Growing Citrus and Avocados

Getting Started in the North Bay

UC Cooperative Extension Webinar

October 21, 2025

Citrus and Avocado Agenda

History/Origins
Botany, Flowering & Pollination
Climate Considerations
Site Selection
Site Preparation
Planting & Establishment
- Time of year
- Soil/Hole Prep
- Fertility
- Irrigation

Orchard Management
- Seasonal Activities
- Pruning
- Fertility
- Irrigation
- Frost Protection
- Pests & Diseases

Cultivars/Varieties

Resources

Citrus Geographical Origins

Originally from the topics of SouthEast Asia

- South China
- India
- Vietnam
- Thailand
- Malaysia
- Australia
- Philippines

India/NE China?- Buddha's Hand Citron

Philippines- Calamondin/'Calamansi'

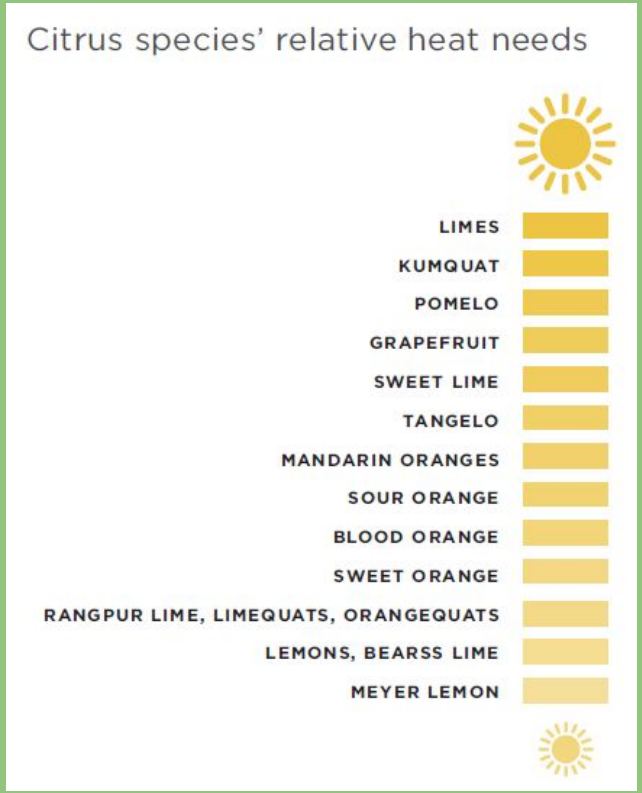
Australian Finger Lime- citrus caviar

Cold Hardiness

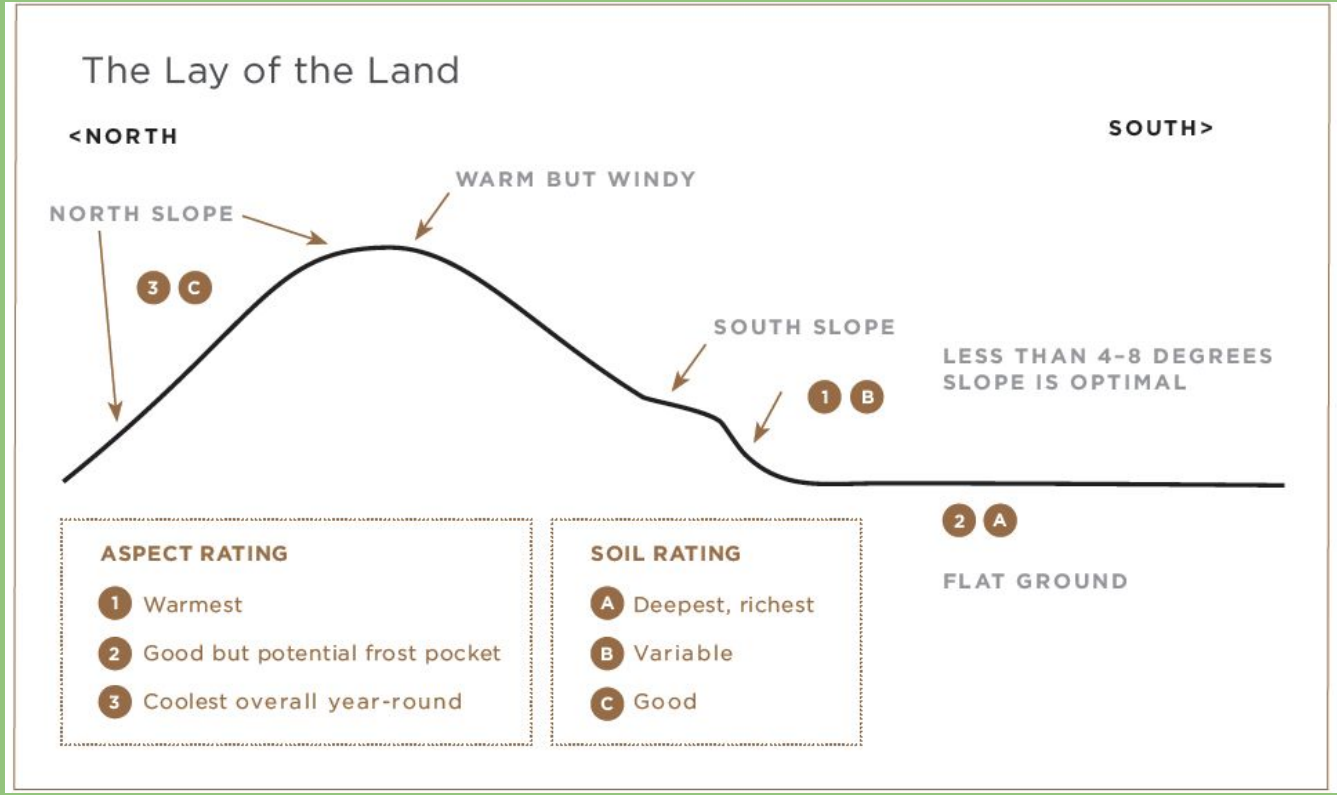
Common citron varieties

CITRUS COLD HARDINESS			
TEMPERATURE	**SPECIES**	**PLACE OF ORIGIN**	**COMMON NAME(S)**
32°F	*Citrus medica*	India	citron, etrog, Buddha's hand
32°F	*C. aurantifolia*	India, Southeast Asia	limes: Mexican, Bearss, key, Tahitian
28°F	*C. limon* or *limonia*	Southeast Asia	lemons
26°F	*C. paradisi* (natural hybrid of lemon and pomelo)	Caribbean	grapefruit
24°F	*C. maxima* or *grandis*	Malaysian Peninsula	pomelo
24°F	*C. paradisi* (grapefruit) *x reticulata* (mandarin)	N/A	tangelo
24°F	*C. sinensis*	Southeast China, Vietnam	oranges: sweet, sour, blood
24°F	*C. nobilis reticulata* x *sinensis*	N/A	Florida oranges: temple, sweet
22°F	*C. reticulata*	Southeast Asia	mandarins, tangerines
22°F	*C. limon* cv. (orange x lemon)	N/A	improved Meyer lemon
20°F	*C. mitis*	Philippines	calamondin
18°F	*Fortunella margarita* and hybrids	Southeast China	kumquat, limequat, orangequat, citrangequat

Site Selection – Sunlight & Heat



Site Selection – Orientation & Lay of the Land



When & Where to Plant

- Plant in late Spring to early Summer
- Techniques to enhance warmth, and
- Improve soil drainage
- High on a South-facing slope
- Location protected from strong winds
- Not on low ground where cold air drains
- Raised bed, Mounding
- Against wall or fence that can reflect warmth
- Choose a cold-tolerant variety

CHOOSE THE OPTIMAL PLANTING SITE

Especially in cool or marginal growing areas, choosing successful planting sites for citrus on your property will involve some common-sense use of microclimates and cultural practices.

- By using south-facing slopes and even south sides of buildings and fences, gardeners can maximize heat absorption. Planting at the top of a south-facing slope and avoiding low spots will reduce the risk of frost damage. Remember that, like water, cold air seeks its own level, i.e., it flows downhill and accumulates in low-lying areas called "frost pockets."
- To increase the heat available to citrus in the summer, choose a wind-free site.
- Dark background surfaces (walls, buildings) and dark mulches absorb and reradiate more heat than light-colored surfaces.
- Culturally, raised beds warm more quickly than compacted soil. Minimize nitrogen inputs from mid summer onward to reduce frost-susceptible new growth in fall and winter. Higher moisture levels in the soil also help reduce frost damage.
- There may be times when some sort of frost blanket makes the difference between life and death for a citrus tree.

Choose varieties whose heat requirements (see Table 3) and cold tolerance are appropriate for your growing region. Note that a variety may be cold-tolerant enough to withstand a region's low temperatures, but its heat requirements may preclude it from setting fruit in that same region.

Citrus: Planting and Establishment

- Citrus are sold in pots, not bare root
- Best planting in Spring, but can be planting most of the year
- Dig holes approximately 50% larger than container size: depth x width
- Roots are fragile, handle root ball carefully
- Lightly amend native soil with compost, and backfill around root ball
- Be careful with planting depth: neither deep or proud
- Topdress new plantings with granular fertilizer
- Mulch heavily but not up against the tree trunk
- Set up irrigation, irrigate immediately after planting and biweekly thereafter

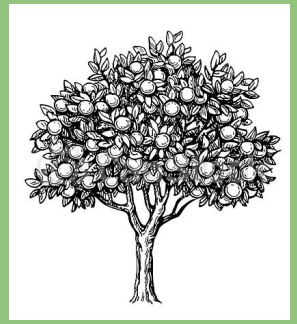
Irrigation Delivery

Citrus and Avocados trees are shallow rooted

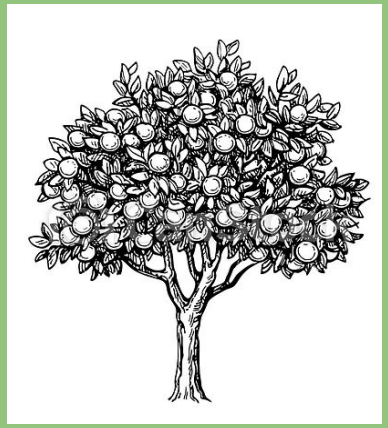
- Most citrus roots in top 12” of soil profile
- 60% of Avocado roots in top 3” and 90% in top 12”
- Mostly branched, fibrous roots, extend well out past dripline
- Prefer frequent, shallow watering : approximately 1 inch per week
- Use drip lines, drip emitters, or micro sprinklers
- Mulch with wood chips and/or compost, this will help build organic matter, suppress weeds and conserve moisture.

Root Stock and Tree Size

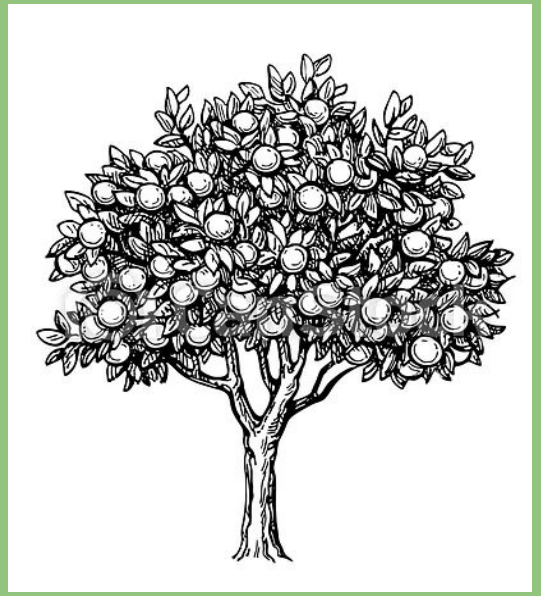
Inherent genetic vigor of variety influences overall tree size, as well as rootstock, soil fertility, climatic conditions



Dwarf 3-8’ tall (Cuban, Shaddock)



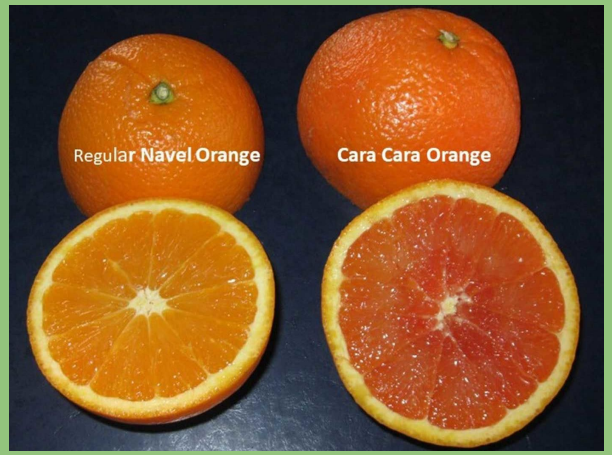
Semi Dwarf 12-18’ tall (Trifoliate),

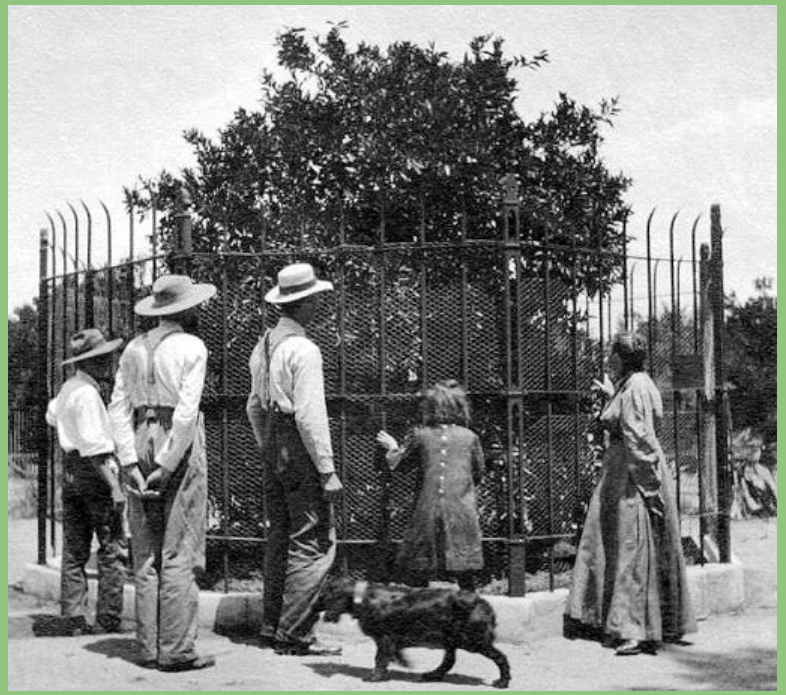


Full Size 25-30’ tall

Varieties of Note - Navel Oranges

- Washington Navel
- Skagg's Bonanza
- Lane's Late
- Trovita
- Cara Cara





Parent tree of the first Washington Navel

Varieties of Note - Blood & Seeded Oranges

Blood Oranges:

Moro

Sanguinelli

Smith Red

Seeded Oranges:

Valencia

Santa Barbara Greens

Moro Blood Orange

Santa Barbara Green

Varieties of Note - Grapefruit

Oro Blanco is great in a warm microclimate, but all grapefruits can take 2 years to ripen when grown in cooler climates

Varieties of Note - Mandarins

Owari Satsuma

Clementine/Algerian

W. Murcott

Minneola Tangelo
(mandarin X grapefruit)

Encore

Gold Nugget

Yosemite Gold

Varieties of Note - More Mandarins

Shasta Gold

Kinnow

Pixie

Page

Tango

Shasta Gold

Kinnow Mandarin

Varieties of Note - Lemons & Limes

Lemons:

Eureka

Lisbon

Genoa

Improved Meyer

New Zealand Lemonade

Limes:

Bearss Lime

Rangpur Lime

Millsweet Limetta

Bearss

Eureka

Varieties of Note - Kumquats and Hybrids

- Meiwa
- Fukushu
- Nagami
- Tavares Limequat is a great cool area lime substitute
- Calamondin
- Citrus hystrix or Makrut lime

Meiwa

Calamondin

Makrut Lime

Avocado Botany and Origins

Avocado, Persea americana, in the Lauraceae family

Originally from Mexico and Central America

Domesticated by 500 BC or earlier

Avocado comes from the Spanish Aguacate, a mispronunciation of the Ahuacatl, from the Aztec language Nahuatl

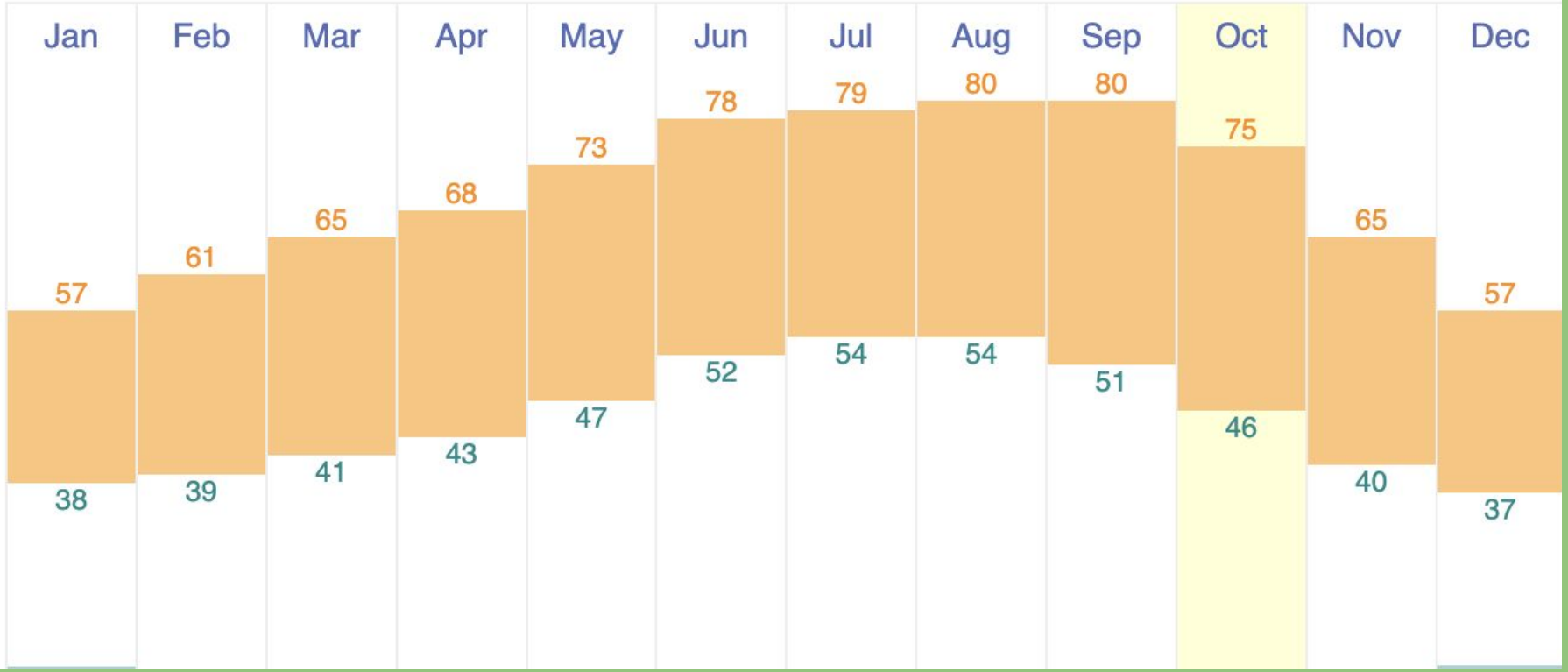
Evergreen trees, with only moderate frost tolerance

Flowering happens principally in Spring, and most regions both A and B types are required to insure good pollination and fruit set.

Annual Weather Averages Near Napa

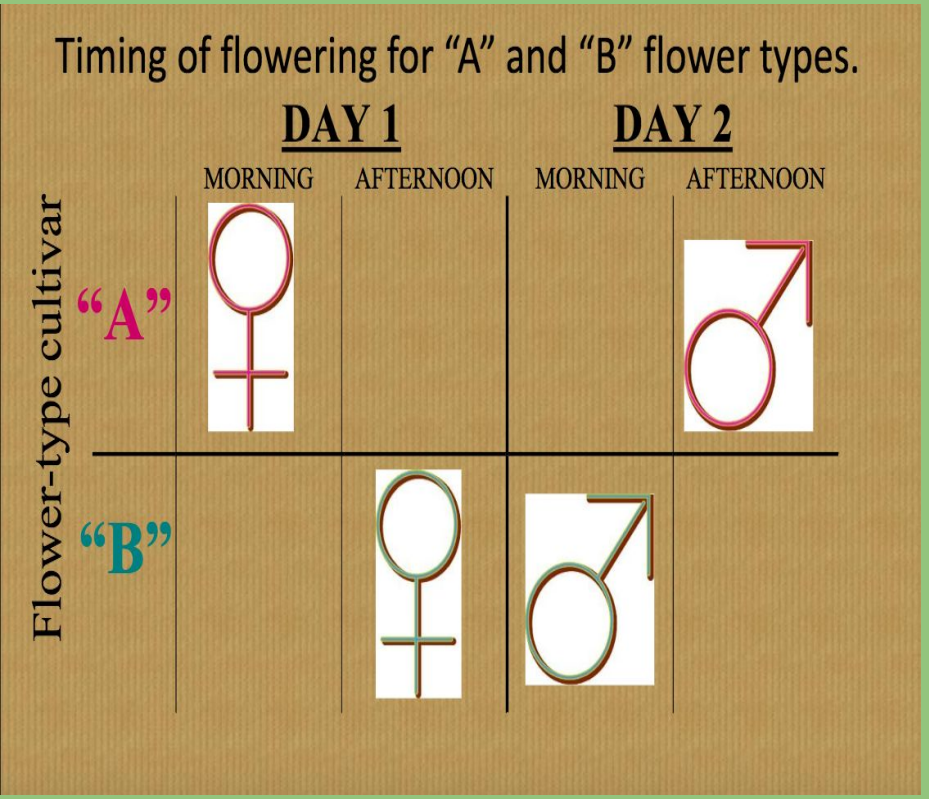
Averages are for Napa County Airport, which is 6 miles from Napa.

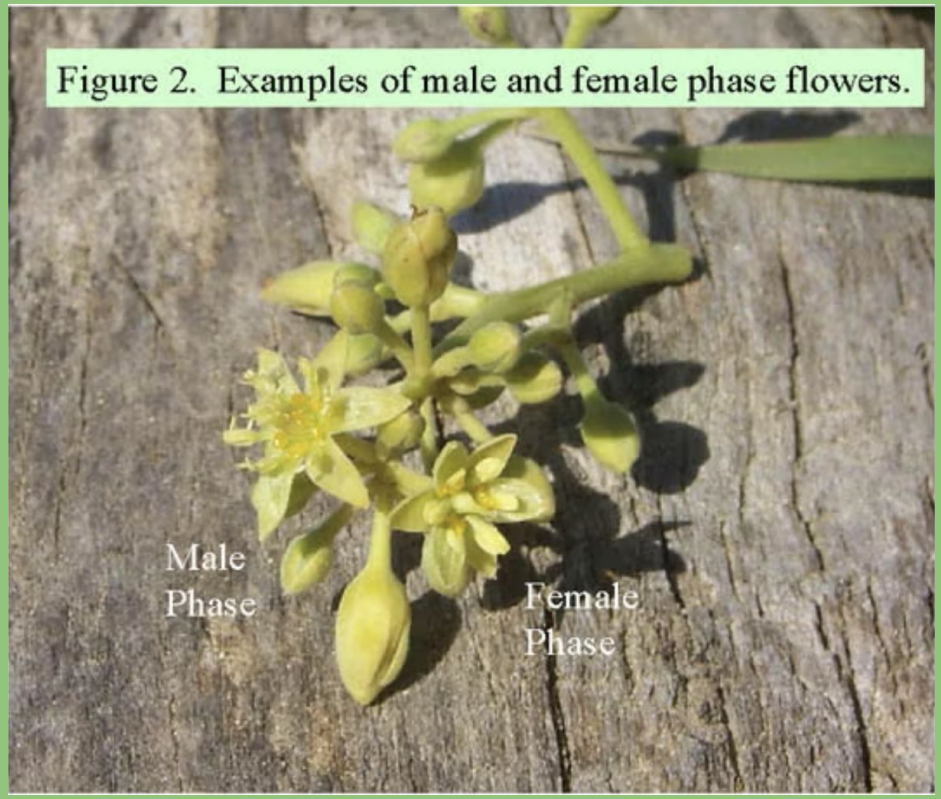
Based on weather reports collected during 1992–2021.



Non-perfect flowering conditions (<53ºF nights or <70°F day and night average) for the A and B flowers will disrupt the timing of flower opening

Avocado Flowers: pollen distribution and receptivity





A and B types can go out of sync and the B types don’t form female flowers below 55°F

Positive effects of cooler weather:

Effective pollination period is much longer: 3 months (No. Cal) vs. 35-45 days (So. Cal)

More self-pollination & close pollination

Works especially well for “A” type avocados

Avocados: Planting and Establishment

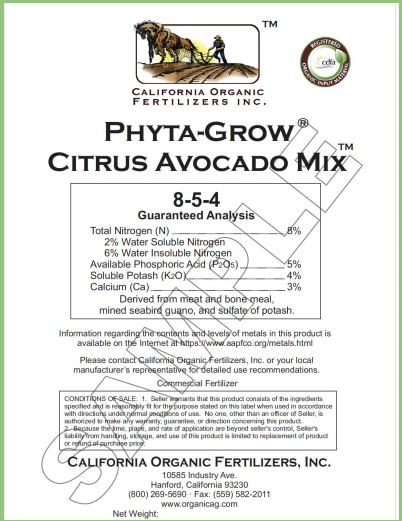
- Avocados are sold in pots or deep sleeves, not bare root
- Best planting in Spring, but can be planting most of the year
- Dig holes approximately 50% larger than container size: depth x width
- Roots are fragile, handle root ball carefully
- Do not amend native soil with compost, or fertilizer
- Backfill around root ball with native soil only
- Be careful with planting depth: neither deep or proud
- Mulch heavily but not up against the tree trunk
- Set up irrigation, irrigate immediately after planting and biweekly thereafter
- Do Not Topdress new plantings with granular fertilizer, until obvious new flush of growth appears

After you plant; mulching, staking, painting, collars

Newly planted trees will benefit from the sun protection, especially coming from the southwest

Fertility:

Citrus and Avocados benefit from repeated fertility applications, monthly or bimonthly from March through September. Slow release, granular fertility is ideal along with compost topdressing in the Spring.



California Organic Fertilizers Inc.

PHYTA-GROW™
CITRUS AVOCADO MIX™

8-5-4
Guaranteed Analysis

Total Nitrogen (N)	8%
2% Water Soluble Nitrogen	
6% Water Insoluble Nitrogen	
Available Phosphoric Acid (P_2O_5)	5%
Soluble Potash (K_2O)	4%
Calcium (Ca)	3%

Derived from meat and bone meal, mined seabird guano, and sulfate of potash.

Information regarding the contents and levels of metals in this product is available on the Internet at https://www.aapfco.org/metals.html

Please contact California Organic Fertilizers, Inc. or your local manufacturer's representative for detailed use recommendations.

Commercial Fertilizer

CONDITIONS OF SALE: 1. Seller warrants that this product consists of the ingredients specified and is reasonably fit for the purposes stated on this label when used in accordance with directions under normal conditions of use. No one, other than an officer of Seller, is authorized to make any warranty, guarantee, or direction concerning this product. 2. Because the time, place, and rate of application are beyond seller's control, Seller's liability from handling, storage, and use of this product is limited to replacement of product or refund of purchase price.

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Citrus Mix 6-3-3

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DESCRIPTION | GUARANTEED ANALYSIS | APPLICATION RATES | DOWNLOADS

TOTAL NITROGEN (N) 6.0%
6.0% Water Insoluble Nitrogen

AVAILABLE PHOSPHATE (P_2O_5) 3.0%

SOLUBLE POTASH (K_2O) 3.0%

CALCIUM (Ca) 3.0%

SULFUR (S) 2.0%

IRON (Fe) 0.5%

ZINC (Zn) 0.5%

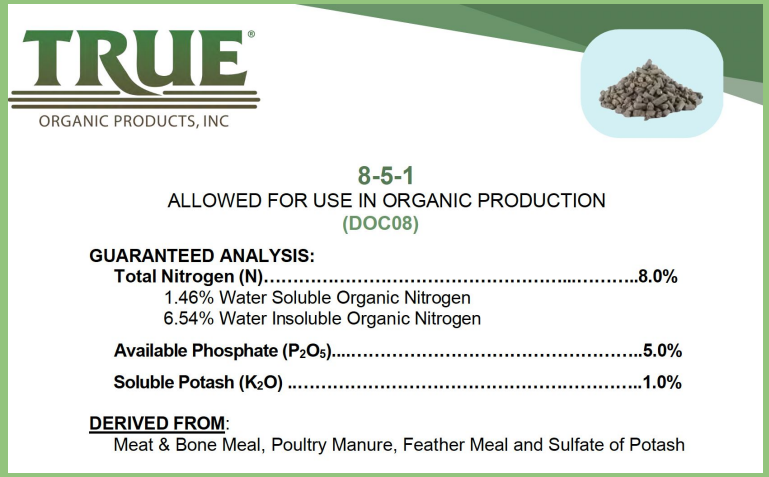
Derived from:

Feather Meal, Fish Bone Meal, Alfalfa Meal, Langbeinite, Basalt, Potassium Sulfate, Zinc Sulfate and Seaweed Meal

ALSO CONTAINS NON PLANT FOOD INGREDIENT(S):

2.5% Humic Acids derived from Leonardite

**Humic Acids may increase micronutrient uptake by plants*



TRUE®
ORGANIC PRODUCTS, INC

8-5-1
ALLOWED FOR USE IN ORGANIC PRODUCTION
(DOC08)

GUARANTEED ANALYSIS:

Total Nitrogen (N).....**8.0%**
1.46% Water Soluble Organic Nitrogen
6.54% Water Insoluble Organic Nitrogen

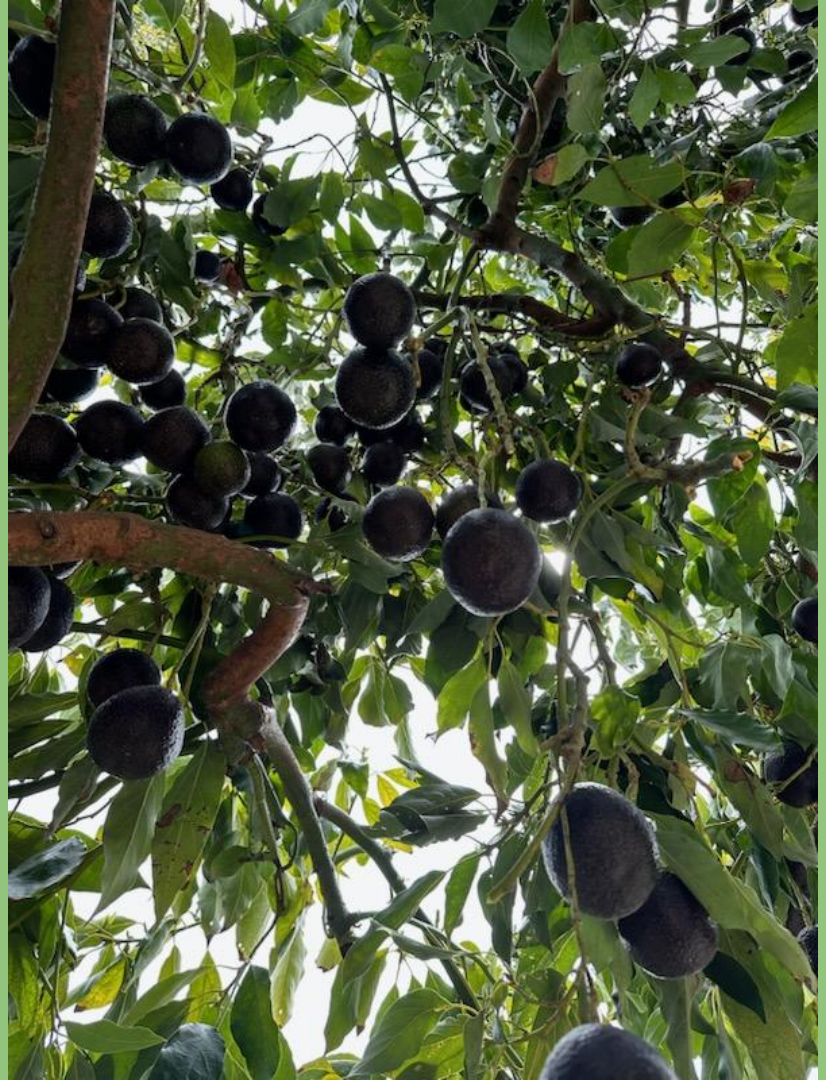
Available Phosphate (P_2O_5).....**5.0%**

Soluble Potash (K_2O) **1.0%**

DERIVED FROM:
Meat & Bone Meal, Poultry Manure, Feather Meal and Sulfate of Potash

How to get your trees through the winter in good condition: Frost Protection

Mexican vs Guatemalan Avocados: mostly a question of hardiness



In Northern California, “A” types produce well

Hass

Carmen Hass

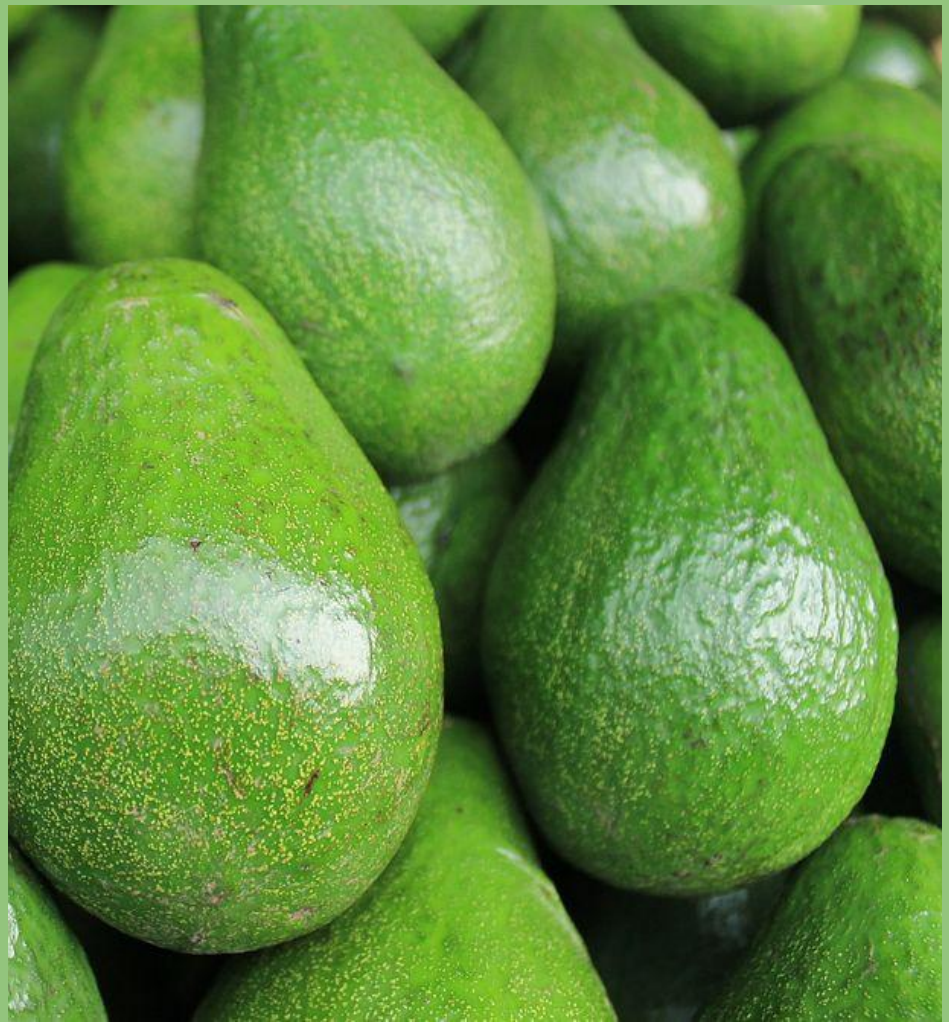
Reed

Lamb

Palo d’Oro

GEM

B Type Avocados:
Sir Prize,
Bacon,
Zutano,
Nimlioh, Nabal,
Ettinger, Hellen,
Fuerte, Sharwil



Smaller Statured Varieties: 12-15’ tall, especially with pruning

- Gwen
- Little Cado (aka Wertz)
- Reed
- Gem
- Holiday
- Greengold

Most Cold Hardy Avocado Varieties:

Most Guatemalan varieties are hardy to 25F, while Mexican varieties can typically tolerate temperatures down to 20F

Aravaipa
Palo d'Oro
Mexicola
Bonny Doon
Zutano
Bacon
D'Arturo

Citrus and Avocado Orchard Management

Fertility: best delivered in splits Spring through Summer

Mulching: to build OM, conserve moisture, especially with young trees

Irrigation: consistent delivery critical for growth and productivity

Harvest: can be virtually year round with careful varietal selection

Pruning: very different than with deciduous trees like apples and plums

- Citrus: minimal need except to remove damaged wood, raise canopy
- Avocados: mostly for size control, selecting for ‘weakness’ as needed

Frost Protection: grow canopy, provide irrigation, mulch, frost blankets, lights

Pests & Diseases: see UC IPM website for management information

- Citrus: Scale, Leaf Miner, Asian Citrus Psyllid (Citrus Greening)
- Avocados: Phytophthora Root Rot, Persea Mites

Resources

Books, Articles, Videos, Websites:

Citrus Production Manual: https://anrcatalog.ucanr.edu/Details.aspx?itemNo=3539

Avocado Production in California book 1 & 2 (available as pdfs): https://ucanr.edu/site/subtropical-fruit-crops-research-education/avocado-production-books

Citrus Offers Year Round Options: https://escholarship.org/uc/item/8wz382fh

Interview with Avocado Grower John Shoustra: https://gregalder.com/yardposts/interview-with-john-schoustra/

UC Riverside Avocado Variety Collection: https://avocado.ucr.edu/introduction

Pest and Disease Information:

UC Davis IPM Website/Citrus: https://ipm.ucanr.edu/agriculture/citrus/#gsc.tab=0

UC Davis IPM Website/Avocados: https://ipm.ucanr.edu/agriculture/avocado/#gsc.tab=0