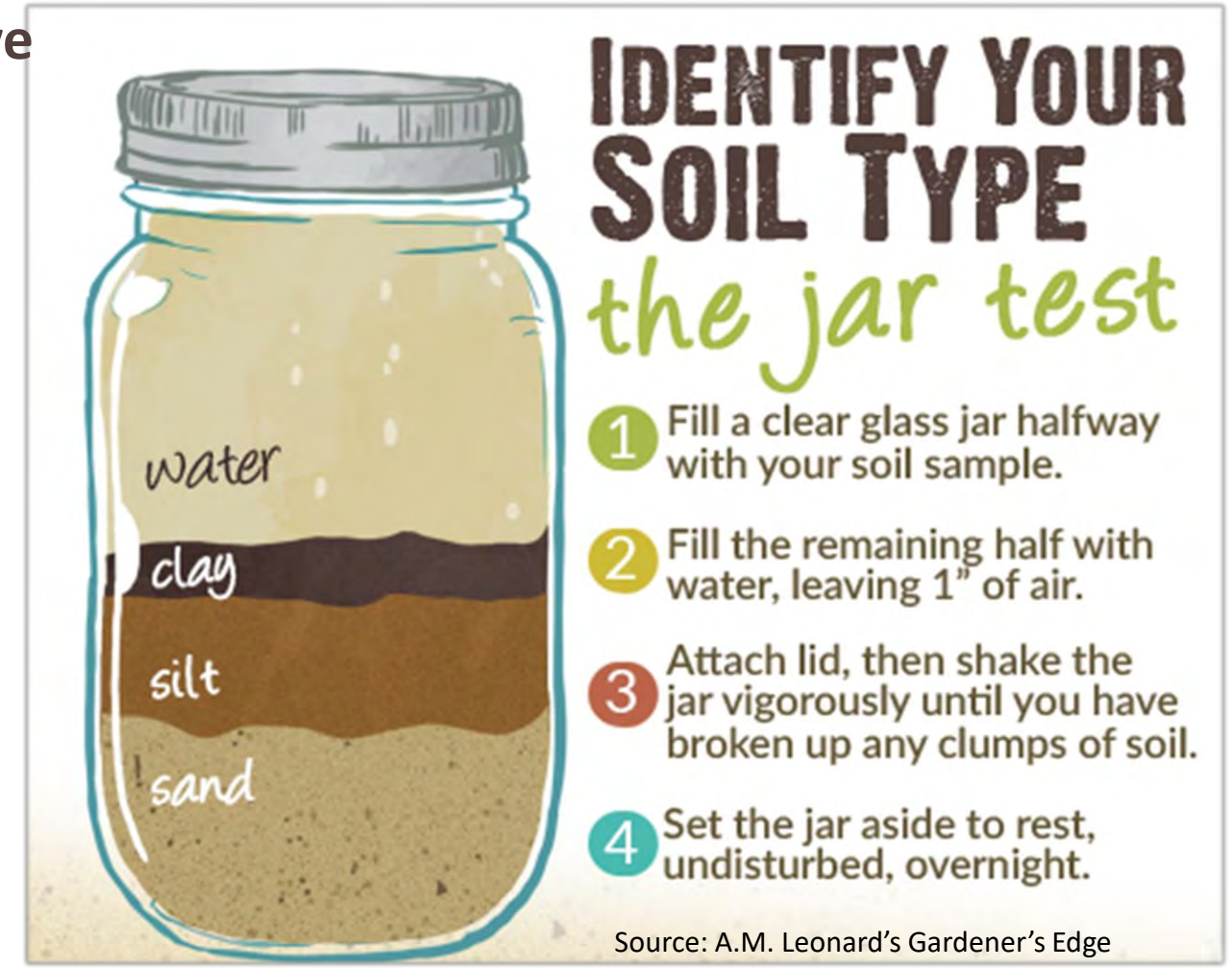
UNIVERSITY OF CALIFORNIA
Agriculture and Natural Resources
UC Master Gardener Program

Understanding Your Soil: Texture

Soil texture is determined by the relative amounts of sand, silt and clay

Soil texture influences:

- the ease with which the soil can be worked
- the amount of water and air the soil can hold
- the rate at which water can enter and move through the soil
- the soil's nutrient holding capacity

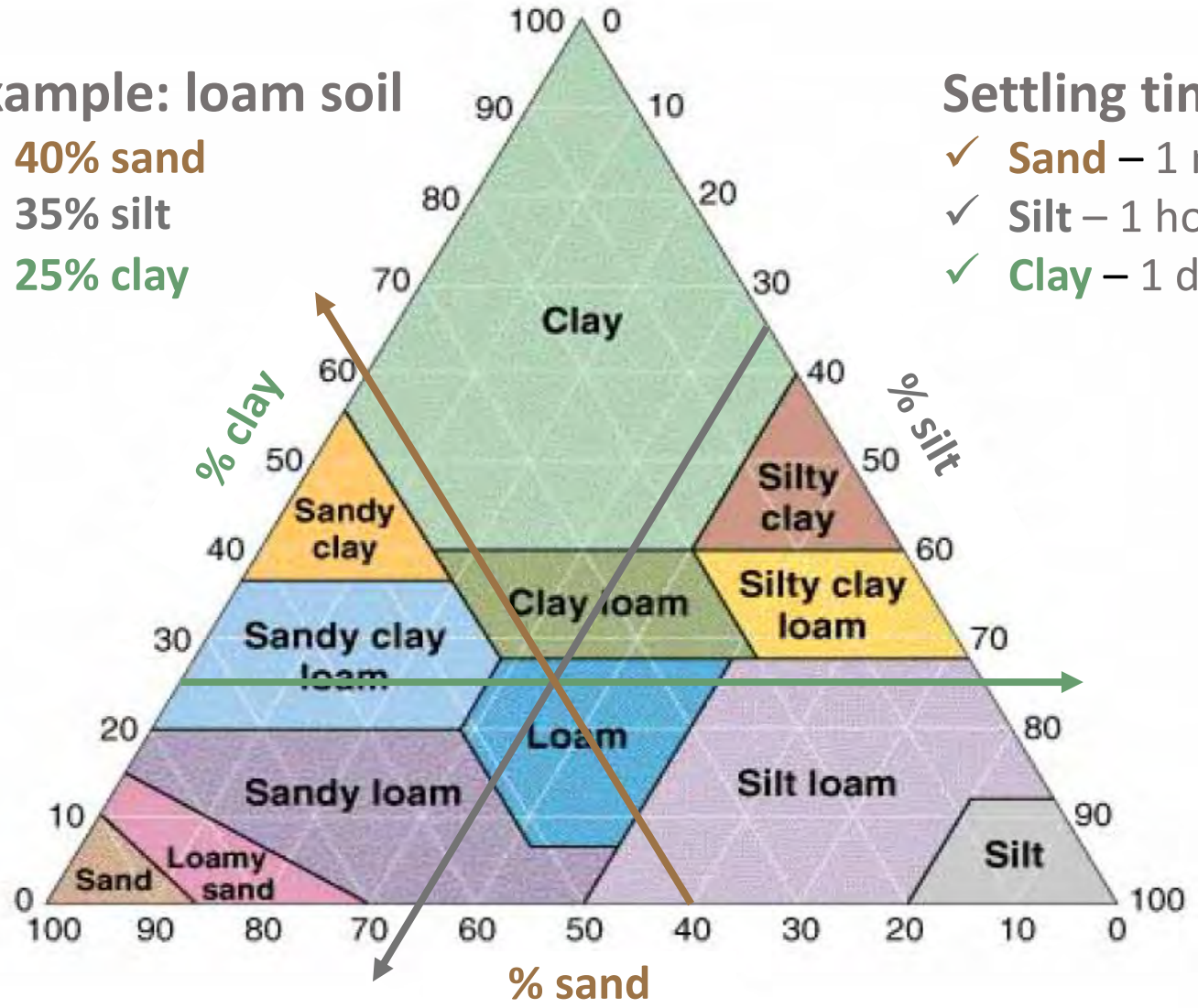


Source: A.M. Leonard's Gardener's Edge

Understanding Your Soil: Texture

Example: loam soil

- 40% sand
- 35% silt
- 25% clay



Settling times

- ✓ **Sand** – 1 minute
- ✓ **Silt** – 1 hour
- ✓ **Clay** – 1 day or longer

Understanding Your Soil: Drainage

Step 1: Dig a hole 1 ft deep and wide

Step 2: Fill with water and allow to drain overnight

Step 3: Refill the hole with water

Step 4: Measure drainage every hour until the hole is empty

Ideal rate: 2 to 3 inches per hour
Ideal drainage for most trees

Too slow: less than 1 inch per hour
Indicates either a heavy clay soil or an underlying hardpan

Remedy: plant tree on a mound or in a raised bed to improve the drainage

Too fast: greater than 4 inches per hour
Indicates a sandy soil

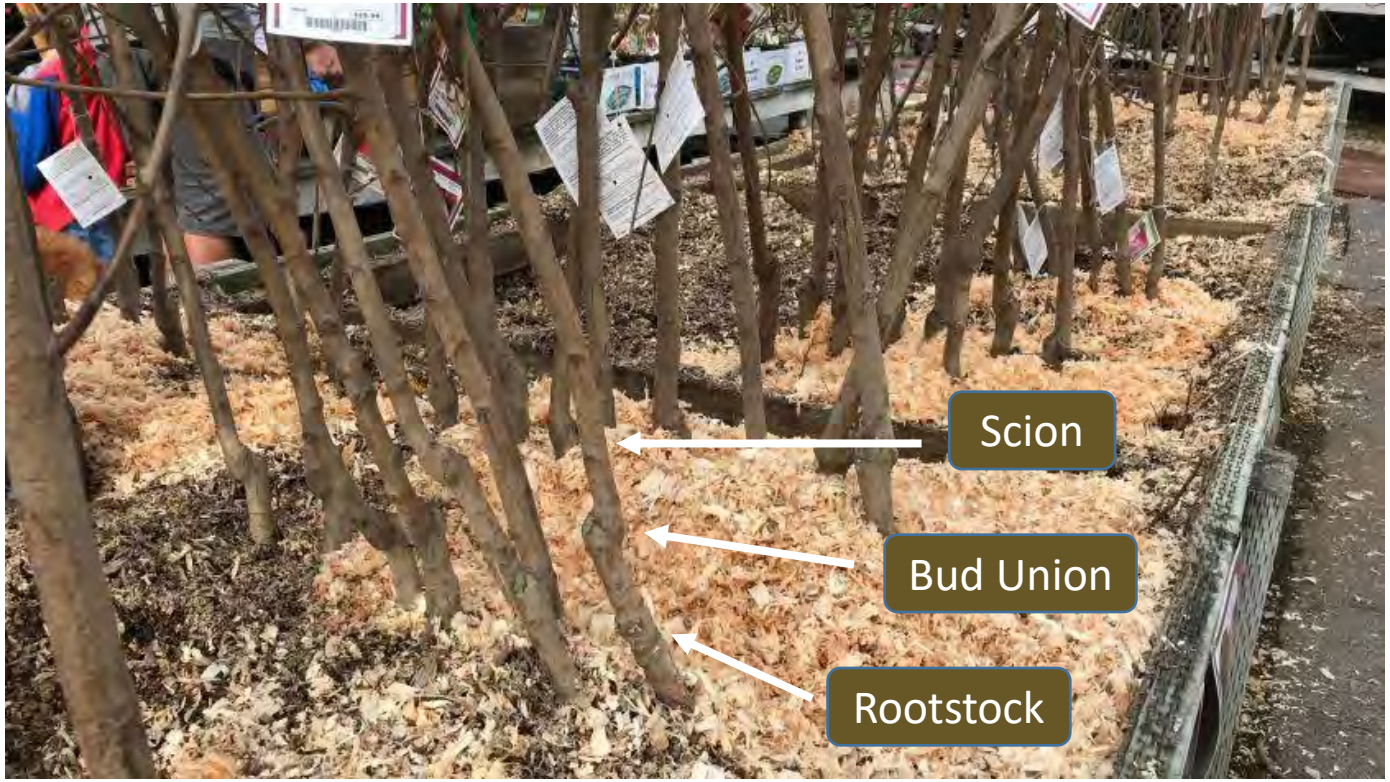
Remedy: top dress with a thick layer of woody mulch to help hold the moisture

All fruit trees benefit from **well-draining** soil

UNIVERSITY OF CALIFORNIA
Agriculture and Natural Resources
UC Master Gardener Program

Selecting a Nursery Tree

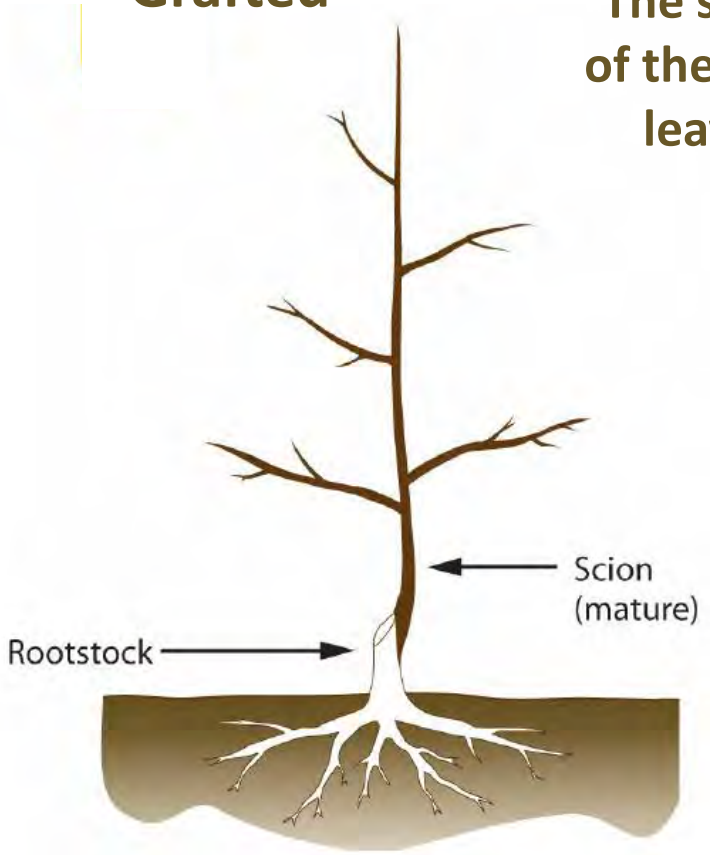
Avocado trees in #15 and #5 pots



Bare-root deciduous trees are available in January & February

Grafted and Ungrafted Fruit Trees

Grafted

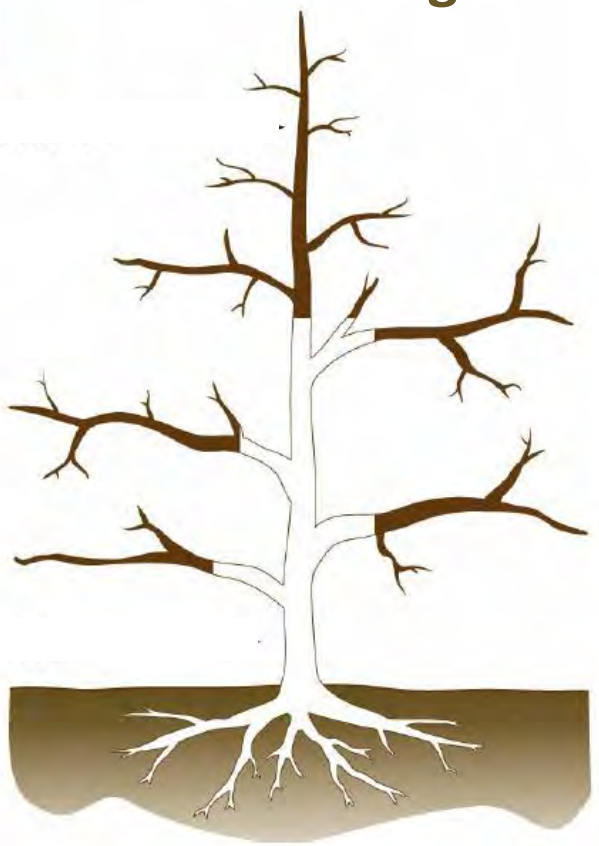


The scion makes up the rest of the trunk and all branches, leaves, flowers and fruit

- Apples
- Avocados
- Citrus
- Grapes
- Jujubes
- Loquats
- Pears
- Persimmons
- Stone fruit

The rootstock makes up the lower few inches of the trunk and the tree's roots

Ungrafted



- Figs
- Mulberries
- Olives
- Papaya
- Pomegranates

Figure 16.2 California Master Gardener Handbook

Tree Size Options

Pruning and training young trees is the key to size control

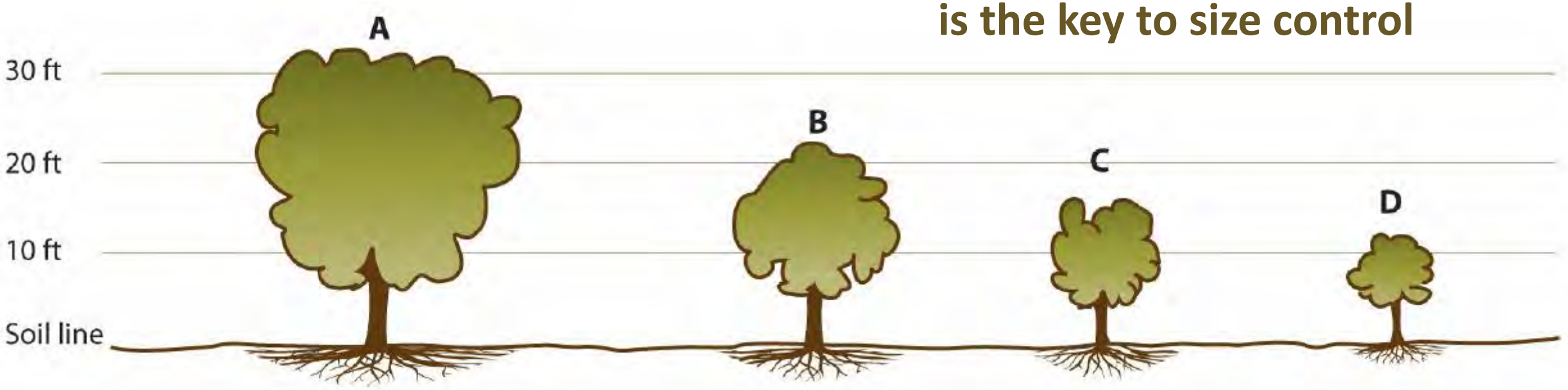


Figure 16.3 California Master Gardener Handbook

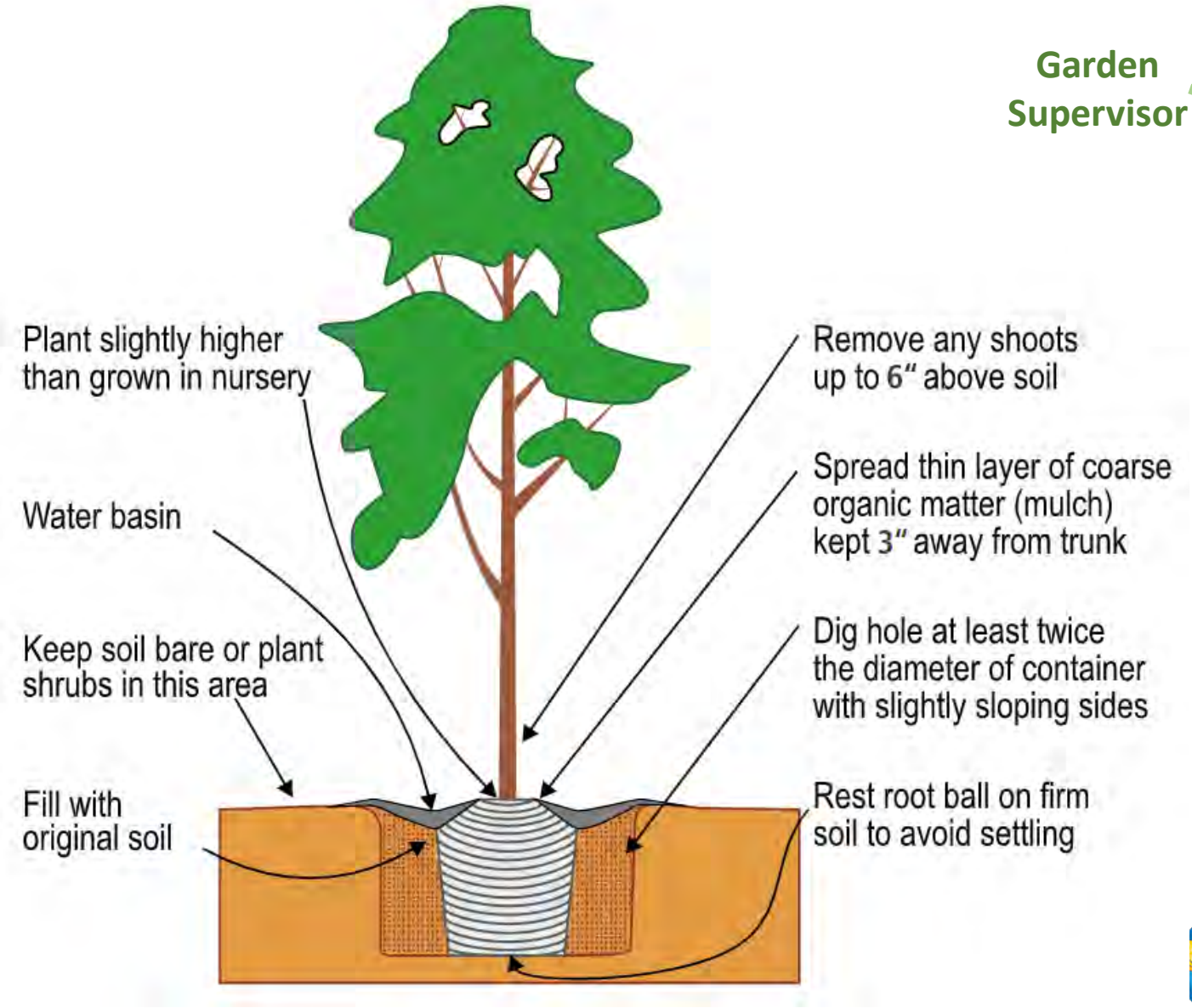
Size control in temperate fruit trees

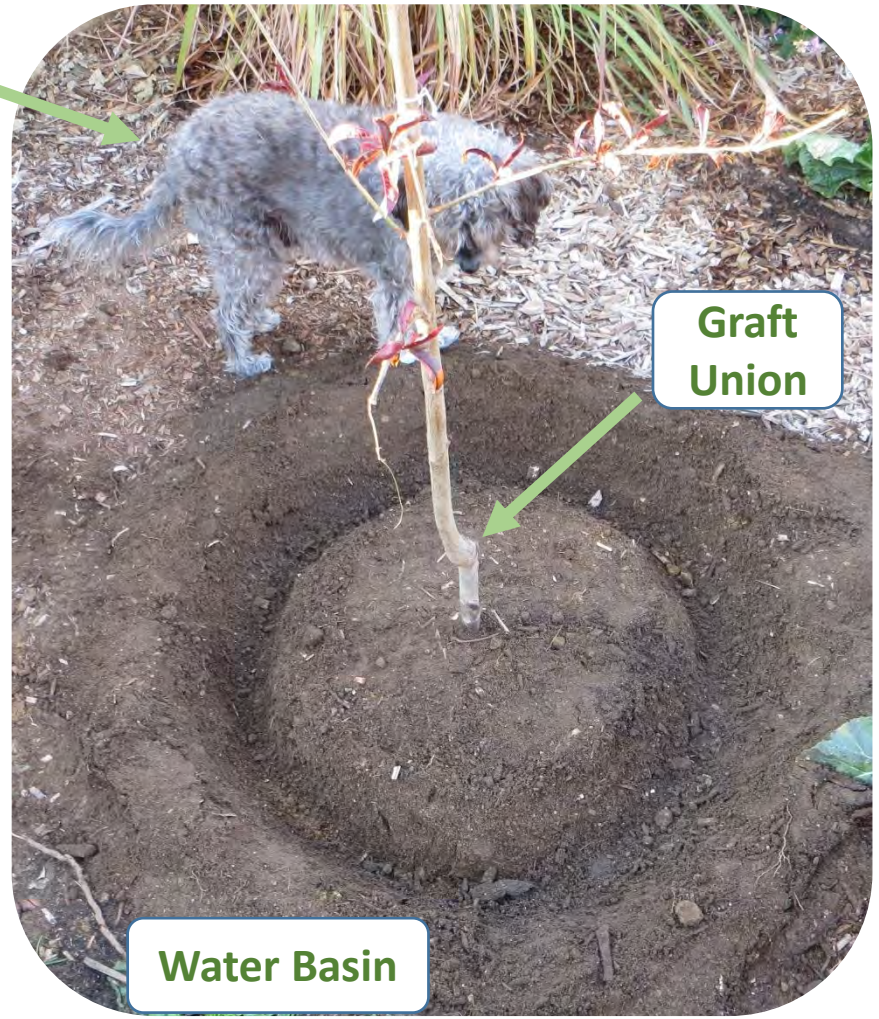
(A) standard variety

(B) and (C) standard variety on semidwarfing rootstock or semidwarf variety

(D) Standard variety on dwarfing variety or dwarf variety

Planting a Container Grown Tree





Planting a Bare Root Tree

- Keep roots moist until ready to plant
- Trim broken or damaged roots
- Dig a hole so that the roots will be buried 1”-3”deep
- Spread the roots over a mound at the bottom of the hole
- Fill with original soil, tamping down to remove air pockets
- Water thoroughly, so that soil flows around roots

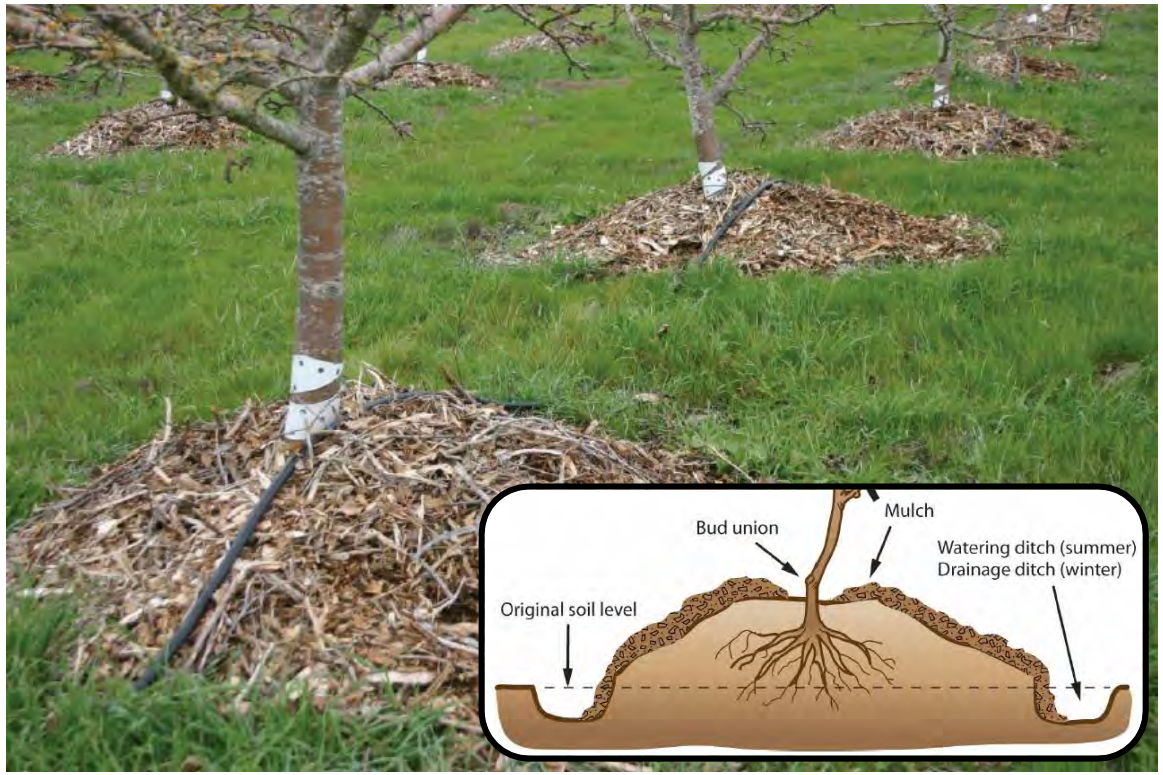
Root Washing

Root Washing: Why and Hot to Wash Roots
Linda Chalker-Scott, Ph.D.
Fine Gardening – Issue 191, Jan-Feb 2020, page 22
https://www.finegardening.com/digitalissue/97240

UNIVERSITY OF CALIFORNIA
Agriculture and Natural Resources
UC Master Gardener Program

Raised Planting

Planting on a mound will improve drainage



Figures 16.32 & 16.33
California Master Gardener Handbook

With extremely slow-draining soil, a raised bed may be needed to elevate the roots

Hass Avocado in a 12” high raised bed

Mulch: An Insulating Blanket for the Soil

Research has shown that arborist wood chips are the ideal garden mulch

Benefits of Woody Mulch:

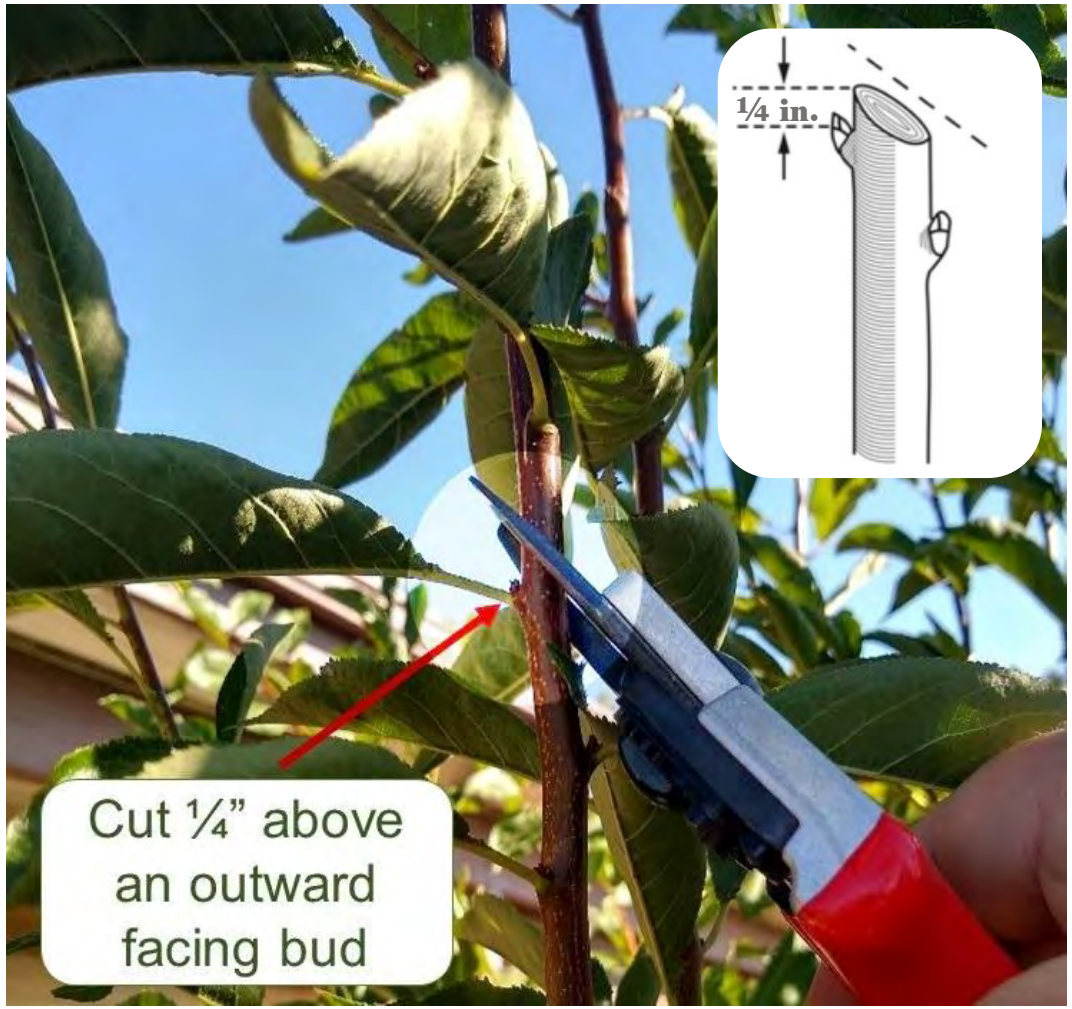
- Conserves water
- Suppresses weeds
- Insulates roots
- Adds organic matter
- Provides slow-release nutrients
- Increases soil biological activity
- Slows soil erosion

ChipDrop matches people who want free mulch with arborists and tree trimming companies who are trying to get rid of it
https://getchipdrop.com/

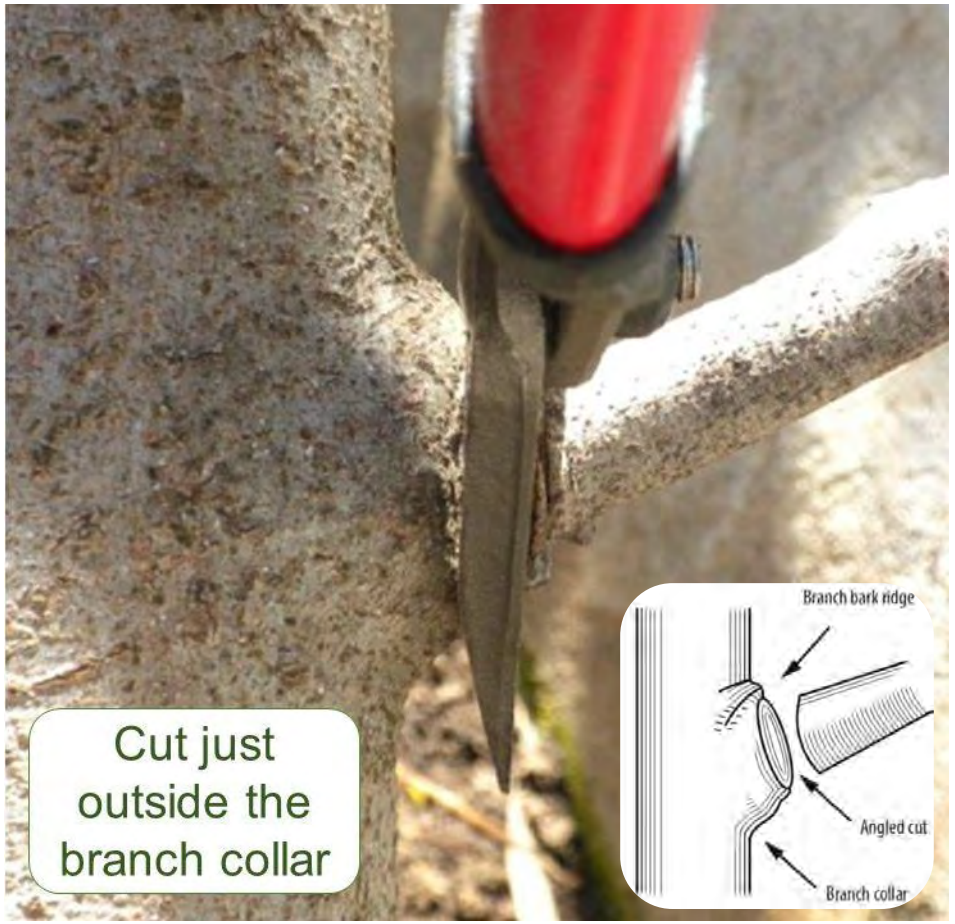
UNIVERSITY OF CALIFORNIA
Agriculture and Natural Resources
UC Master Gardener Program

Pruning: Two Basic Cuts

A **heading cut** shortens the branch



A **thinning cut** eliminates the branch



Pruning Sequence

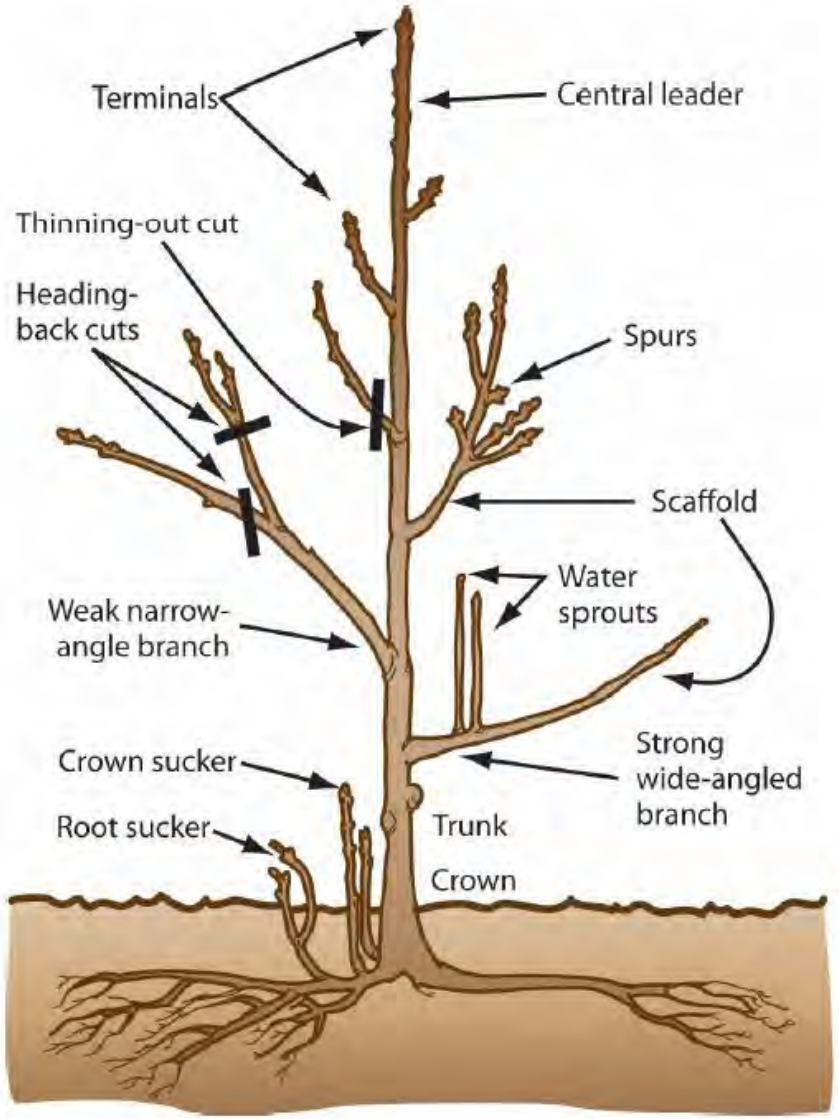


Figure 16.34 California Master Gardener Handbook

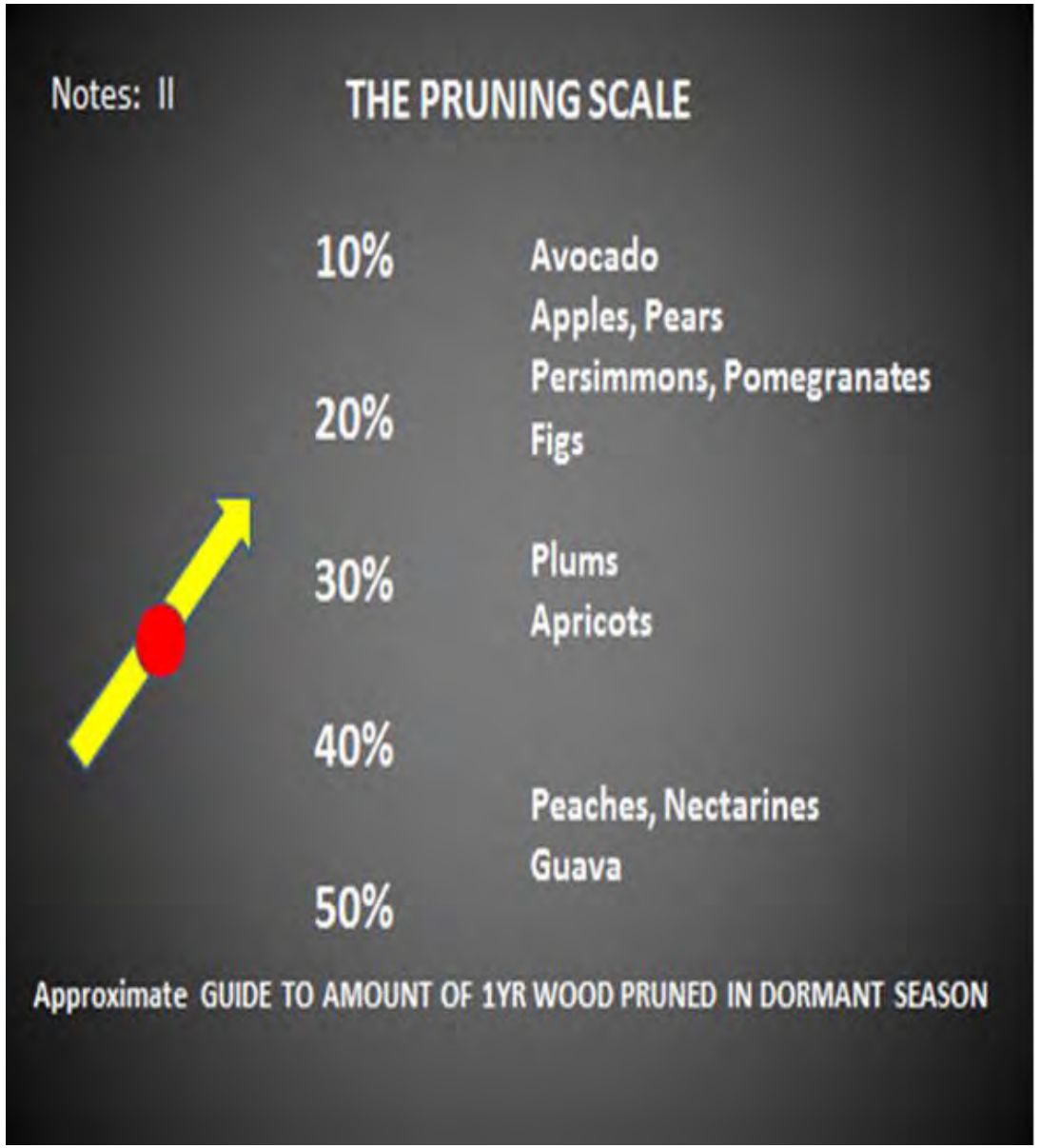
Remove unhealthy branches (the three D's)

- Dead
- Damaged
- Diseased

Remove unwanted growth

- Suckers
- Water sprouts
- Rubbing branches
- Crowed branches
- Downward pointing or poorly aligned branches
- Twiggy growth

Pruning for Fruit Production



A few examples

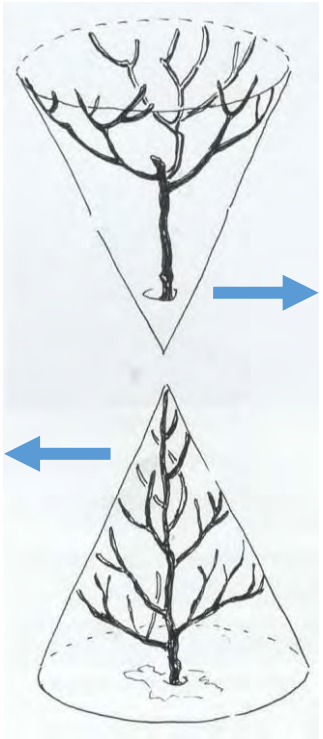
- Peaches, Nectarines produce flowers and fruit on last season's growth (1-year-old wood) and need to be pruned heavily each year to renew the fruiting wood
- Pomegranates and persimmons bear fruit on new growth and require renewal pruning of older branches only ever few years
- Most apples flower and fruit on long-lived spurs that should be left along for the 6 to 10 years that they will be productive

Pruning: Training Systems

Stone fruit, apple and pear trees need to be properly pruned and trained the first two years to develop a structure of strong scaffold branches.

Central Leader (apple)

Vase-shape



Cone-shape

Open Center (stone fruit)

UNIVERSITY OF CALIFORNIA
Agriculture and Natural Resources
UC Master Gardener Program

Thinning Fruit

- Increases fruit size and quality
- Prevents limb breakage
- Discourages alternate bearing

Alternate Bearing: a tendency to produce a heavy crop in one year that leads to little or no crop the next year

June Drop: many fruit trees, including apples, pears and citrus naturally thin their crop in early summer

Figure 16.41

Fruit thinning in peach. Same branch before (left) and after (right) thinning. *Source:* After LaRue and Johnson 1989, pp. 58, 59.

California Master Gardener Handbook

Some Fruit Trees Need a Companion

Many varieties of apples, loquats, pears, plums, plum hybrids and cherries are **self-incompatible** (or self-sterile) and require pollination from another variety to produce fruit.

An Elephant Heart plum requires cross-pollination from another variety of plum such as Beauty or Santa Rosa

Other varieties are only **partially self-incompatible** and can produce a small crop on their own but will produce more and better-quality fruit when cross-pollinated by a compatible variety.

A **pollenizer** is a compatible plant that provides pollen
vs
A **pollinator** is the biotic agent that moves the pollen (e.g. bees, butterflies & birds)

Other Fruit Trees are Self-Fruitful

Many types of fruit trees are self-fertile, producing abundant crops of high-quality fruit without the help of a companion pollenizer.

Apricot
Blackberry
Blueberry

Citrus
Jujube
Nectarine

Peach
Pomegranate
Quince

Raspberry
Strawberry

Some varieties of apples, loquats, pears, plums, plum hybrids and cherries are considered to be self-fruitful, but will produce fruit more reliably when cross-pollinated

Trees that Bear Fruit Without Pollination

Banana (top), wild banana (bottom)

- Bananas
- Bartlett pears
- Clementines
- Figs
- Grapes
- Navel oranges
- Persimmons
- Pineapples
- Prickly pears (tunas)

Fuyu persimmon

Parthenocarpy – the development of fruit without prior fertilization

Cocktail Fruit Trees (Multi-grafted)

Newly planted 4-in-1 pluot

Multi-budded Pluot

Planting Multiple Trees in One Hole

Four peach trees in one hole:
May Pride, Eva's Pride,
Mid Pride & August Pride

Advantages

- Have multiple varieties in the space needed for a single tree
- Good cross-pollination between compatible varieties
- Easier than creating a DIY multi-grafted tree
- Many more variety choices than are available in multi-grafted trees sold by nurseries

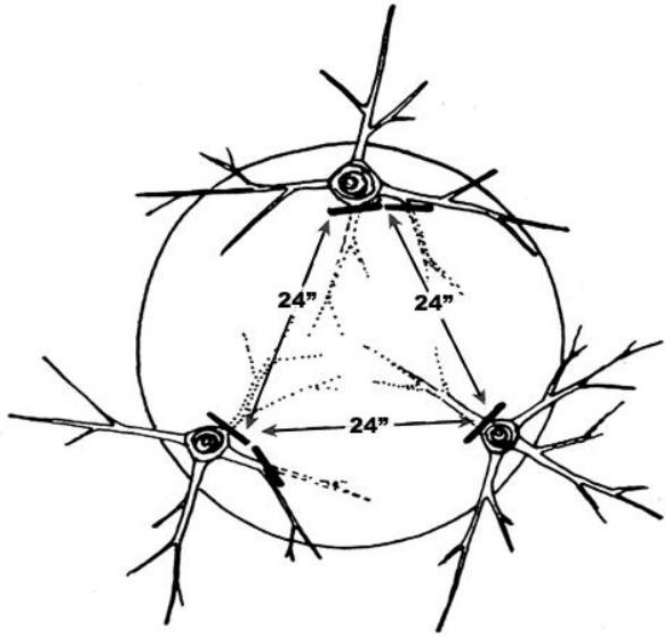
https://youtu.be/W0WM0HFduXI

Tom Spellman's recommendations for multiple planting combinations
https://www.davewilson.com/home-gardens/backyard-orchard-culture/recommendations-multiple-planting

Planting Multiple Trees in One Hole

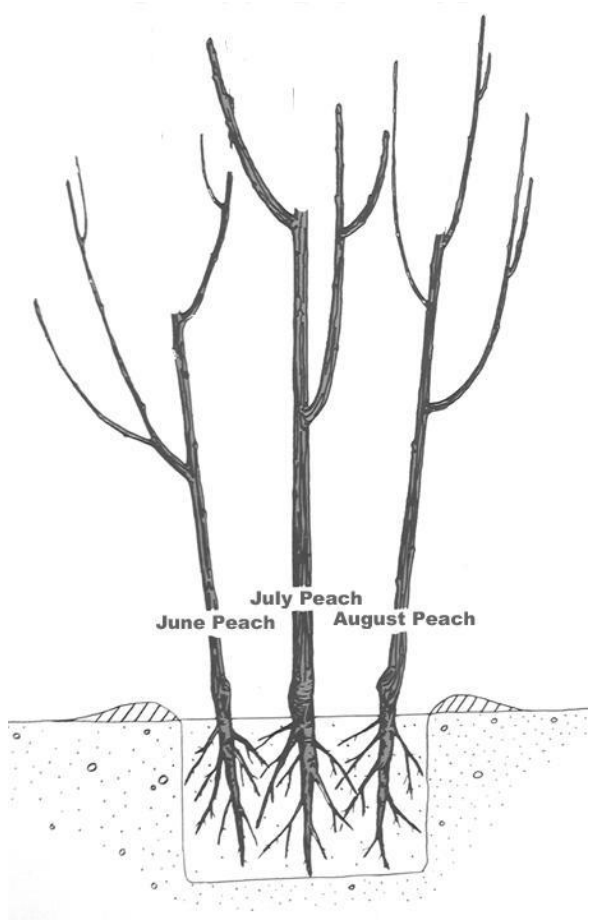
Planting and care

- Select varieties that are closely related
- Select varieties with similar vigor
- Plant each tree 18 to 24 inches apart and ideally angled slightly outward at about 30 degrees from vertical
- When pruning, treat the group as a single open-vase style tree
- Remove branches growing toward the center to allow plenty of sunlight into the interior
- Do not allow any variety to dominate and shade out the others

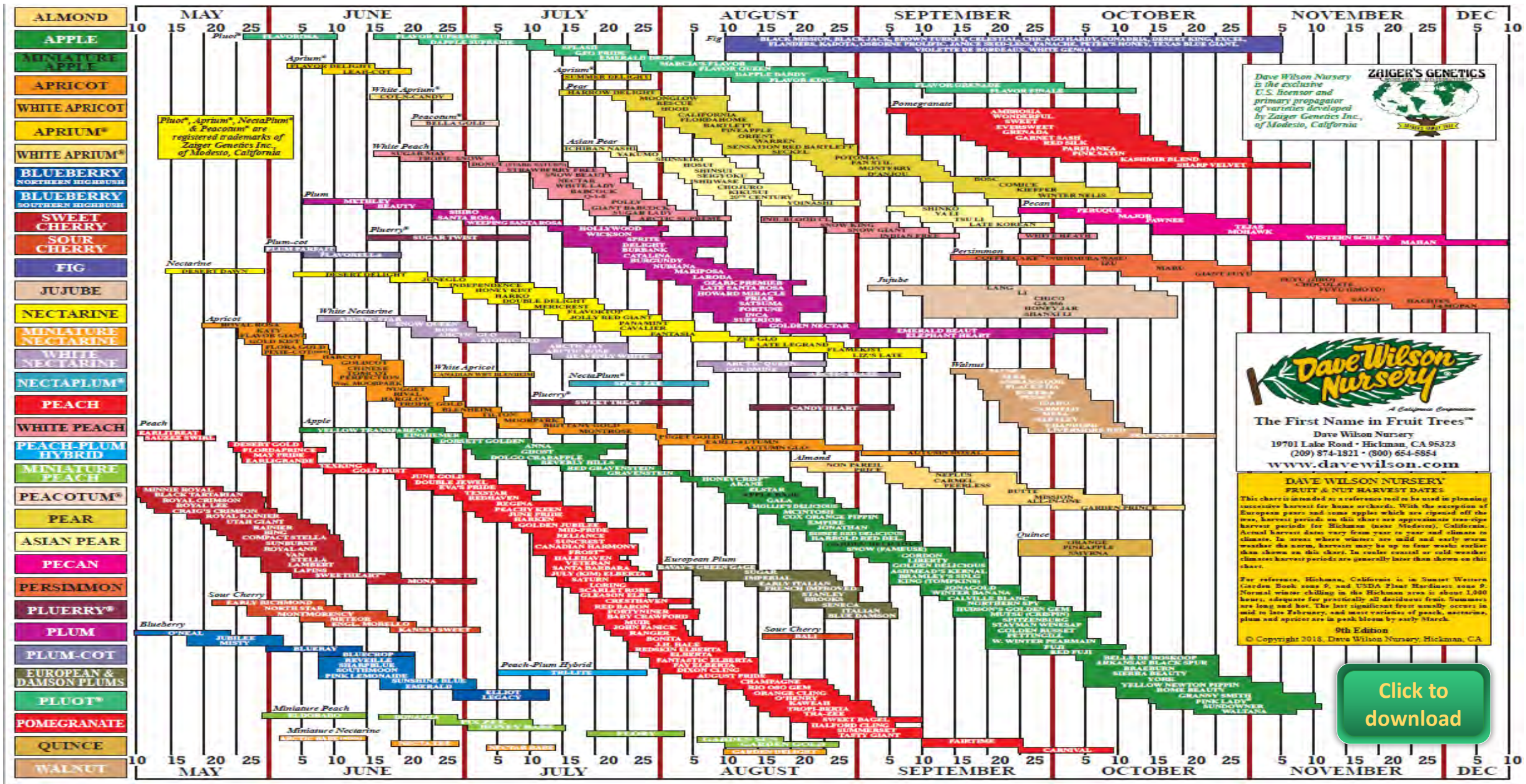


Disadvantages

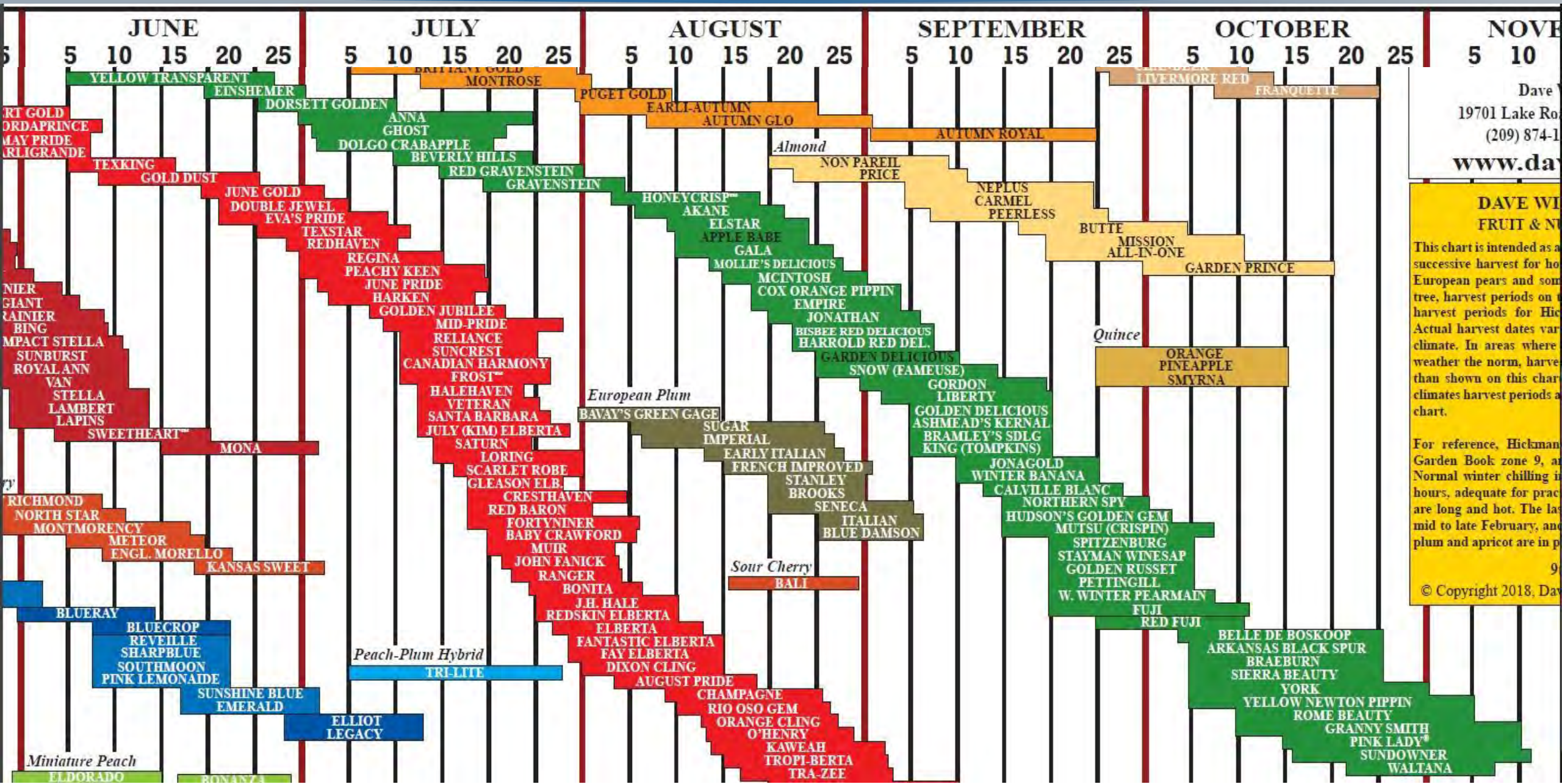
- The size of the trees must be kept in balance so that more vigorous varieties aren't allowed to dominate and shade out the slower growing varieties
- The trees have to compete for water and nutrients, which may be problematic in sandy, fast-draining soils



Harvest Fruit Throughout the Year



Apples Varieties



Common Mistakes

1. High chill variety
2. No companion pollinizer
3. Circling roots
4. Planting too deep
5. Poor soil drainage
6. Sunburn
7. Allowing suckers to take over
8. Failing to thin fruit

Circling roots

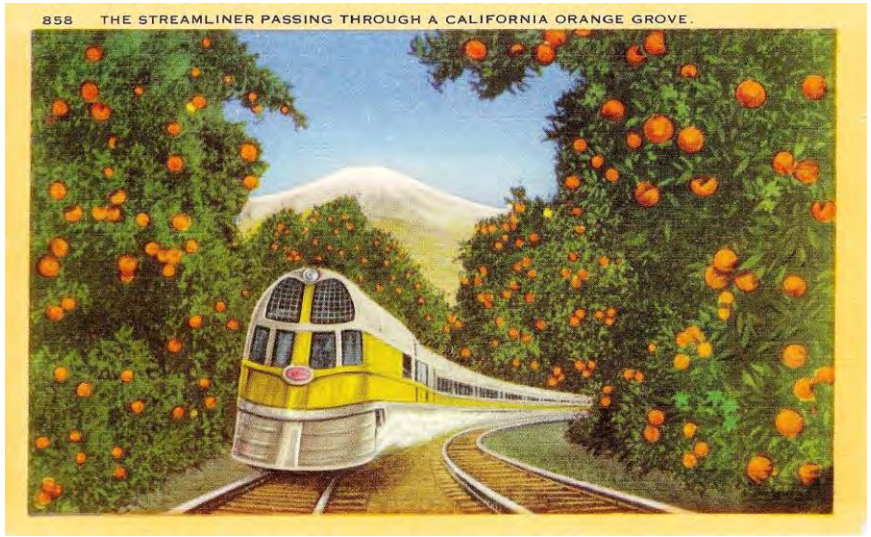
Peach tree: broken branch due to heavy fruit load

Los Angeles: The Orange Empire

Early history of Citrus in California

- 1769 – Father Junipero Serra plants the first citrus seeds in California
- 1804 – the region's **first significant citrus orchard** is planted at the **San Gabriel Mission**
- 1841 – using lemon and orange seedlings from the San Gabriel Mission, **William Wolfskill** planted California's **first commercial citrus grove** on two acres in modern-day downtown Los Angeles
- 1850 – California becomes the 31st state on September 9 (**California Admission Day**)
- 1849 – the **Gold Rush** created a huge demand for citrus to combat scurvy

California's Second Goldrush



First citrus in California:

- A thin-skinned, seedy Spanish sweet orange
- A thick-skinned citron-type lemon

Early history of citrus in CA continued:

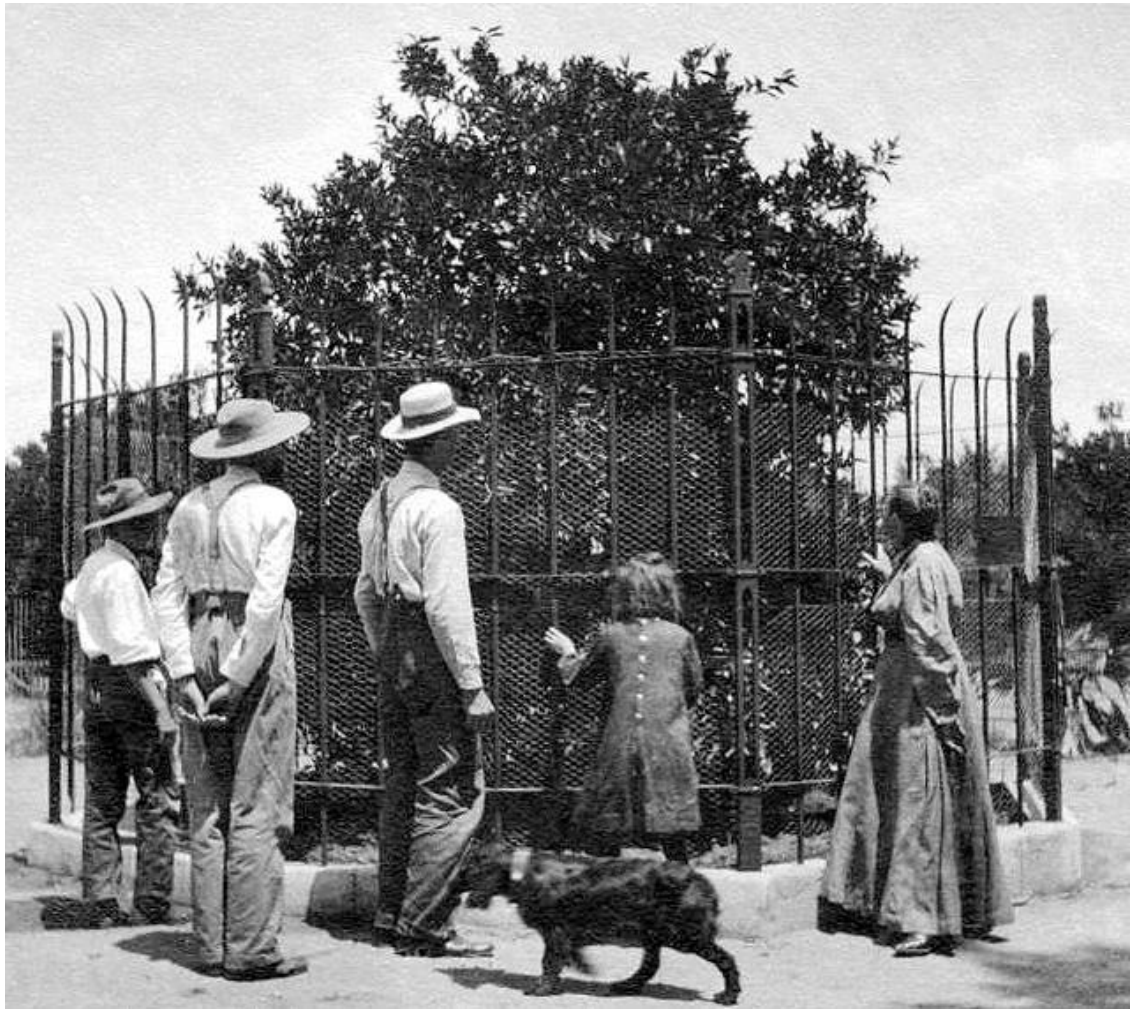
- 1873 – Elizabeth and Luther Tibbets plant the first **Washington navel orange** trees in Riverside
- 1880's – the citrus boom came to be known as **California's Second Gold Rush**
- 1893 – growers form the **Southern California Fruit Exchange**, known today as **Sunkist Growers**
- 1880 to mid-1950's - approximately **10,000 citrus labels** were created during the 75-year period of the wooden shipping box

Two Original Washington Navel Orange Trees

This tree succumbed to phytophthora root rot in 1921

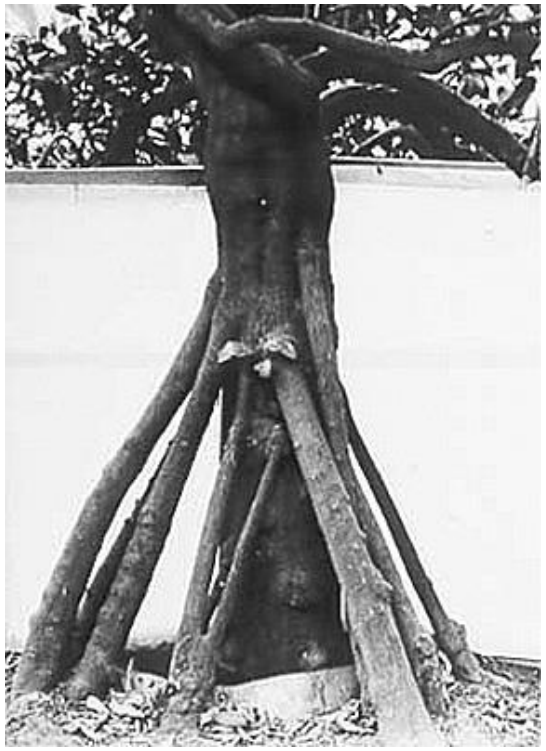
Theodore Roosevelt participated in replanting one of the two original Washington navel orange trees at the Mission Inn in Riverside, May 8, 1903

With Help, the Other Parent Tree Survives



In 1910, the tree appeared to be in good health, but began to show decline about 1915-1917, suffering from Phytophthora root rot

Picture of sapling inarches taken by Dr. L.J. Klotz in 1918



Dr. Klotz photographed the inarches again on July 17, 1944, twenty-six years later

Citrus: A Southern California Favorite

California ranks 2nd in the nation in total citrus production and is the nation's leading producer of fresh citrus

There is at least one citrus tree in 60 percent of the yards in California

Top 5 citrus crops:

1. Navel oranges
2. Mandarins
3. Lemons
4. Valencia oranges
5. Grapefruits

UNIVERSITY OF CALIFORNIA
Agriculture and Natural Resources
UC Master Gardener Program

A Deadly Disease is Infecting Citrus Trees in Southern California

Asian Citrus Psyllid

Huanglongbing
(Citrus Greening Disease)

UNIVERSITY OF CALIFORNIA
Agriculture and Natural Resources
UC Master Gardener Program

Asian Citrus Psyllid (ACP)

The psyllid (pronounced síl - lid) is a small insect, about the size of an aphid

Psyllid Eggs

The female lays her eggs in new **feather flush** growth

Females may lay more than 800 eggs during their lives

The eggs are yellow-orange, tucked into the tips of tiny new leaves. They are difficult to see because they are so small.

UNIVERSITY OF CALIFORNIA
Agriculture and Natural Resources
UC Master Gardener Program

Psyllid Nymphs

The nymphs produce waxy tubules that direct the honeydew away from their bodies. These tubules are unique and easy to recognize

Nymphs can only survive by living on young, tender leaves and stems

ACP Feeding Damage

As the psyllid feeds, it injects a salivary toxin that causes the tips of new leaves to easily break off. If the leaf survives, then it twists as it grows

Twisted, notched leaves can be a sign that psyllids have fed there

Why are we so worried about this psyllid?

The Asian citrus psyllid can pick up the bacterium that causes **Huanglongbing** (HLB) disease and move the disease from citrus tree to citrus tree as it feeds.

Huanglongbing means **yellow shoot disease** or **yellow dragon disease** in Chinese

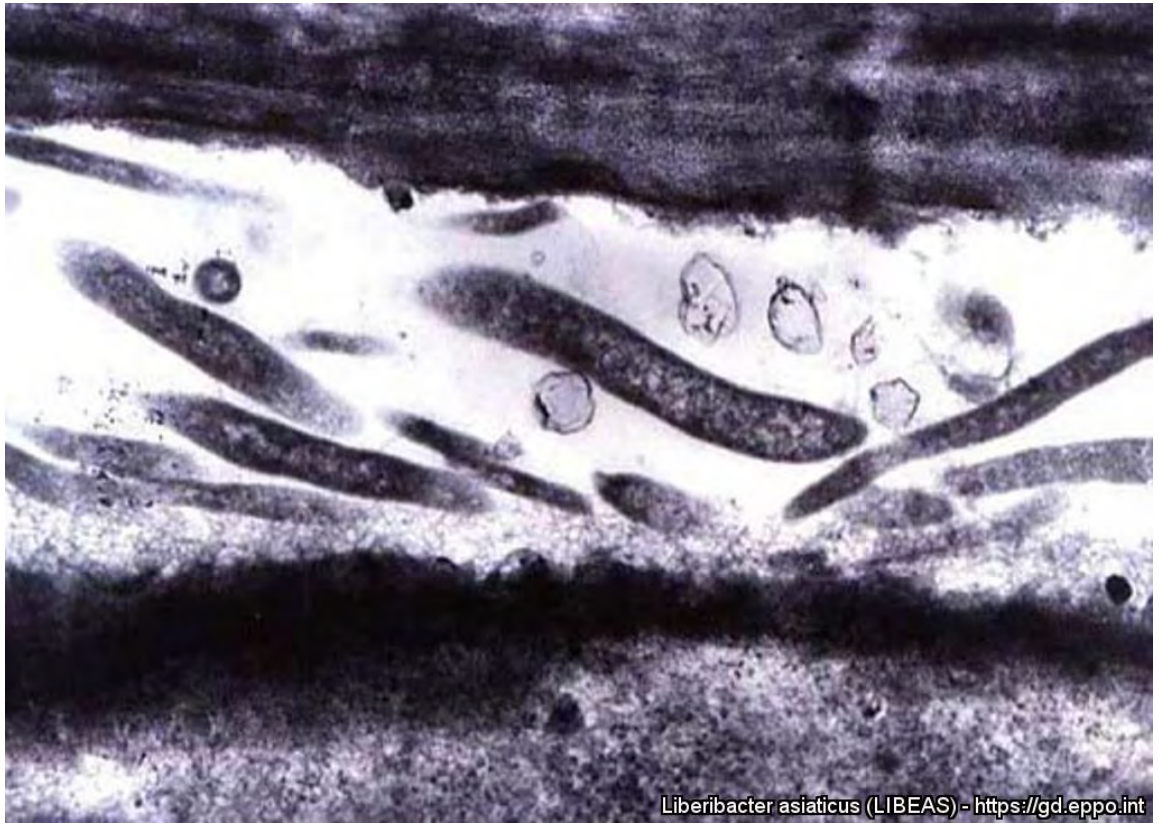
The bacterium blocks nutrient flow in the tree

It causes the leaves on some of the branches of citrus to turn yellow

Candidatus Liberibacter asiaticus (CLas)

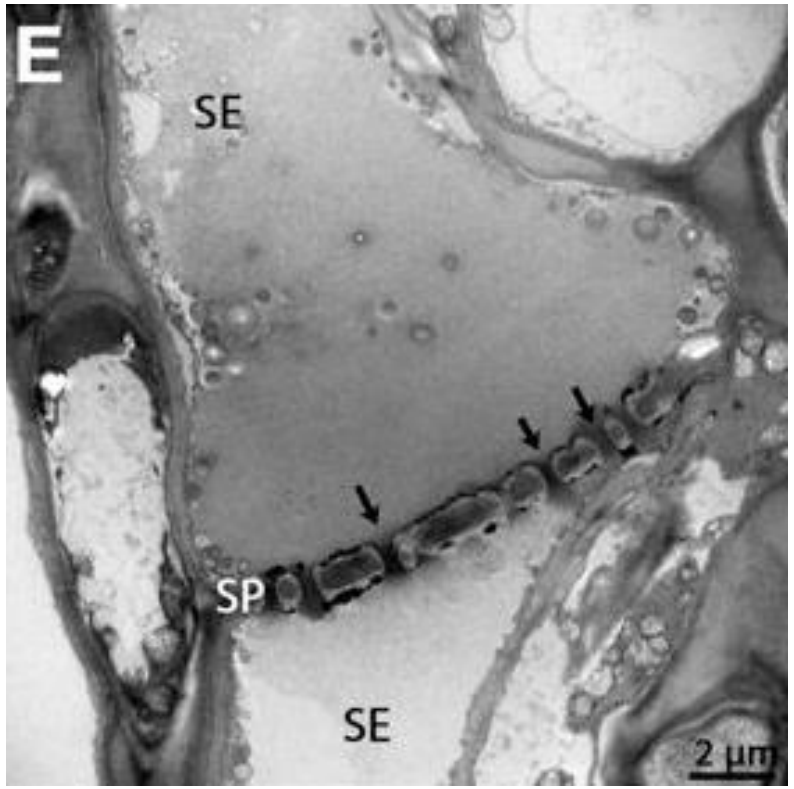
CLas is a phloem-restricted, non-cultured, gram-negative bacteria

Transmission electron microscopy (TEM) image of CLas bacteria in the phloem of sweet orange



Left: http://www.plantphysiol.org/content/182/2/882
Right: https://swfrec.ifas.ufl.edu/hlb/database/pdf/00000377.pdf

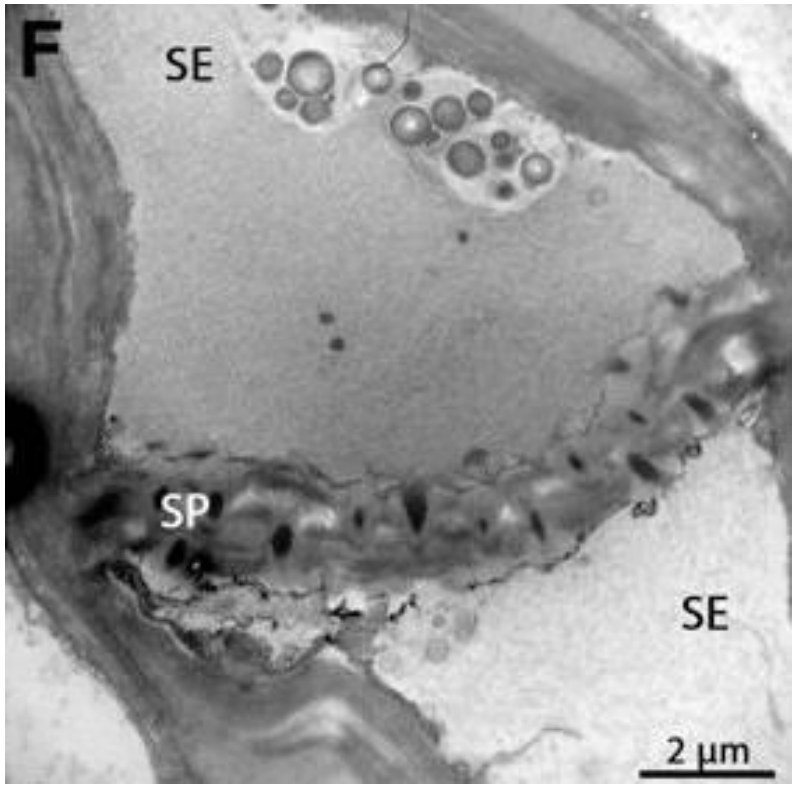
CLas Causes Plugging of Phloem Cells



Sieve elements showing an accumulation of callous, plugging the pores in the sieve plates and blocking the flow of photosynthates in sweet orange flush

← Low levels of callous

High levels of callous →



- **Phloem** - the vascular tissue that carries the photosynthates to various parts of the plant
- **Sieve Elements** (SE) – the main conductive cells in the phloem
- **Sieve Plates** (SP) – the porous connections between sieve elements

TEM micrographs of sieve plates
Plant Physiology, Feb 2020
www.plantphysiol.org/content/182/2/882

HLB Leaf Symptoms

Leaf discoloration can range from slight to nearly completely yellow

In addition to yellow mottling, the veins of the leaf may be thickened

HLB vs Nutrient Deficiency

Leaves with HLB disease have a blotchy yellow pattern that is not the same on both sides of the leaf

Leaves with nutrient deficiencies generally have the same yellow pattern on both sides of the leaf

Huanglongbing

Stages of Iron deficiency

Zinc Deficiency

HLB Fruit Symptoms

HLB disease prevents the fruit from developing the proper color

As the tree sickens, the fruit becomes small, oddly shaped, with bitter juice

The lower half of the fruit may remain green

UNIVERSITY OF CALIFORNIA
Agriculture and Natural Resources
UC Master Gardener Program

Symptoms of HLB on Sweet Orange

Yellowing leaves in one sector of the canopy

Thinning canopy, yellow leaves and fruit with color inversion

UNIVERSITY OF CALIFORNIA
Agriculture and Natural Resources
UC Master Gardener Program

There is no cure for the disease!

In as little as 5 years after an infection, the tree stops bearing fruit and eventually dies

Older trees typically survive longer than younger trees

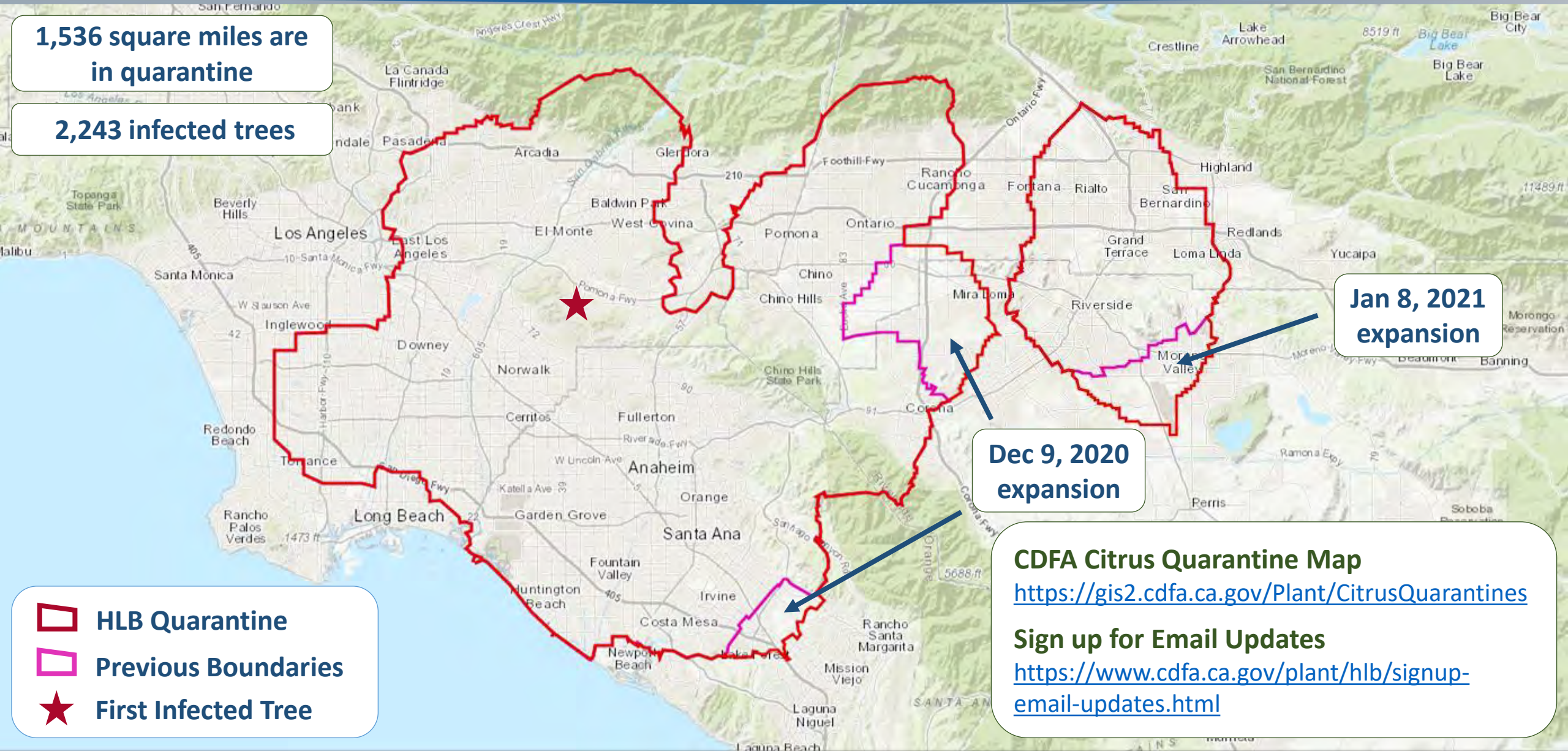
Dead trees being removed from a Florida grove

Watch as a CDFA crew removes the first HLB infected tree in California

HLB has been found in Los Angeles, Orange, Riverside & San Bernardino Counties

1,536 square miles are in quarantine

2,243 infected trees

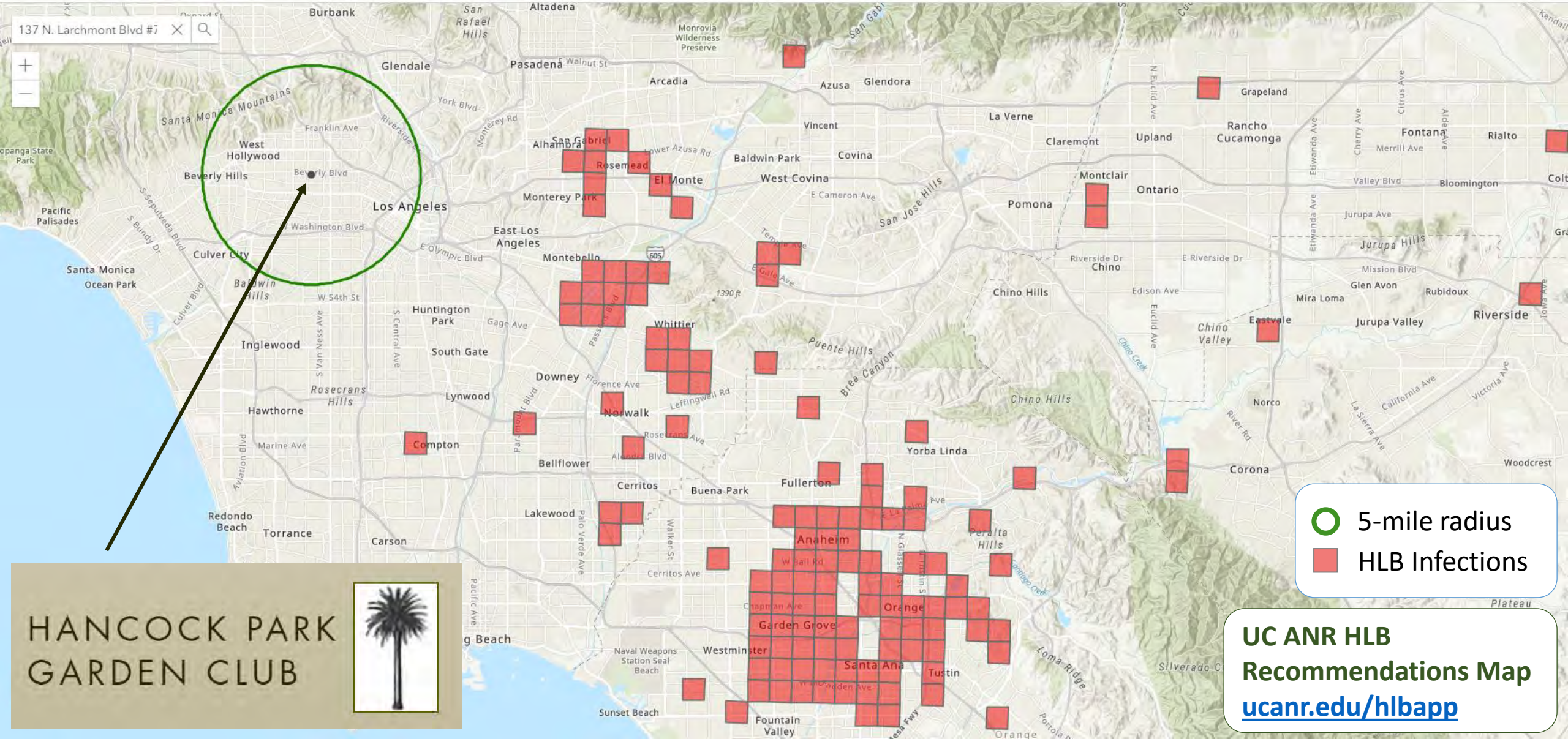


CDFA Citrus Quarantine Map
https://gis2.cdfa.ca.gov/Plant/CitrusQuarantines

Sign up for Email Updates
https://www.cdfa.ca.gov/plant/hlb/signup-email-updates.html

HLB Recommendations Map

You are more than **5 miles** from an HLB detection (colored boxes). Regularly check the map and protect citrus trees by treating for psyllids and controlling ants.



HANCOCK PARK GARDEN CLUB

UC ANR HLB Recommendations Map
ucanr.edu/hlbapp

The Huntington's orange grove is threatened

Remove and replace your tree with a non-citrus fruit tree.

You are within **2 miles** of an HLB detection (colored boxes). Tree removal is occurring near you and your tree is likely infected with HLB even if it is not showing symptoms.

The Huntington Library, Art Collections and Botanical Gardens

- 2-mile radius
- 5-mile radius
- HLB Infections

UC ANR HLB Recommendations Map
ucanr.edu/hlbapp

What can we do as home citrus growers?

Inspect our trees, especially when new flush is present

Ways to Reduce Psyllid Populations

Provide habitat for beneficial insects like lady beetles, lacewings, syrphid flies, parasitoid wasps and spiders

Cilantro in flower

Use soft insecticides like horticultural oils and insecticidal soaps

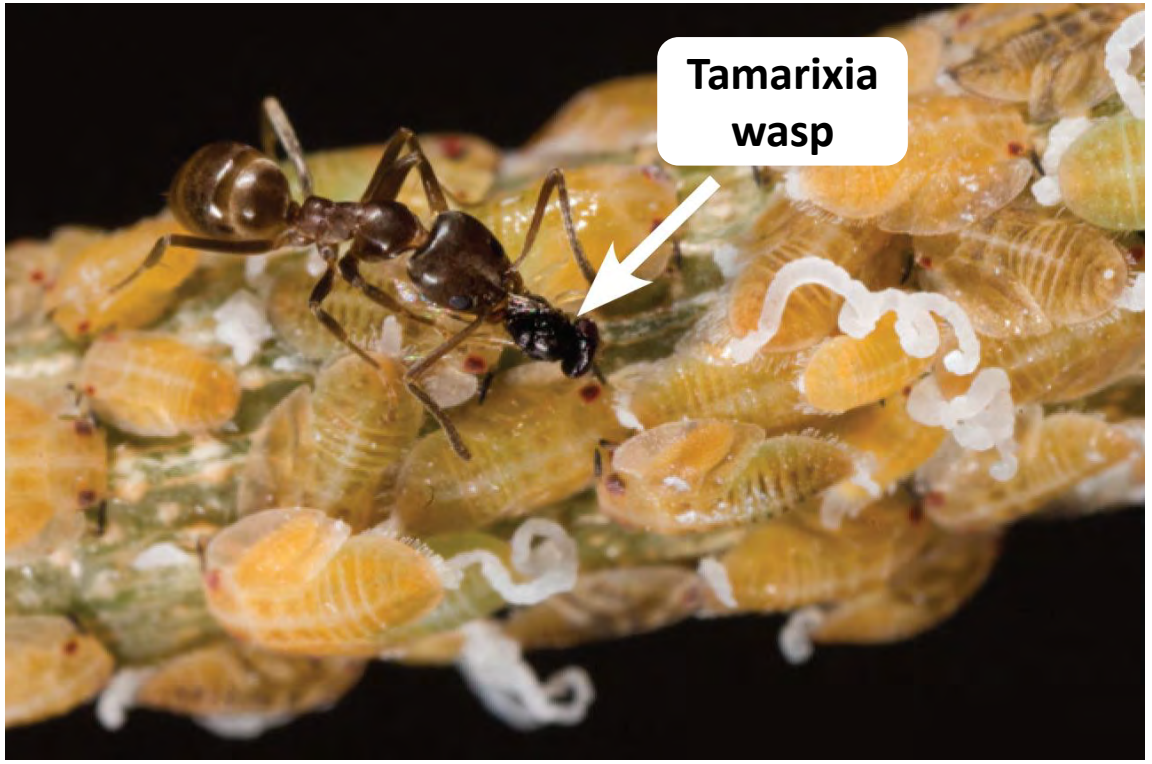
Control ants with low-toxicity baits and sticky barriers

http://ipm.ucanr.edu/PMG/GARDEN/CONTROLS/antmanagement.html

Ant Control is Critical

It is critical to control ants, because they feed on the honeydew that the nymphs produce in the white tubules, and they aggressively prevent natural enemies from attacking the psyllid nymphs.

Ant tending an ACP nymph



Ant attacking a Tamarixia wasp, prevent it from laying an egg under an ACP nymph

Watch Argentine ants attacking Tamarixia wasps
https://youtu.be/VGXay2RYDuI

Ways to Safely Handle Pruning Waste

To avoid spreading the Asian Citrus Psyllid:

- **Dry out the cuttings for two weeks before putting them in the greens can, or**
- **Double bag cuttings and dispose as regular trash**

Sharing Fruit within the HLB Quarantine

Officially:
Within the HLB quarantine homegrown citrus fruit should not be moved offsite

Practically:
The psyllids can't live on citrus fruit. So as long as you brush or wash the fruit and make sure it is free of leaves and twigs before transporting it, it is ok to move it

CDFA Pest Hotline

Immediately Report Suspected Cases of HLB

If You Find it: Act Fast, Time is Critical

Call
800/491-1899

If you think you found **HLB symptoms** on your tree:

- Time is critical.
- Secure psyllids and leaf samples in a clear, locked sandwich bag, jar or plastic container.
- Contact your local Agricultural Commissioner's office or call the California Department of Food and Agriculture hotline immediately.

PestHotline@cdfa.ca.gov

Include photos of insects, damage or disease

A Promising Treatment

In July, UC Riverside plant geneticist Dr. Hailing Jin announced the discovery of an **antimicrobial peptide in Australian finger limes** that is effective against the bacteria that causes Huanglongbing disease

Microcitrus australasica

'Citrus caviar'

UNIVERSITY OF CALIFORNIA
Agriculture and Natural Resources
UC Master Gardener Program

UC Integrated Pest Management (IPM)

Pest Notes, Publication 74155
Revised September 2018

UC IPM

UC PEER REVIEWED

Asian Citrus Psyllid and Huanglongbing Disease

Integrated Pest Management for Home Gardeners and Landscape Professionals

The Asian citrus psyllid (Figure 1), *Diaphorina citri*, is a tiny, mottled brown insect about the size of an aphid. This insect poses a serious threat to California's citrus trees because it vectors the pathogen that causes huanglongbing disease (HLB). This disease is the most serious threat to citrus trees worldwide—including those grown in home gardens and on farms. The psyllid feeds on all varieties of citrus (e.g., oranges, grapefruit, lemons, and mandarins) and several closely related ornamental plants in the family Rutaceae (e.g., calamondin, box orange, Indian curry leaf, and orange jessamine/orange jasmine).

Figure 1. Brownish adult, yellow nymphs, and white wax of the Asian citrus psyllid, *Diaphorina citri*.

The Asian citrus psyllid (or ACP), damages citrus directly by feeding on newly developed leaves (flush) (Figure 2). However, more seriously, the insect is a vector of the bacterium *Candidatus* Liberibacter asiaticus, associated with the fatal citrus disease HLB, also called citrus greening disease. The psyllid takes the bacteria into its body when it feeds on bacteria-infected plants. The disease spreads when a bacteria-carrying psyllid flies to a healthy plant and injects bacteria into it as it feeds.

HLB can kill a citrus tree in as little as 5 years, and there is no known cure or remedy. All commonly grown citrus varieties are susceptible to the pathogen. The only way to protect trees is to prevent the spread of the HLB pathogen by controlling psyllid populations and destroying any infected trees.

The Asian citrus psyllid is widely distributed throughout Southern California and is becoming more widespread in the Central Valley and further north. The first tree with HLB was found in March 2012 in a home garden in Los Angeles County and a few years later was found in residences in Orange and Riverside Counties. Spread of the disease began to rapidly accelerate in these areas in 2017. Removal of infected trees by the California Department of Food and Agriculture (CDFA) has occurred wherever they have been found.

The presence of HLB in pockets of Southern California emphasizes that it is critical to control psyllid populations so that disease spread is limited.

Authors:
Elizabeth E. Grafton-Cardwell, Entomology, UC Riverside and Lindcove Research and Extension Center.
Matthew P. Daugherty, Entomology, UC Riverside.

Figure 2. Adults feed on and deposit yellow-orange eggs on the newly developing citrus flush.

BACKGROUND

The Asian citrus psyllid and the HLB disease originated in eastern Asia or the Indian subcontinent and then spread to other areas of the world where citrus is grown. The psyllid was first found in the United States in 1998 in Palm Beach County, Florida on

http://ipm.ucanr.edu/PMG/PESTNOTES/pn74155.html

Fruit & Nuts

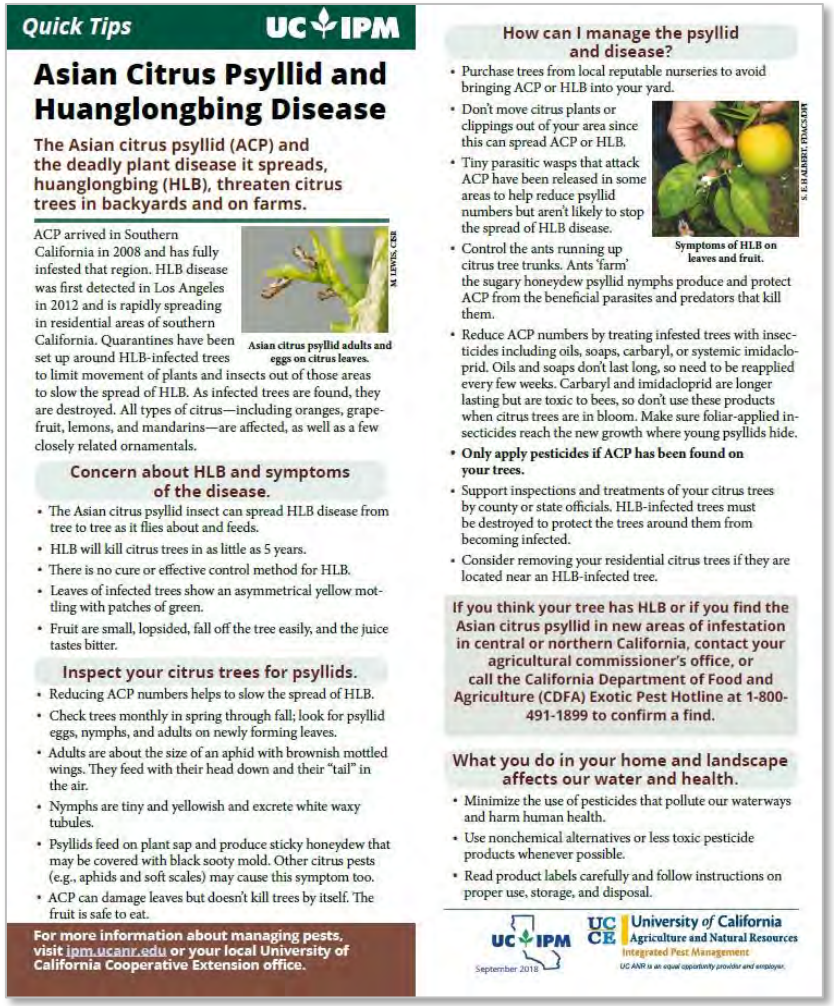
ipm.ucanr.edu/PMG/GARDEN/fruit.html

Vegetables

ipm.ucanr.edu/PMG/GARDEN/veggies.html

Plant Problem Diagnostic Tool

www2.ipm.ucanr.edu/diagnostics/



Quick Tips UC IPM

Asian Citrus Psyllid and Huanglongbing Disease

The Asian citrus psyllid (ACP) and the deadly plant disease it spreads, huanglongbing (HLB), threaten citrus trees in backyards and on farms.

ACP arrived in Southern California in 2008 and has fully infested that region. HLB disease was first detected in Los Angeles in 2012 and is rapidly spreading in residential areas of southern California. Quarantines have been set up around HLB-infected trees to limit movement of plants and insects out of those areas to slow the spread of HLB. As infected trees are found, they are destroyed. All types of citrus—including oranges, grapefruit, lemons, and mandarins—are affected, as well as a few closely related ornamentals.

Asian citrus psyllid adults and eggs on citrus leaves.

Concern about HLB and symptoms of the disease.

- The Asian citrus psyllid insect can spread HLB disease from tree to tree as it flies about and feeds.
- HLB will kill citrus trees in as little as 5 years.
- There is no cure or effective control method for HLB.
- Leaves of infected trees show an asymmetrical yellow mottling with patches of green.
- Fruit are small, lopsided, fall off the tree easily, and the juice tastes bitter.

Inspect your citrus trees for psyllids.

- Reducing ACP numbers helps to slow the spread of HLB.
- Check trees monthly in spring through fall; look for psyllid eggs, nymphs, and adults on newly forming leaves.
- Adults are about the size of an aphid with brownish mottled wings. They feed with their head down and their "tail" in the air.
- Nymphs are tiny and yellowish and excrete white waxy tubules.
- Psyllids feed on plant sap and produce sticky honeydew that may be covered with black sooty mold. Other citrus pests (e.g., aphids and soft scales) may cause this symptom too.
- ACP can damage leaves but doesn't kill trees by itself. The fruit is safe to eat.

For more information about managing pests, visit ipm.ucanr.edu or your local University of California Cooperative Extension office.

How can I manage the psyllid and disease?

- Purchase trees from local reputable nurseries to avoid bringing ACP or HLB into your yard.
- Don't move citrus plants or clippings out of your area since this can spread ACP or HLB.
- Tiny parasitic wasps that attack ACP have been released in some areas to help reduce psyllid numbers but aren't likely to stop the spread of HLB disease.
- Control the ants running up citrus tree trunks. Ants 'farm' the sugary honeydew psyllid nymphs produce and protect ACP from the beneficial parasites and predators that kill them.
- Reduce ACP numbers by treating infested trees with insecticides including oils, soaps, carbaryl, or systemic imidacloprid. Oils and soaps don't last long, so need to be reapplied every few weeks. Carbaryl and imidacloprid are longer lasting but are toxic to bees, so don't use these products when citrus trees are in bloom. Make sure foliar-applied insecticides reach the new growth where young psyllids hide.
- **Only apply pesticides if ACP has been found on your trees.**
- Support inspections and treatments of your citrus trees by county or state officials. HLB-infected trees must be destroyed to protect the trees around them from becoming infected.
- Consider removing your residential citrus trees if they are located near an HLB-infected tree.

Symptoms of HLB on leaves and fruit.

If you think your tree has HLB or if you find the Asian citrus psyllid in new areas of infestation in central or northern California, contact your agricultural commissioner's office, or call the California Department of Food and Agriculture (CDFA) Exotic Pest Hotline at 1-800-491-1899 to confirm a find.

What you do in your home and landscape affects our water and health.

- Minimize the use of pesticides that pollute our waterways and harm human health.
- Use nonchemical alternatives or less toxic pesticide products whenever possible.
- Read product labels carefully and follow instructions on proper use, storage, and disposal.

UC IPM September 2018 — UC CE University of California Agriculture and Natural Resources Integrated Pest Management

UC ANR is an equal opportunity provider and employer.

http://ipm.ucanr.edu/QT/asiancitruscard.html

UNIVERSITY OF CALIFORNIA
Agriculture and Natural Resources
UC Master Gardener Program

USDA MyPlate Dietary Guidelines

10 tips Nutrition Education Series

MyPlate MyWins

Based on the Dietary Guidelines for Americans

Focus on fruits

Eating fruit provides health benefits. People who eat more vegetables and fruits as part of an overall healthy eating style are likely to have a reduced risk of some chronic diseases. Fruits provide nutrients vital for health, such as potassium, dietary fiber, vitamin C, and folate. Focus on whole fruits—fresh, canned, frozen, or dried—instead of juice. The sugar naturally found in fruit does not count as added sugar.

1 Keep visible reminders
Keep a bowl of whole fruit on the table, counter, or in the refrigerator.

2 Experiment with flavor
Buy fresh fruits in season when they may be less expensive and at their peak flavor. Use fruits to sweeten a recipe instead of adding sugar.

3 Think about variety
Buy fruits that are dried, frozen, and canned (in water or 100% juice) as well as fresh, so that you always have a supply on hand.

4 Don't forget the fiber
Make most of your choices whole or cut-up fruit, rather than juice, for the benefits that dietary fiber provides.

5 Include fruit at breakfast
At breakfast, top your cereal with bananas, peaches, or strawberries; add blueberries to pancakes; drink 100% orange or grapefruit juice. Or, try a fruit mixed with fat-free or low-fat yogurt.

6 Try fruit at lunch
At lunch, pack a tangerine, banana, or grapes to eat or choose fruits from a salad bar. Individual containers of fruits like peaches or applesauce are easy to carry and convenient for lunch.

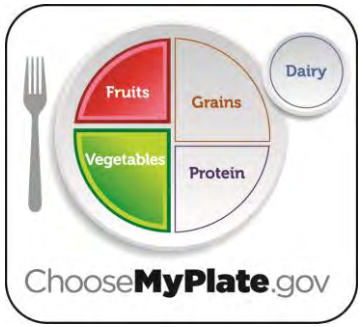
7 Enjoy fruit at dinner, too
At dinner, add crushed pineapple to coleslaw or include orange sections, dried cranberries, or grapes in a tossed salad. Try fruit salsa on top of fish.

8 Snack on fruits
Fruits make great snacks. Try dried fruits mixed with nuts or whole fruits like apples. They are easy to carry and store well.

9 Be a good role model
Set a good example for children by eating fruit every day with meals or as snacks.

10 Keep fruits safe
Rinse fruits before preparing or eating them. Under clean, running water, rub fruits briskly to remove dirt and surface microorganisms. After rinsing, dry with a clean towel.

1. Fruits and vegetables provide several **nutrients** that are under consumed in the United States
2. Consumption of fruits and vegetables is associated with **reduced risk** of many chronic diseases
3. Most vegetables and fruits, when prepared without added fats or sugars, are relatively **low in calories**



UNIVERSITY OF CALIFORNIA
Agriculture and Natural Resources
UC Master Gardener Program

Healthy Recipes

visit eatFresh.org Tasty Recipes On Your Budget #eatfreshCA

Apple Celery Slaw with Nuts

We made this once for a group event, but did not have any mustard. We used curry powder, instead, and it was delicious!

Ingredients

2 tablespoons apple cider vinegar
¼ teaspoon mustard
2 tablespoons olive oil
3 apples, *diced (skin on)*
2 large celery ribs, *cut into ¼ inch-thick pieces*
2 cups raw cabbage, *shredded*
¼ cup nuts, *chopped*
Chopped parsley (optional)

Directions

1. Whisk the vinegar with the mustard in a large bowl.
2. Add oil in a stream, whisking until blended.
3. Toss apples, celery, and cabbage with dressing.
4. Just before serving, sprinkle with nuts and parsley (if using).

❋ *Tip: Use roasted nuts for extra crunch and nutty flavor.*

Nutrition Information *per 1 cup serving*:
Calories 137 Carbohydrates 16g Fiber 9g Protein 3g Total Fat 8g Sat. Fat 1g Sodium 115mg

Source: Leah's Pantry

去 eatFresh.org #eatfreshCA

秋季鮮沙拉

美味沙拉配時令蔬菜和水果，成就美好的秋天!

准备 20 分鐘 | 供应 5 份量: 1 杯

用料

1 杯 小菠菜
1 杯 混合各種生菜
2 梨 去核切碎
2 蘋果 去核切碎
1 蔥 切碎
6 安士 藍乳酪 (可選)
1 瓣蒜 切碎
⅛ 杯 米醋
⅛ 杯 檸檬汁
1 汤匙 蜂蜜
1 汤匙 芥末
¼ 杯 橄欖油

做法

1. 混合橄欖油、米醋、檸檬汁、蜂蜜、芥末、蒜茸、鹽和胡椒。調料做好後放在一邊。
2. 在大碗中混入嫩菠菜、各種生菜混合、梨、蘋果和青蔥。把調料澆在沙拉上，然後上桌。藍乳酪單獨上桌，放在沙拉旁邊。

营养信息份量 熱量 310 碳水化合物 26g 纖維素 4g
蛋白質 8g 脂肪總量 21g 飽和脂肪 8g 钠 590mg

資料來源 UC CalFresh, Shaping Healthy Choices

所有內容均由美國農業部（USDA）的補充營養援助計劃（SNAP）提供資助，該計劃在加州被稱為CalFresh。USDA提供平等的機會和工作。如需詳細瞭解CalFresh的資訊，請致電1-877-847-3663。

visite eatFresh.org Recetas Sabrosas Bajo su Presupuesto #eatfreshCA

Ensalada Fresca de Otoño

¡Una ensalada deliciosa con frutas y verduras en temporada para un buen día de otoño!

Ingredientes

1 taza de espinaca baby
1 taza de una mezcla de lechuga de primavera
2 peras, *sin corazón y picadas*
2 manzanas, *sin corazón y picadas*
1 cebollita verde, *picada*
6 onzas de queso azúl (opcional)
1 ajo, *picado*
⅛ taza de vinagre de arroz
⅛ taza de jugo de limón
1 cucharada de miel
1 cucharada de mostaza
¼ taza de aceite de oliva

Instrucciónes

1. Mezcle el aceite de oliva, el vinagre de arroz, el jugo de limón, la miel, la mostaza, el ajo picado, la sal y la pimienta. Póngalos a un lado.
2. En un recipiente grande, combine la espinaca baby, la mezcla de lechuga de primavera, las peras, las manzanas y las cebollitas verdes. Vacíe el aderezo sobre la ensalada y sírvala. Sirva el queso azul por separado.

Información Nutricional *por porción de 1 taza*:
Calorías 310 Carbohidratos 26g Fibra 4g Proteínas 8g Grasa Total 21g Grasa Sat. 8g Sodio 590mg

Origen: UC CalFresh, *Shaping Healthy Choices*

UNIVERSITY OF CALIFORNIA
Agriculture and Natural Resources
UC Master Gardener Program

Alternatives to Citrus website

http://ucanr.edu/alts2citrus

UNIVERSITY OF CALIFORNIA
Agriculture and Natural Resources
UC Master Gardener Program

Learn More About Fruit Trees & Orchard Care

The California Backyard Orchard
http://homeorchard.ucanr.edu/
The **Fruits and Nuts** section covers 24 of the most common fruit and nut trees grown in California backyards

California Rare Fruit Growers
https://crfg.org/
A non-profit organization for fruit enthusiasts based in California with four chapters in LA County

Recommend reading…

California Master Gardener Handbook (Dennis R. Pittenger, 2015)
The Home Orchard (Chuck A. Ingels, Pamela M. Geisel, Maxwell V. Norton, 2007)
Fruit Trees for Every Garden (Orin Martin, 2019)

Nursery & Plant Providers (A list compiled by the California Rare Fruit Growers)
https://crfg.org/home/library/crfg-member-nurseries/

Master Gardener Program

LA County Master Gardener website

http://celosangeles.ucanr.edu/UC_Master_Gardener_Program/

Find useful gardening tips, learn more about the Master Gardener program, request a Master Gardener for an upcoming event or to get a question answered by our helpline volunteers.

Additional resources…

Facebook: https://www.facebook.com/Master-Gardener-Program-UC-Cooperative-Extension-Los-Angeles-County-124160624772

YouTube: https://www.youtube.com/channel/UCV5VatlzLNthp9GE0BAKyeg

Instagram: https://www.instagram.com/ucmastergardenerslosangeles/

Ask an LA County Master Gardener: https://www.facebook.com/groups/MGCommunityResources

Garden-in-Place workshops

Gardening workshops presented the 1st and 3rd Tuesdays at 10 am on Zoom. Upcoming workshops are listed on our FB page. Recordings of previous workshops can be found on our YouTube channel.

Grow LA Victory Garden Initiative

http://ucanr.edu/glavg

A four week beginning gardening series. Spring 2021 classes starts in March at 11 virtual locations.

Click to Sign-up for the Master Gardener Newsletter

UNIVERSITY OF CALIFORNIA
Agriculture and Natural Resources
UC Master Gardener Program

Bare Root Fruit Trees

California

https://www.davewilson.com/product-information/category/fruit-trees
https://www.groworganic.com/collections/bareroot-trees
https://baylaurelnursery.com/order-online/bare-root-fruit-trees.html
https://www.treesofantiquity.com/collections
https://plantingjustice.org/product-category/bareroot/

Out of state

https://www.starkbros.com/products/fruit-trees
https://raintreenursery.com/collections/fruit-trees

Rootstock and scion wood

https://fruitwoodnursery.com/

UNIVERSITY OF CALIFORNIA
Agriculture and Natural Resources
UC Master Gardener Program

Online Survey & Newsletter Sign-up

Alternatives to Citrus Survey for On-Line Workshops

Hello, and thank you for participating in our on-line event about the Asian Citrus Psyllid, Huanglongbing, and fruit trees to consider for your home orchard.

Please help us out be responding to this short survey. It will only take a few minutes. It will help us improve future workshops!

* = Required

What group hosted the workshop? (Eg., name of your garden club). **Hancock Park Garden Club**

Date of event, eg. 03/15/20 **2/23/21**

#1. Would you like to be on our e-mail list to receive occasional recipes, planting and care tips for fruit trees, and gardening information? *If so, you will be entered in a quarterly drawing to win a $100 gift certificate from a local nursery.* We will also contact you by email to ask you to complete a follow-up survey to help us understand the impact of the Master Gardener Program. *

- ◯ Yes
- ◯ No

#2. If yes, please provide your email.

#3. Did you learn about the importance of eating more fruits and vegetables? *

- ◯ Yes
- ◯ No
- ◯ I'm not sure.

Thank You

Jeff Warner
Master Gardener Special
Project Coordinator
jcwarner@ucanr.edu