Fruit and Nut Trees & Shrubs

Varieties, Care, Fertilizing and Pruning

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Master Gardeners of Maricopa County

THE UNIVERSITY OF ARIZONA
COLLEGE OF AGRICULTURE & LIFE SCIENCES
Cooperative Extension

What is an Arizona Master Gardener (MG)?

- A University of Arizona trained individual who completes a Cooperative Extension semester-long specialized course in gardening/horticulture.
- A non-paid volunteer who agrees to complete a specified number of volunteer hours and continuing education hours each year to remain certified.

What is an Arizona Master Gardener (MG)?

- County-specific. Each county extension has its own program. Maricopa and Pinal Counties focus on our conditions in the low desert.
- The MG provides educational leadership in home gardening, landscaping, and irrigation.
- We may or may not be experts or “masters” at any or all horticulture topics, but we are trained to help you find science- and research-based information.

Free Gardening Publications

Fruit & Nut Related

Online at https://extension.arizona.edu/pubs

FRUITS & NUTS

Deciduous Fruit and Nuts for the Low Desert	AZ1269
Growing Blackberries in the Low Desert	AZ1450
Growing Figs in the Low Desert	AZ1636
Growing Grapes in the Home Garden	AZ1657
Growing Strawberries in Home Gardens	AZ1667
Pecans for Small Orchards and Home Yards	AZ1400
Training & Pruning Newly Planted Decidous…	AZ1668
Pruning Deciduous Shade Trees	AZ1139

Chill Hours

- Non-citrus fruit and nut trees typically require a genetically determined amount of cold weather (chill hours) to set fruit. Varies by species and cultivar
- Chill hours: the number of hours between Nov 1st and Feb 15th that are below 45F. These hours are cumulative and need not be continuous.
- The most benefit comes from chilling hours occurring in December and January

Chill Hours

- Daytime temperatures above 60F during this period may negatively affect the total
- Most areas of Maricopa and Pinal Counties average 300 - 400 chill hours per year
- Select varieties of fruit that require around 250 or less chilling to set fruit for a good crop.
- If the tree tag doesn't tell you chill hours, pass up the tree until you research it. Even if it is on sale!!

Commercially Grown Fruits-Nuts in Low Deserts of Arizona

Varieties that do very well

- Citrus – Decreasing production due to urbanization
- Dates – Steadily increasing production in AZ
- Pomegranate - Steadily increasing production

Others that do fairly well:

- Apples, grapes, stone fruit ("low chill" fruit)
- Pecans – but better at higher elevations and don't suffer "sprouting in shell." High water use and very large trees

Commercially Grown Fruits-Nuts in Low Deserts of Arizona

- Peanuts
  - Used to be grown commercially in Yuma, but farmers suffered from pest issues.
  - Can be grown in the backyard garden
  - Need shade when temperatures exceed 100

Citrus in Arizona

- One of the “5 C’s” of Arizona’s Economic History
- Arizona is one of only four citrus-producing states in the nation
- Reconstruction of *Hohokam Canals* during the 1870s. Enabled irrigated farming.
- In 1889, William J. Murphy planted an experimental citrus grove in Ingelside*. He grew over 1,800 orange trees.

* near what is now 44th and Indian School Rd in Phoenix

Best Trees for Our Low-Desert Area

Fruit (Not Including Citrus)

For optimum fruit production in the low desert, choose deciduous fruit tree varieties that have:

- Low chill requirements
  - The higher in elevation you live, the more success you will likely have with non-citrus fruit.
- Early maturing fruit
- Self pollinating (unless you buy multiples)

Maturity and Pollination

- Select varieties which mature before the hot summer temperatures arrive
- If space is a consideration, choose a self-fruitful/self-pollinating variety. Some deciduous fruit and nut trees require cross pollination to bear fruit.
- A self-pollinating variety will have good fruit set even with only one tree.

Rootstock

Our fruit trees are typically grafted onto a rootstock from a donor tree.

- Provides disease resistance
- Improved performance in clay or sandy soils
- Control growth rate and mature size
- Increase drought tolerance and/or salt tolerance
- Modify fruit quality for taste, texture, size and yield
- Local stores/nurseries should offer fruit trees that are grafted onto appropriate rootstocks for our area

Growing From Seed or Cuttings

- Desert adapted fruit trees such as figs and pomegranates do well when propagated
- Cuttings are a CLONE of the parent tree. Cuttings can sometimes be difficult to start.
- Trees grown from seed are DIFFERENT from the parent. Easy but risky. May not have the same characteristics and fruit production.
- Even if you start a tree from a cutting and produce a clone, it may produce differently if the parent tree was grafted onto a rootstock

Varieties and Calendars

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COLLEGE OF AGRICULTURE AND LIFE SCIENCES

AZ1269

Deciduous Fruit & Nuts for the Low Desert

ISSUED MARCH, 2002

LUCY BRADLEY,
Agent, Urban Horticulture

MICHAEL MAURER,
Former Agent, Fruit Crops

ag.arizona.edu/pubs/garden/az1269.pdf

This information has been reviewed by university faculty.

ON 1-0036

For optimum fruit production in the low desert, choose deciduous fruit tree varieties that have low "chilling requirements," early maturing fruit, and are self pollinating.

- Most deciduous fruit and nut trees from temperate climates require a genetically determined amount of cold weather (chill hours) to set fruit. While there is still some disagreement in the scientific community around how to precisely calculate chill hours, a good rule of thumb is to count the number of hours between November 1st and February 15th that are between 32^0 and 45^0 F. These hours are cumulative and need not be continuous. The most benefit is derived from chilling hours occurring in December and January. Daytime temperatures above 60^0 F during this period may negatively affect the cumulative total. Most areas of Maricopa County average between 300 to 400 chilling hours per year. By selecting varieties of fruit that require around 250 hours of chilling to set fruit you can be sure of a full crop almost

Your local nursery should offer fruit trees that are grafted onto appropriate rootstocks for your area.

The following is a list of low-chill deciduous fruit trees which should do well in the low desert and are available at local nurseries. This is not an all- inclusive list and many of these varieties are still untested in the low desert of Arizona. In addition, many new varieties are developed every year. Use the three criteria identified above when selecting fruit trees for your yard.

Apples

✓**Anna:** Remarkable fruit for mild-winter climates in Southern Arizona. Heavy crops of sweet, crisp, flavorful apples even in low desert. Fresh or cooked. Keeps 2 months in refrigerator. Chilling requirement 200 hours. Self-fruitful or pollinated by Dorsett Golden or Ein shemer.

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Varieties - Difficulty Level

Easy

- Fig
- Pomegranate
- Grapes*
- Jujube
- Mulberry
- Loquat

Moderate

- Citrus
- Peach
- Apple – Anna
- Apple – Gold Dorsett
- Barbados Cherry (AKA Acerola)
- Kiwi
- Blackberry
- Date Palm
- Papaya
- Peach, plum, apricot
- Passion Fruit

*Grapes have some aggressive pests including the grape skeletonizer

Moderate-level plants require more maintenance in terms of protection, feeding and irrigation, but grow well.

Difficulty Level

Difficult

- Asian Pear – heat and sun damage
- Star Fruit and Raspberries – dislike heat and direct hot sun
- Nectarine - fruit sometimes doesn't set due to heat; thrips damage
- Almond, Pistachio – too much heat
- Cherry and Pear - no adequate rootstock or low chill varieties
- Apples with higher chill
- Other tropical fruits

VERY Difficult:

- Blueberry
- Avocado

Primarily due to alkalinity and excessive heat

Deciduous Fruit and Nut Chart and Harvesting Calendar for the Low Desert

DECIDUOUS FRUIT VARIETY	Chilling Hours	Fruit Color	Heavy Bearing	Alternate Bearing	Cross Pollination	Free Stone	Jan 1	Jan 15	Feb 1	Feb 15	Mar 1	Mar 15	April 1	April 15	May 1	May 15	June 1	June 15	July 1	July 15	Aug 1	Aug 15	Sept 1	Sept 15	Oct 1	Oct 15	Nov 1	Nov 15	Dec 1	Dec 15
Apples																														
Anna	200	Y	✓		✓												▲	▲												
Beverly Hills	300	Y	✓														▲	▲												
Ein Shemer	100	Y															▲	▲												
Fuji	600	R																			▲	▲								
Gala	500	O																			▲	▲								
Golden Dorsett	100	Y															▲	▲												
Gordon	400	Y															▲	▲												
Apricots																														
Castlebrite	450	O	✓												▲	▲														
Gold Kist	300	O	✓			✓										▲	▲													
Katy	400	O				✓										▲	▲													
Modesto	400	O	✓													▲	▲													
Patterson	500	O															▲	▲												
Royal Rosa	500	O																												

AZ1269

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							1	15	1	15	1	15	1	15	1	15	1	15	1	15	1	15	1	15	1	15	1	15	1	15
Peaches																														
Bonanza	250	Y				✓										▲	▲													
August Pride	300	Y				✓													▲	▲										
Babcock	250	W				✓											▲	▲												
Desert Gold	250	Y	✓													▲	▲													
Desert Red	200	Y												▲	▲															
Earligrande	275	Y													▲	▲														
Eva's Pride	200	Y				✓									▲	▲														
Flordaking	450	Y				✓								▲	▲															
Flordaprince	150	Y												▲	▲															
May Pride	200	Y														▲	▲													
Mid-Pride	250	Y				✓											▲	▲												
Tropic Beauty	200	Y				✓										▲	▲													
Tropic Snow	200	W				✓									▲	▲														
Tropic Sweet	200	Y				✓										▲	▲													
Vallagrande	200	Y														▲	▲													

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							1	15	1	15	1	15	1	15	1	15	1	15	1	15	1	15	1	15	1	15	1	15	1	15
Figs 																														
Black Mission		BI	✓																		▲	▲	▲	▲	▲	▲				
Brown Turkey		Br																			▲	▲	▲	▲	▲	▲				
Conadria (White)		W																			▲	▲	▲	▲	▲	▲				
White Kodata	100	Y																			▲	▲	▲	▲	▲	▲				
Kiwi 																														
Tumari Male		N/A																									▲	▲		
Vincent Female		G																									▲	▲		
Blackberries 																														
Brazos		B	✓											▲	▲															
Rosborough		B												▲	▲															
Strawberries 																														
Camerosa		R									▲	▲	▲	▲	▲	▲	▲	▲	▲	▲										
Chandler		R									▲	▲	▲	▲	▲	▲	▲	▲	▲	▲										
Sequoia		R									▲	▲	▲	▲	▲	▲	▲	▲	▲	▲										
Tioga		R									▲	▲	▲	▲	▲	▲	▲	▲	▲	▲										

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THE UNIVERSITY OF ARIZONA
TUCSON ARIZONA

Publication AZ 1001

LOW DESERT CITRUS VARIETIES

Issued April 1998 by:
Michael Maurer, Agent
Fruits Crops
Lucy Bradley, Agent
Urban Horticulture

When choosing a variety of citrus to plant in your yard consider: what you like to eat; when you want to harvest; and how cold it gets in your yard.

& Each of us has individual taste and the variety that you prefer may not be what someone else prefers. Do you want a seedless fruit? Is it important that the skin be easy to peel, or that the fruit be low in acid? These are all personal preferences. Evaluate the fruit characteristics that are important to you and choose a fruit to meet your needs.

& Harvest time can have a significant impact on fruit flavor. Citrus fruit will not ripen once removed from the tree. However, if the fruit is left on the tree it will continue to sweeten as the season progresses. For example, grapefruit is palatable in September, but most people prefer them in March or April when they are sweeter and have less acid. If you are only here in the winter, you will want to choose a variety that is sweet while you are here.

& Some fruit trees are more frost sensitive than others. Kumquats and Mandarins tend to be the most cold hardy, followed by grapefruit, orange, lemon and lime. If you live in some of the colder parts of the Valley you may want to select cold tolerant varieties. (While trees may be somewhat cold hardy, the fruit is not)

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Citrus Harvesting Calendar for the Low Desert

Citrus Variety	Harvest Dates																							
	Jan		Feb		Mar		April		May		June		July		Aug		Sept.		Oct.		Nov.		Dec.	
	1	15	1	15	1	15	1	15	1	15	1	15	1	15	1	15	1	15	1	15	1	15	1	15
Navel Oranges																								
Cara Cara	■	■																					■	■
Fukumoto																				■	■	■	■	■
Lane Late	■	■	■	■	■	■																		
Parent Washington	■	■																			■	■	■	
Sweet Oranges																								
Diller	■	■	■	■																			■	■
Hamlin	■	■																			■	■	■	■
Marrs	■	■	■																	■	■	■	■	■
Pineapple	■	■	■	■																			■	■
Trovita	■	■	■	■																			■	■
Valencia Oranges																								
Campbell			■	■	■	■	■	■	■	■														
Delta			■	■	■	■	■	■	■	■														
Midknight			■	■	■	■	■	■	■	■														
Olinda			■	■	■	■	■	■	■	■														

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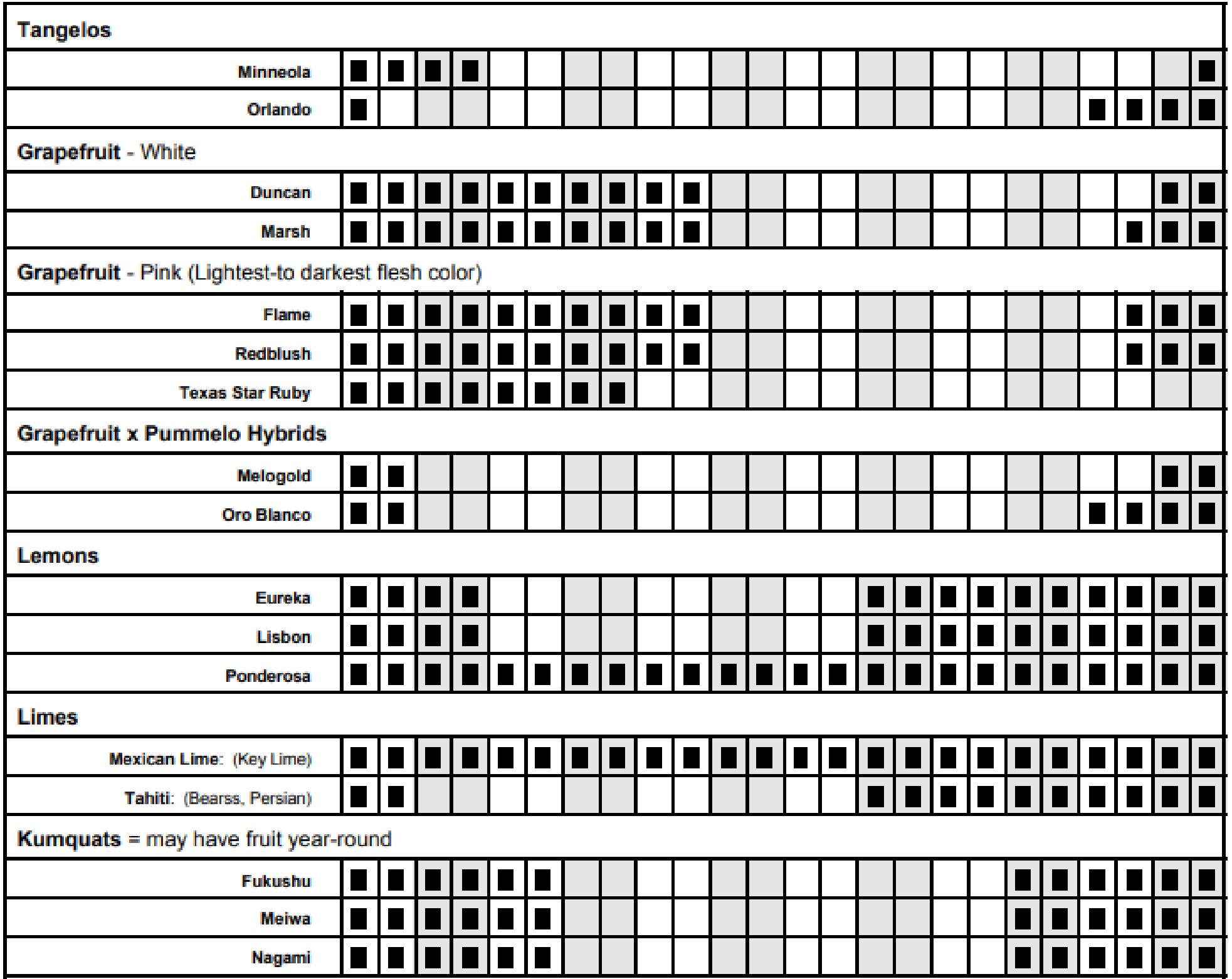
Tangelos
Minneola
Orlando
Grapefruit - White
Duncan
Marsh
Grapefruit - Pink (Lightest-to darkest flesh color)
Flame
Redblush
Texas Star Ruby
Grapefruit x Pummelo Hybrids
Melogold
Oro Blanco
Lemons
Eureka
Lisbon
Ponderosa
Limes
Mexican Lime: (Key Lime)
Tahiti: (Bearss, Persian)
Kumquats = may have fruit year-round
Fukushu
Meiwa
Nagami

Dr. Glenn Wright, University of Arizona Citrus expert, discusses the 100 varieties on display at the Extension's Citrus Clinic.

This is an annual event held in two locations every January by the Maricopa Master Gardeners and UA staff.

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Citrus Hybrids

- Tangelos - a cross of mandarin x grapefruit or mandarin x pummelo
- Grapefruit x pummelo hybrids
- Limequats
- Meyer Lemon – hybrid of orange x lemon
- Ponderosa Lemon – lemon x citron
- Tangor – Mandarin x sweet orange
- Many others…

Unique Citrus

Buddha's Hand Citron

Citrus medica var. sarcodactylis

Finger lime or Caviar Lime

Citrus australasica

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Water and Fertilizer

Fruit Tree Care – Water

Basic Rules of Watering/Irrigation

- Established trees need watering to 3 feet deep
- New trees: more frequently, less deep
- Whether you use manual or automatic irrigation, you must learn how long it takes to wet 3-ft deep.
- Once you establish the amount of time to water the tree, do not change it. Seasonally, you only change the frequency of watering.

Fruit Tree Care - Water

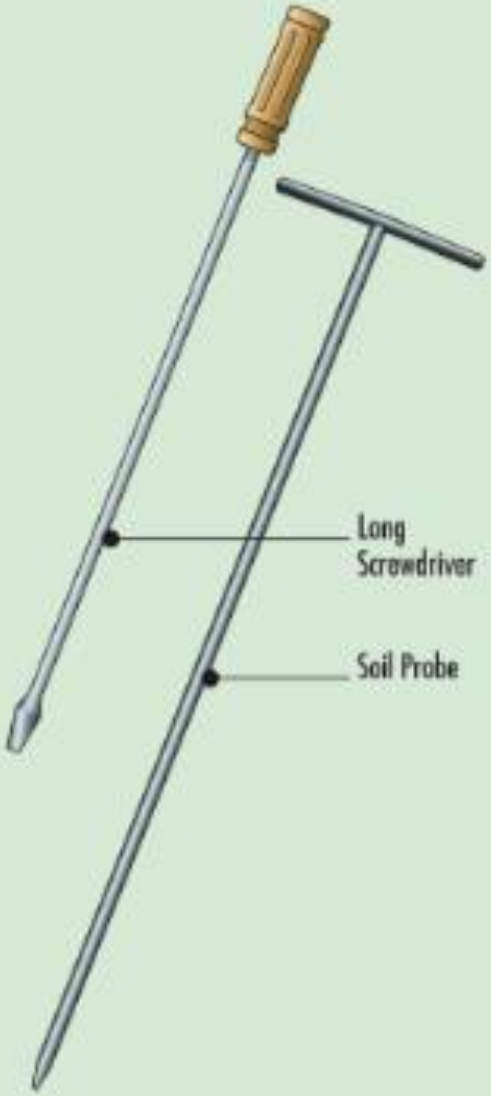
- Most fruit trees are not desert-adapted except fig, date and pomegranate.
- Citrus have much higher water and feed requirements than other fruit trees.
- For automatic systems, use a separate zone for fruit trees and a bubbler instead of dripper (flood the basin)
- Don’t expect the irrigation for lawns/turf and shrubs to be enough for your fruit trees.

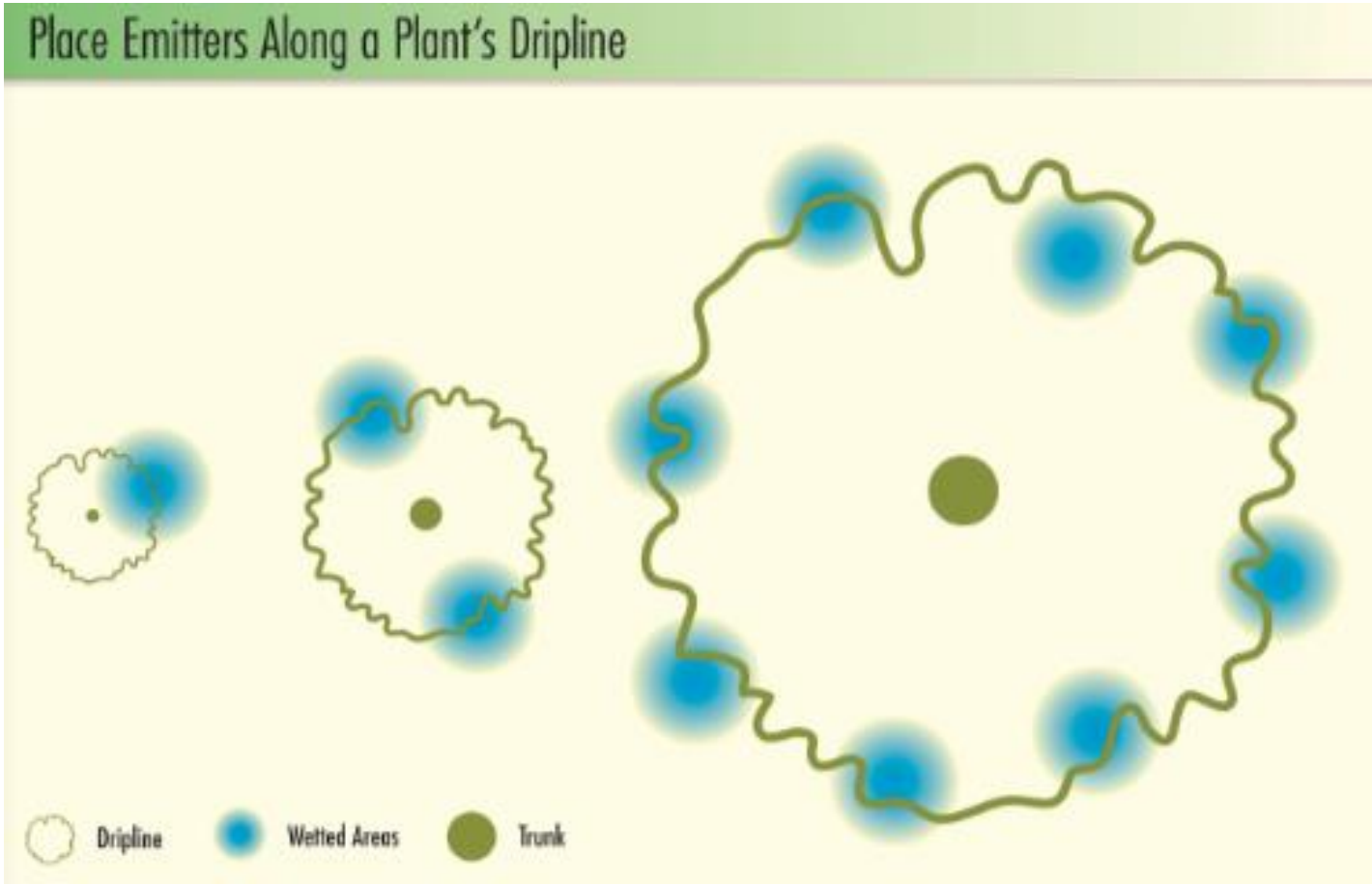
Fruit Tree Care - Water

- Flood the tree basin when watering
- It is best to have two berms, one at the drip line and one around the trunk to keep water off the trunk. Water soaking at the trunk can cause disease or rot.
- Use a probe to test the depth of the moisture.
- Water at the drip line. This requires expanding the berm and/or moving the irrigation as the tree grows.

Soil Probes

A soil probe, sharpened piece of rebar, or a very long screwdriver works well to test how deep the water has penetrated into the soil.





As the tree grows, you must moveand add emitters! If you have a basin, it will need to be made wider.

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Fertilizer

- Nitrogen is the most important ingredient in the fertilizer for fruit trees.
- For apples, peaches, nectarines, plums, cherries, and apricots, apply 0.1 pound (1.6 dry ounces) of nitrogen per inch of trunk diameter (or years of age) up to a maximum of 1.0 pound of nitrogen per tree.
- For pears, use half this amount.
- For other trees, follow the fertilizer package instructions.

Fertilizer

- Apply to deciduous fruit trees in February or March.
- Spread evenly on the soil surface in the irrigation basin and lightly rake into the soil.
- Follow with a generous irrigation.

Reference: Fertilizing Fruit Trees by Jeff Schalau, County Director, Agent, Agriculture & Natural Resources Arizona Cooperative Extension, Yavapai County
https://cals.arizona.edu/yavapai/anr/hort/byg/archive/fertilizingfruittrees.html

Citrus Fertilizer

- Citrus is different! It is a very heavy feeder.
- Apply fertilizer February through September, typically 3-4 times per year.
- It is the amount of nitrogen applied per year that is most important, not how many times it is applied
- Nitrogen is the most important, and always the first number in the guaranteed analysis (N-P-K = Nitrogen-Phosphorus-Potassium)

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az1671 June 2015

Citrus Fertilization Chart for Arizona

Glenn Wright

Fertilizer does no good in a heap, but a little spread around works miracles all over.

-Richard Brinsley Sheridan - Irish Playwright

To promote optimal growth and production of your citrus tree, use the chart to determine the correct amount of fertilizer to apply.

Steps To Use This Fertilizer Chart:

1. On the **blue left edge** of the chart, find a description of the tree you wish to fertilize. Since commercial citrus fertilizer application recommendations are based either on tree height, trunk diameter or the area of the ground covered by the canopy, ranges of all three measurements are included in the tree descriptions. The total pounds of actual nitrogen recommended by the University of Arizona for a tree for one year are found in the **gray column** directly to the right. Since no fertilizer is 100% nitrogen, use the chart to determine the amount of a specific type of fertilizer needed by your citrus tree.
2. Look at the **red top edge** of the chart for the percent nitrogen which your fertilizer contains. Remember that every container of fertilizer has 3 numbers written on it. The first number indicates the % nitrogen, the second the % phosphorus as available phosphate (P2O5), and the third the % potassium as available potash (K2O). For example: 9-6-4 has 9% nitrogen, 6% phosphorus and 4% potassium – see illustration.

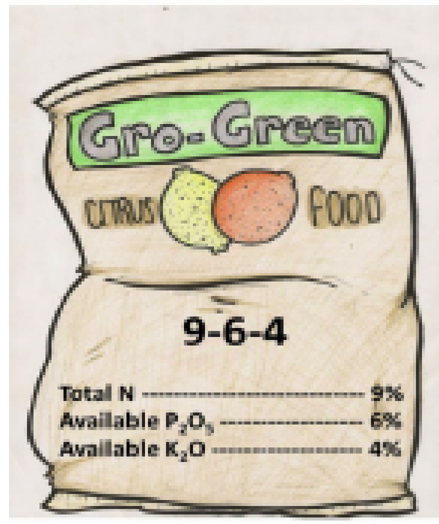


Illustration Credit: Christiana Wright

small tree. Then, find the column for 13% nitrogen. They meet at the number 1.9 to 3.8. Because the tree is a lemon, add about 10% to the total (2.10 to 4.2 lbs.). Since the tree height is at the low end of the range, apply 2.10 lbs. of the citrus food during the year. Apply ⅓ (about 0.7 lbs.) during January-February, ⅓ in March-April, and ⅓ in August-September.

Example 2:

You have a large, 10 foot tall adult grapefruit tree, whose canopy covers about 100 square feet of the ground surface and you have citrus fertilizer with 6% nitrogen (6 is the first of the three numbers on the bag). The row for this tree and the column for 6% nitrogen join at the numbers 20.80 to 25.00. Mature grapefruit trees require only half of the amounts listed in the table.

Therefore, this tree will require about 10.4 to 12.50 lbs. of fertilizer annually. Apply about 3.5 to 4.0 lbs. (⅓ of the total) during January- February, ⅓ in March-April and ⅓ in May-June.

Adapted from and replaces

Chott, G., Chard, C., Bradley, L. 1998. *Fetilizing Citrus Chart.*

Annual Fertilizer Requirements for Citrus Trees

- For oranges, tangerines, and grapefruit, apply ⅓ of the total in January-February, ⅓ in March-April and ⅓ in May-June.
- For lemons and limes, apply ⅓ of the total in January-February, ⅓ in March-April and ⅓ in August-September.

Oranges, tangerines, tangelos, and other exotic citrus. **For grapefruit, pummelo, lemons and limes, see note below.**

	Lbs. of Actual Nitrogen Required for the Year	% Nitrogen in Fertilizer (First number written on fertilizer container – See illustration)								
		4%	5%	6%	8%	10%	13%	16%	21%* (Ammonium Sulfate)	46%* (Urea)
Newly Planted Tree You may apply small amounts of nitrogen after tree is established and new growth has emerged	None to 0.13 lb.	None to 3.0 lbs.	None to 2.5 lbs.	None to 2.0 lbs.	None to 1.5 lbs.	None to 1.2 lbs.	None to 0.9 lb.	None to 0.75 lb.	None to 0.6 lb.	None to 0.25 lb.
Small Tree 2 to 3 feet tall, up to 1.25" trunk diameter and up to 9 sq. ft. of ground area covered by the canopy	0.25 to 0.50 lb.	6.25 to 12.50 lbs.	5.00 to 10.00 lbs.	4.20 to 8.40 lbs.	3.10 to 6.25 lbs.	2.50 to 5.00 lbs.	1.90 to 3.80 lbs.	1.60 to 3.20 lbs.	1.20 to 2.40 lbs.	0.50 to 1.10 lbs.
Medium Tree** 4 to 8 feet tall, 1.25" to 4.0" trunk diameter and from 16 to 64 sq. ft. of ground area covered by the canopy	0.75 to 1.00 lb.	18.75 to 25.00 lbs.	15.00 to 20.00 lbs.	12.50 to 16.75 lbs.	9.40 to 12.50 lbs.	7.50 to 10.00 lbs.	5.80 to 7.70 lbs.	4.70 to 6.50 lbs.	3.60 to 4.80 lbs.	1.60 to 2.20 lbs.
Large Tree 10 feet tall or more, 6 to 10" trunk diameter and more than 64 sq. ft. of ground area covered by the canopy	1.25 to 1.50 lbs.	31.25 to 37.50 lbs.	25.00 to 30.00 lbs.	20.80 to 25.00 lbs.	15.60 to 18.75 lbs.	12.50 to 15.00 lbs.	9.60 to 11.50 lbs.	7.80 to 9.40 lbs.	6.00 to 7.10 lbs.	2.70 to 3.30 lbs.

Note: For grapefruit and pummelo trees small adult or larger: use ½ of the amounts shown. For lemons and limes, use about 10% more than the amounts shown.

* Application of 21-0-0 or 46-0-0 fertilizer will require additional applications of other nutrients, as these fertilizers only contain nitrogen. Urea (46-0-0) is especially concentrated.

** Trees in containers should be fertilized according to this chart, but usually grow no taller than a medium-sized tree.

- To convert from decimal to ounces, multiply the decimal portion of the number by 16. Example: For 6.25 lbs. fertilizer, multiply .25 x 16 = 4 ounces, giving 6 lbs. 4 oz.
- Measure accurately before applying and always incorporate fertilizers in the soil and follow with irrigation.

Citrus Care – Fertilizer Exercise

- Example:
- What percent Nitrogen does this fertilizer have?
- How much of this fertilizer per year for a medium orange tree?
- A large grapefruit tree?
- A small, established lemon tree?

Citrus Care - Fertilizer

- How much fertilizer per year for a medium orange tree? 5.8 – 7.7 lbs.
- A large grapefruit tree? 4.8 to 5.75 lbs.
- A small established lemon tree? 2.1 to 4.2 lbs.

The Importance of Mulch

Mulch provides three advantages. It builds the soil, it keeps the soil MUCH cooler, and slows evaporation.

Woody mulch works well as a soil builder. It breaks down over time. However, it is carbon-based, so as it breaks down, the composting process may take some nitrogen from the soil.

The Importance of Mulch

"Living mulch" also works well. Sweet potatoes and cowpeas are thrive in the heat.

Cowpeas are edible, and black-eyed peas are a type of cowpea. Peas also fix nitrogen in the soil.

Photo from Greg Peterson, Urban Farm

After the summer, work plants into soil to compost in place.

The Importance of Mulch

- For maximum results, use BOTH woody mulch and living mulch around the trees.
- Turf keeps the soil cooler like living mulch
- After the summer, work the plants into soil to compost in place.
- Mulch at least 6-foot diameter around the trunk, more for larger trees (out to the drip line is optimal).

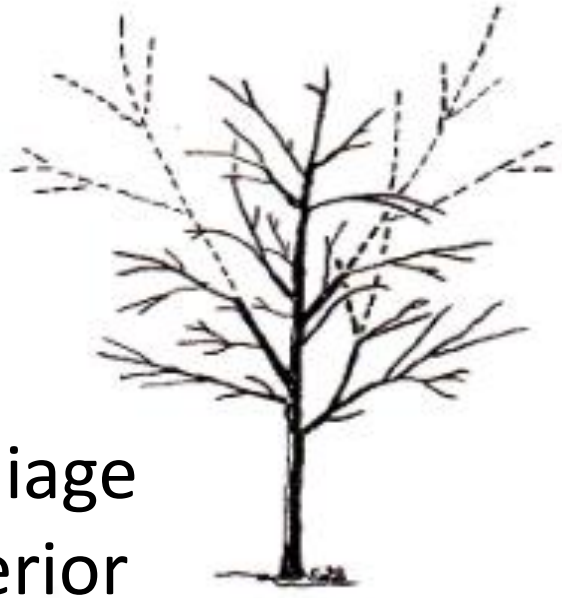

Pruning

Pruning

- Never prune just to prune. Only prune for a reason.
- Pruning always creates a wound that causes a response: loss of foliage and ability to create food from sunlight, potential entry points for decay organisms, an increase in sprouting, reduced vigor and susceptibility to insect problems.
- Decide whether the desired benefit will override the negative effect on the tree.
- So why / when should we prune? …

Reasons for Pruning

1. Dead, dying or diseased material;
2. Crowded or crisscrossing branches/limbs, or to establish a dominant leader;
3. Safety, interference or clearance;
4. Reduce growth;
5. Size and shape.
6. To allow in light if the tree has heavy foliage and there is no fruit production at the interior



Pruning

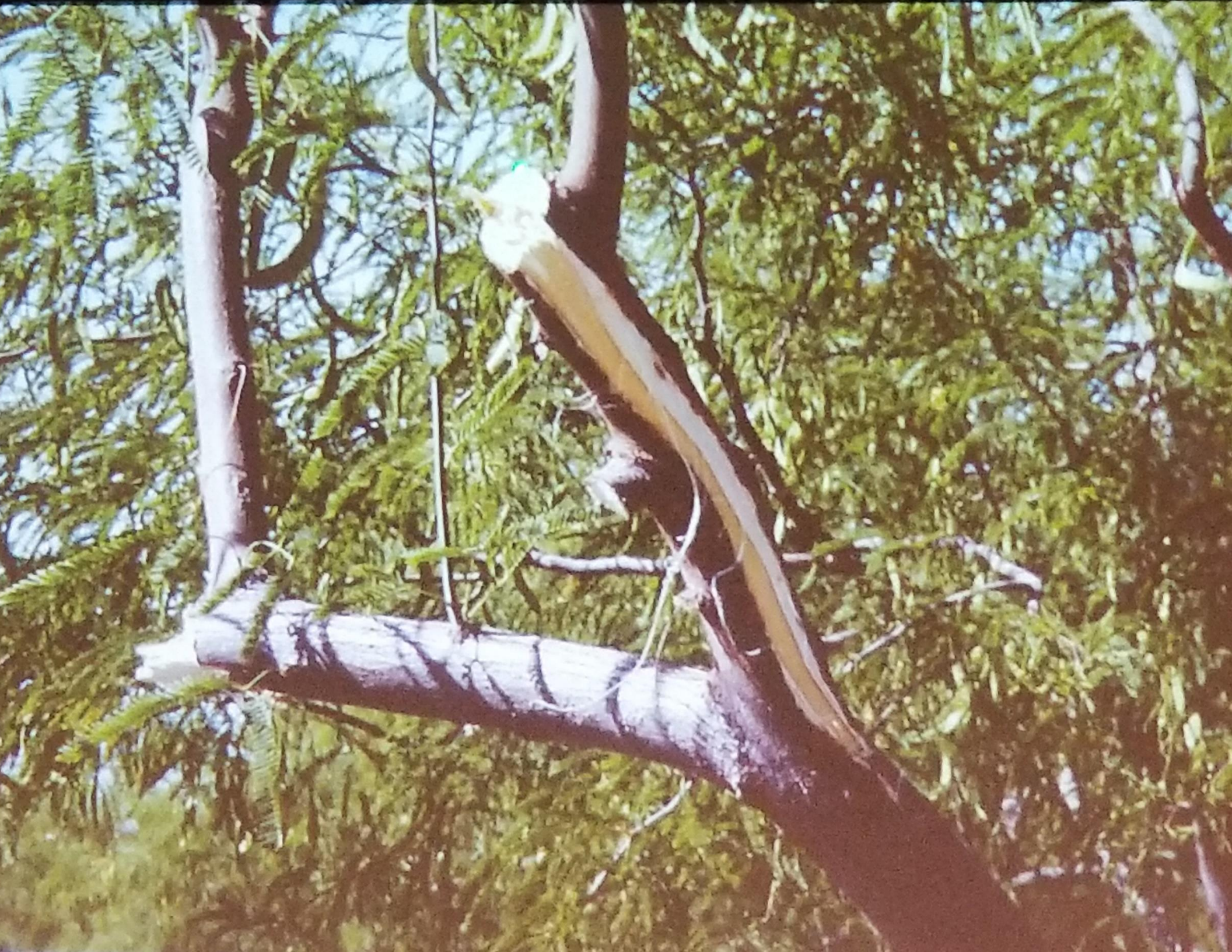
- Do not prune for a year after planting except to remove dead, diseased or protruding branches.
- Once a plant has become established (a year or so) conservative pruning can begin.
- If you need professional assistance, hire a certified arborist rather than a landscaper. Arborists have extensive tree training. Landscapers may have little or NO tree training

Pruning Deciduous Trees

- For deciduous trees, prune when plants are dormant - after complete leaf drop and before bud break in early spring
  - Less likelihood of tearing bark
  - Less likelihood of dripping sap
  - More time for recovery before bud break
  - Easier to see branch structure
  - Less likelihood of stimulating unwanted growth

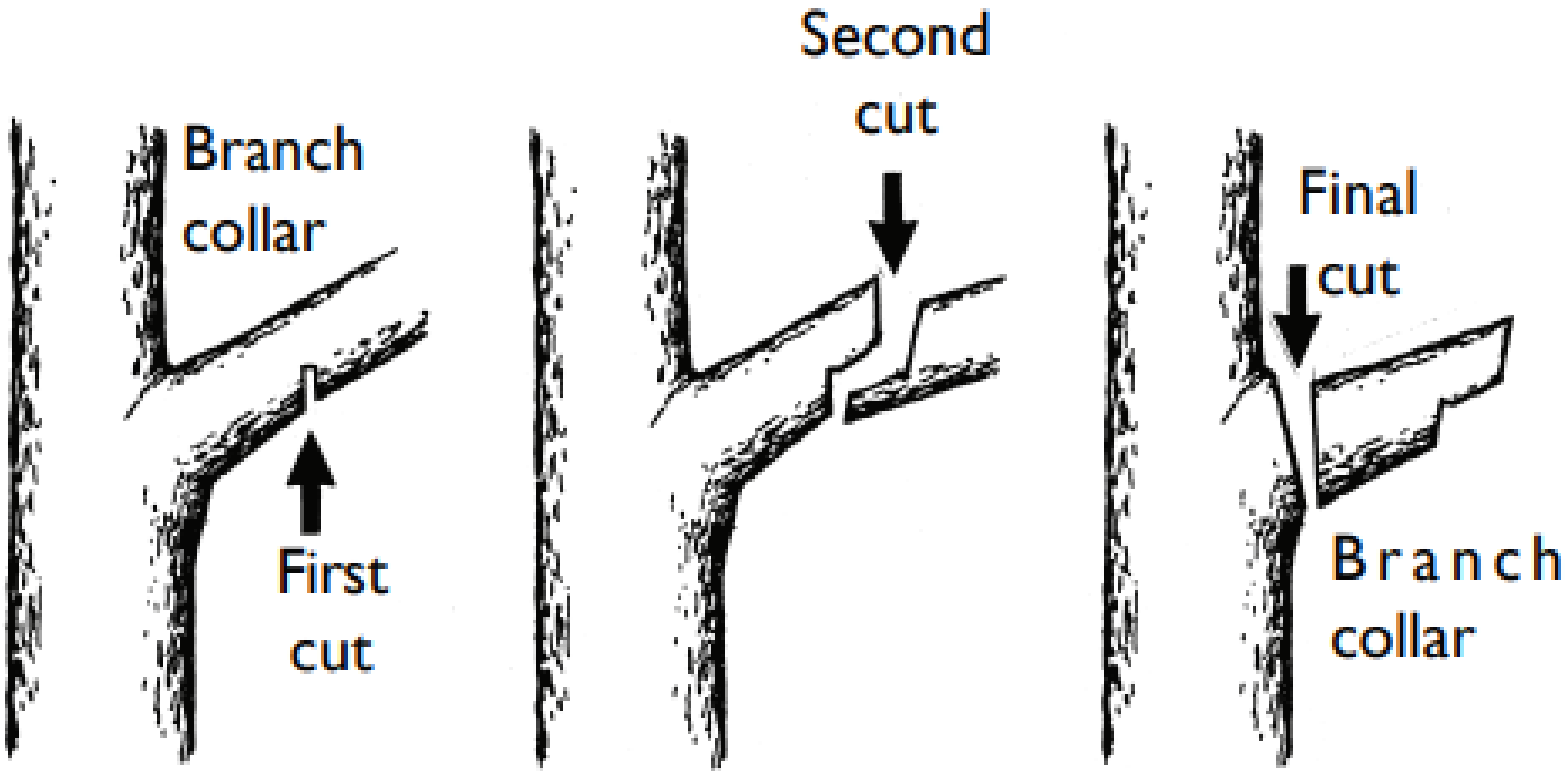
Pruning Deciduous Trees

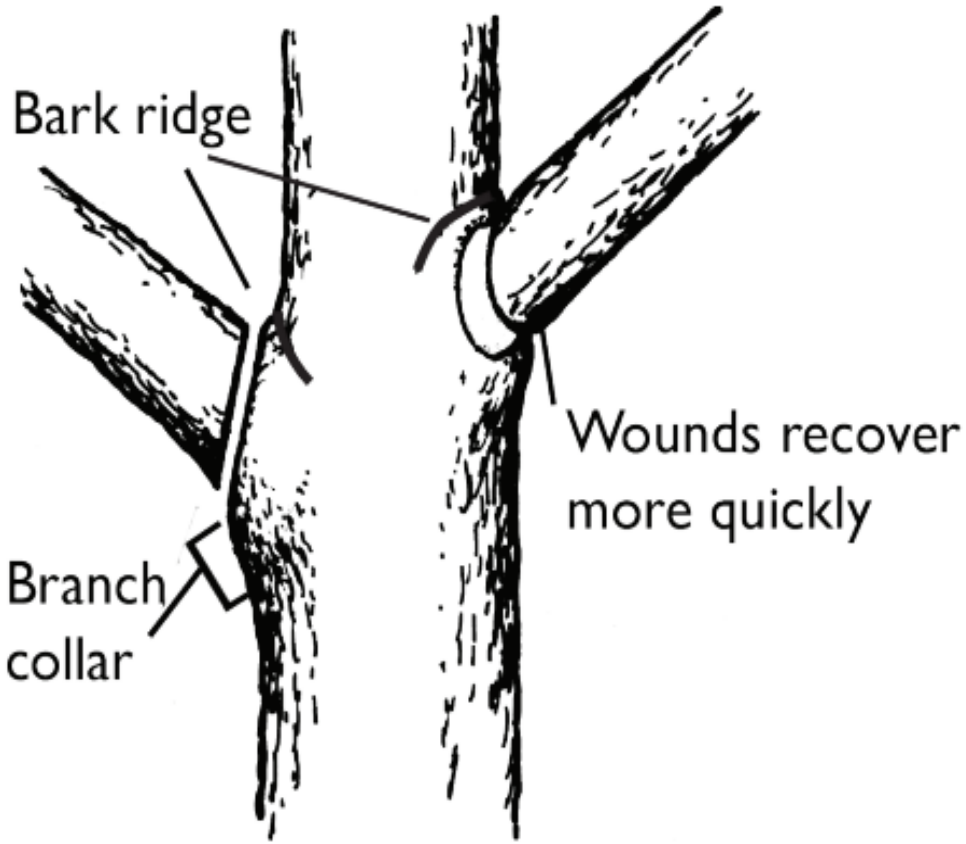
- Avoid pruning when plants appear stressed or during periods of high heat
- An excellent pruning resource: http://www.urbantree.org/prunehome.shtml



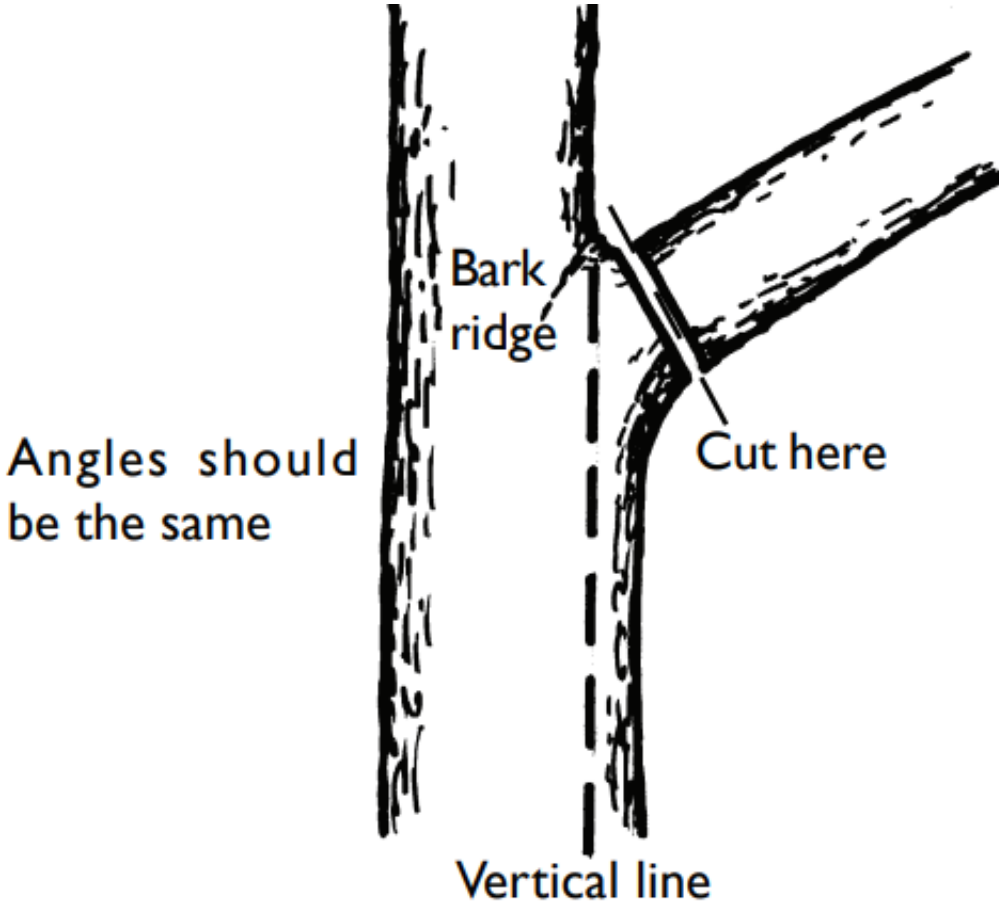
Pruning: 3-Cut Method

Use three cuts to remove larger limbs. This prevents the bark stripping down the trunk





At the base of a limb is a ring of growth; this is called the Branch Collar. The pruning cut should be made just outside a line connecting these two points This is called natural target pruning.



If a tree does have the typical branch collar, make the cut so that the angles between the vertical line of the tree and the bark ridge are the same as the angle where the cut should be made.

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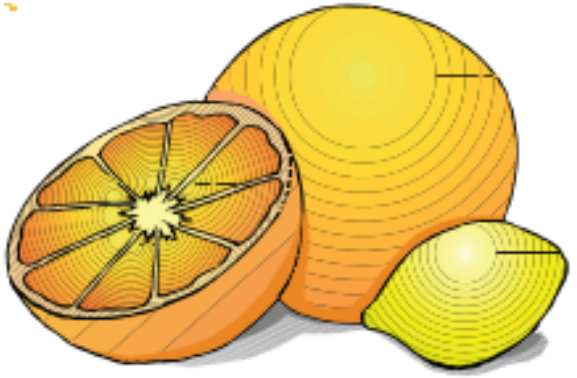
AZ1455
07/08

Pruning Citrus

"Instinct must be thwarted just as one prunes the branches of a tree so that it will grow better."

Henri Matisse



Introduction

Pruning is a common task necessary for best production of many common fruit trees. Most types of deciduous trees are pruned to invigorate the tree, to improve branch configuration, and thus make branches less likely to split under a heavy crop, to improve fruit quality, and/or to reduce the crop load which will improve the potential size of individual fruits.

Homeowners with previous experience pruning deciduous trees often assume that citrus trees should be pruned similarly. However citrus wood is naturally strong

At a Glance

- Prune citrus to eliminate sprouts, remove weak, crossing or dead branches, or to allow more light in the canopy.
- February through April are the best months to prune.
- Remove all sprouts originating from the trunk. Most sprouts are best removed by hand when they are small.
- Remove branches at the collar using a three-part cut.
- Citrus trees need not be skirted except for aesthetical reasons.
- Citrus trees may be easily hedged.

Pruning

- Citrus wood is strong. There is no need to prune so the limbs can bear the weight of the fruit
- Citrus trees can produce fruit in all but the most shaded part of the tree
- Pruning to reduce the crop load and improve fruit size is not necessary, except occasionally with tangerines
- Fruit is just as good or better from a minimally pruned tree as compared a heavily pruned tree

Pruning

- Prune citrus February through April, except when this will result in sun exposure.
- Some fruit production will be lost through pruning.
- Sometimes the lower limbs are removed to allow moving around under the tree. Be cautious of sunburn when doing this.

Pruning: Water Sprouts & Suckers

- Prune to remove suckers that grow from the base and water sprouts that shoot up from older limbs. They grow from latent buds.
- Water sprouts are not as strong as natural tree growth and produce very little fruit, usually of poor quality.
- Suckers that come up from below the graft may produce fruit but it will likely be inedible.

Suckers

Water Sprouts – flattish stem, often have thorns

Less Pruning = Natural Sunburn Protection

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Budding Citrus Trees

ISSUED FEBRUARY 2000 BY:
Glenn C. Wright
Associate Specialist

PUBLICATION AZ1146
2/2000

ag.arizona.edu/pubs/crops/az1146.pdf

This information has been reviewed by university faculty.

Introduction

Citrus budding is a plant propagation technique that any homeowner can do. While it does require some skill, with a moderate amount of practice a homeowner can become proficient. Once the technique is learned, homeowners can add citrus varieties of their choice to their present citrus trees. The use of budding will lead to a producing tree sooner than if a seed were planted. Also a budded tree or branch will be genetically identical to its parent.

Fortunately, any citrus variety can be budded to any other citrus variety. Thus, a tangerine or lemon bud can be budded to an orange tree branch, or a grapefruit bud can be budded to a lemon tree branch, or many other combinations. The varietal bud is sometimes known as the "scion" to distinguish it from the rootstock (See below).

A tree with two or more scion varieties is known as a "cocktail tree." These are popular when space is limited. Homeowners make cocktail trees when they bud an additional citrus variety to an established tree. Caution should be used when selecting varieties so that those with similar growth characteristics are used. For example, a lemon with a vigorous growth characteristic and a moderately vigorous mandarin should not be budded together.

Figure 1. Bark slipping occurs when the bark may be easily peeled away from the wood.

Bark slipping occurs in the spring and resumes in the fall in Arizona. In the winter, it is too cold, and the bark will not slip. In the summer, the temperatures are too hot.

A sharp knife is the third requirement. A sharp knife will allow the propagator to cut into the wood smoothly and with minimal force. When a dull knife is used, the knife cut may be jagged, reducing the chance for bud survival. More importantly, excessive force must often be used with a dull knife, leading to loss of knife control and the possibility of injury.

Finally, the propagator must have something to tie up the bud. Usually strips of rubber, such as wide

Citrus Budding

- Citrus budding is a plant propagation technique that will add other citrus varieties to a citrus tree
- While it does require some skill, with a moderate amount of practice anyone can be proficient
- Any citrus variety can be budded to any other citrus variety. The varietal bud is known as the “scion”

Citrus Budding

Match growth characteristics. A lemon with a vigorous growth and a moderately-growing mandarin should not be budded together. The lemon would eventually outgrow the mandarin and dominate the tree.

Fruit Tree Grafting

- In a nursery, citrus scion varieties are almost always budded to rootstock seedlings.
- If you want to grow a favorite citrus or other fruit from seed, grow or purchase a rootstock tree and graft on. (Not necessary for figs and pomegranates).
- Grafting can be used to produce “cocktail trees” which are trees that produce more than one type of fruit.

Fruit and Citrus Problems

Common, Treatable Problems

- There are many problems that can beset trees. Some may be established at the root level (root rot, nematodes). We may not be able to identify these before they become advanced.
- Instead we will look at some common problems that can be visually identified and treated.
- When in doubt, contact the help desk!

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Protecting a Citrus Tree from Cold

PUBLICATION AZ1222
3/2001

ISSUED MARCH 2001 BY:
Glenn C. Wright
Associate Specialist

ag.arizona.edu/pubs/crops/az1222.pdf

This information has been reviewed by university faculty.

Warmth, warmth, more warmth! For we are dying of cold, and not darkness. It is not the night that kills, but the frost.

Miguel de Unamuno

Introduction

Citrus trees are not particularly cold hardy. This fact is one of the primary reasons for the existence of the citrus industry in Southern Arizona. Nonetheless, freezing temperatures are likely, and it is prudent for homeowners to take precautions.

Citrus trees are most likely to survive cold temperatures if they are planted in the proper location. The USDA has divided the US into eleven plant hardiness zones based on 10°F average annual minimum temperature[1] ranges. Zones 2 through 10 are further subdivided (a and b) which represent 5° F differences within each 10° F zone. In Arizona, citrus may be safely grown in zone 10a, where average annual minimum temperatures range from 30 to 35°F, and in zone 9b, where average annual minimum temperatures range from 25 to

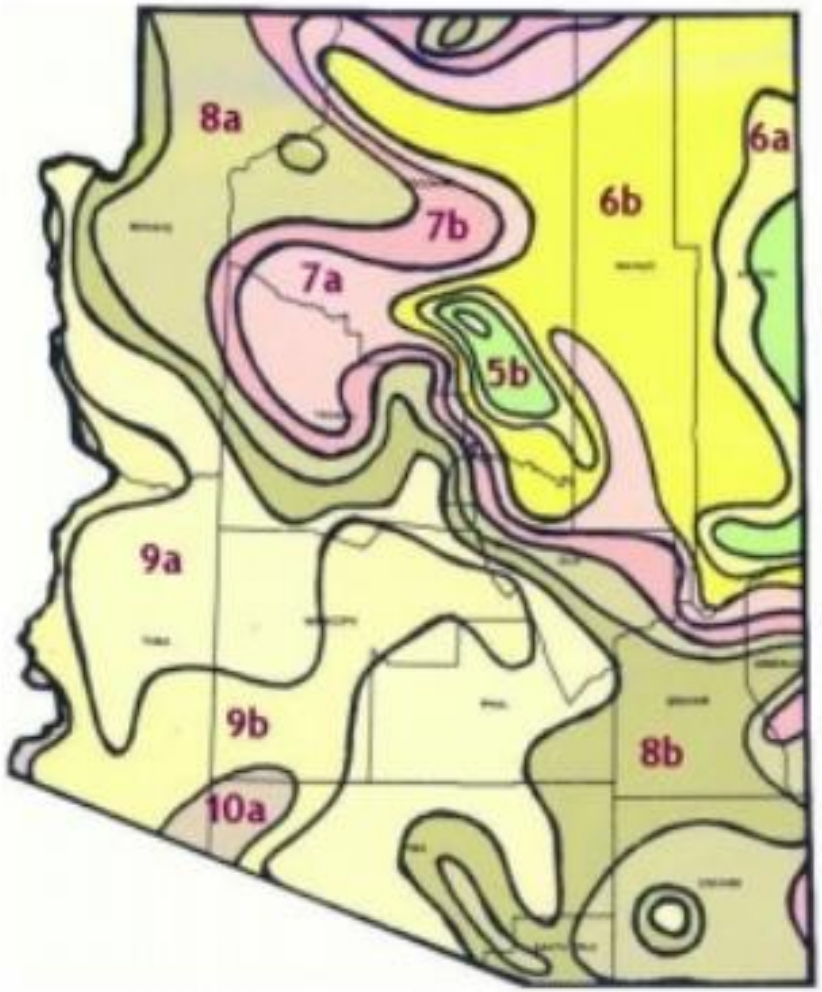

Figure 1. USDA plant hardiness zones for Arizona.[1]

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Tucson, Arizona 85721-0036

Frost-Freeze Damage

- Citrus. Freezing can damage both tree and fruit; limes and lemons are most sensitive. Oranges, and grapefruit are intermediate, mandarins are the cold hardiest.
- Frost protection is necessary from November through March during the first two or three years
- Young trees - run water under the tree; cover with cardboard, burlap or cloth.
- Deciduous trees drop leaves and go dormant; can tolerate cold weather.

Freeze Damage

- Do not use plastic. Plastic does not hold in much heat compared to other materials.
- Remove heavy cloth coverings after each frost period. Burlap may be left in place for the entire winter.
- Hang a light bulb or incandescent Christmas lights in the branches on cold nights provides additional heat.
- If a tree has freeze damage, do not prune damage until new growth emerges in spring. Then, the damage can be more clearly seen and pruned off.

Critical Frost Damage Temps

Fruit Type	Critical Temp (F)
Lemon buds and blossoms	27
Lemon, small fruit	29
Lemon, ripe	27
Oranges, green	26
Oranges, grapefruits, mandarins, partially ripe	27
Oranges, grapefruits and mandarins, tree ripe	25

Generally, more than 4-6 hours below 28 will likely cause damage.

Relative Frost Sensitivity Temps

Fruit Type	Sensitivity
Lemon	High
Lime	High
Citron	High
Oranges, most types	Medium
Grapefruit	Medium
Mandarins	Low
Kumquat	Low

Sunburn

- Temperatures above 100°F with sun usually burn some leaves and fruit and may damage any exposed bark.
- Protect exposed bark areas with tree wraps or light-colored latex paint. When lower branches or tops of old trees have been pruned, exposed bark usually is sunburned and may be killed. Fungal infection may follow and destroy larger areas (e.g. sooty canker).
- Heavy paper tree protectors or cardboard should be applied to young trees after painting.

Sunburn

Hendersonula Branch Wilt "Sooty Canker"

- Disease caused by the fungus, *Hendersonula toruloidea*, a wound pathogen that invades citrus bark that has been damaged by freezing injury, sunburn, or mechanical injury. The fungus does not infect uninjured bark tissue.
- Symptoms: The most common symptom of sooty canker is the sooty, black growth that develops beneath bark tissue. Scattered branches are usually affected.

Hendersonula Branch Wilt "Sooty Canker"

- Most cankers develop on trunks or limbs that face toward the sun and are not shaded. Sunburned trunks and limbs are highly susceptible to infection.

Salt (Sodium) Buildup

- Salt buildup may occur due to the watering and evaporation cycle.
- Plants may show salt burn symptoms such as leaf yellowing and leaf burn.
- Leach salts from the soil 2-3 times per year by irrigating twice as long as usual.
- A good soaking monsoon rain will also flush salts

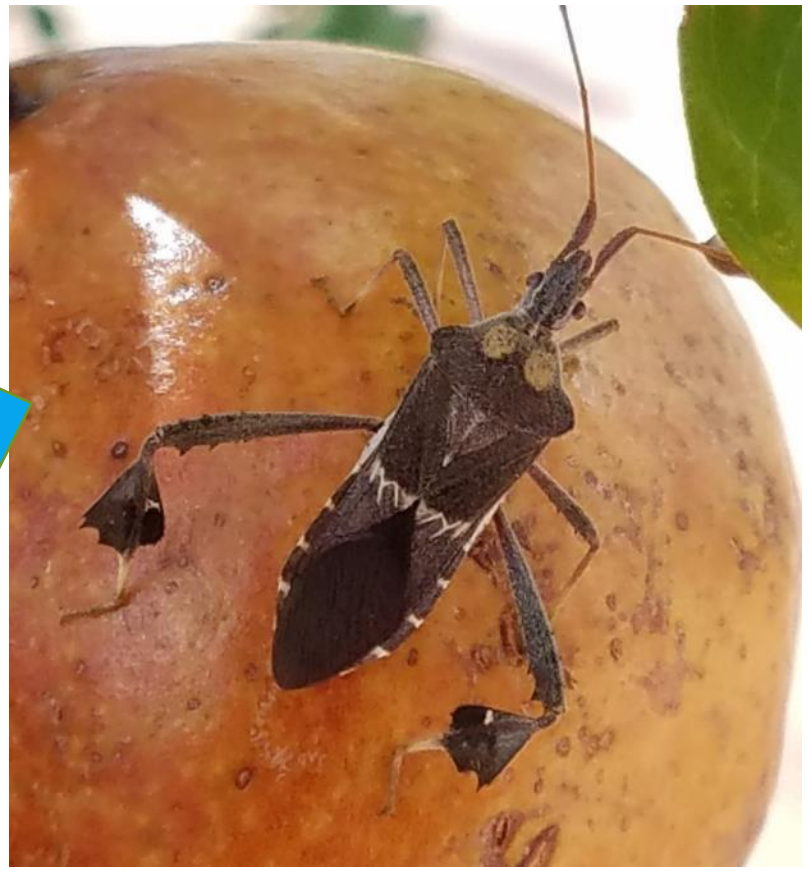
Heat Damage

- Usually on the South and West sides of the tree.
- Citrus primarily, sometimes apples, most young tender trees.
- Faded leaves, loss of color, dry and crispy.
- Use shade cloth or for foliage
- Latex paint, burlap or shade cloth on the trunk and larger branches (any lighter color latex)

Leaf-footed Bugs and Stink Bugs

- Vary greatly in color, size and shape; they pierce fruit and suck juices. This is destructive, as fruit will be malformed and the bugs can inject disease

- Damaged fruit does not fall from the tree, it becomes scarred and malformed.
- Leaf footed bugs find pomegranate delicious!
- Watch for them and dispatch them quickly
- Or use sticky traps

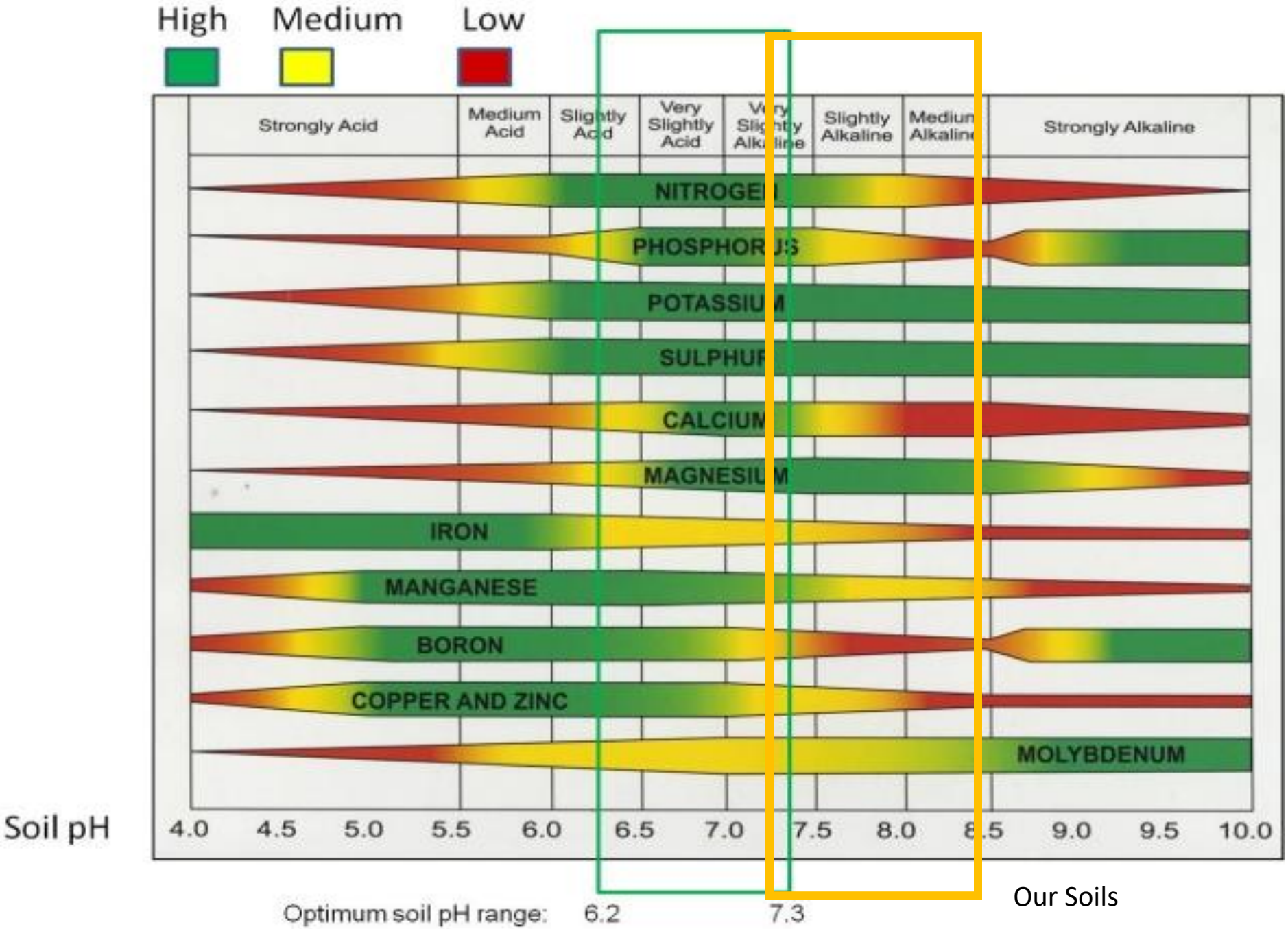


Pale Leaves

Causes: Nitrogen deficiency, over-watering. Occurs mostly on the older growth. Leaves also fall prematurely.

Controls: Apply nitrogen containing fertilizer - follow recommended watering and fertilization practices

How soil pH affects availability of plant nutrients



Iron Deficiency

Pale Leave with Dark Veins

Causes: Nutrient deficiency of iron. Leaves will be normal size. Occurs mostly on the newer growth.

Controls: Apply chelated forms of iron. Foliar sprays act more quickly, but also add iron to soil for longer term absorption

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Zinc Deficiency

Pale Spots

Causes: Nutrient deficiency of zinc. Younger top leaves have yellow between the veins creating a banded appearance. Begin to grow closely together in bunches.

May be gnarled or twisted rather than their normal shape. If the plant is in its flowering stage, the buds may die.

Zinc Deficiency

Controls

- Add compost or other organic matter to help the soil manage zinc better.
- Cut back on high-phosphorus fertilizers because they reduce the amount of zinc available
- Application of zinc to soil may not correct deficiency. It may remain unavailable for plant absorption. Foliar applications of zinc sulphate or as zinc chelate are more effective.

Manganese Deficiency

CITRUS NUTRITIONAL SPRAY

GUARANTEED ANALYSIS:

Total Magnesium (Mg)	1.00%
1.00% Water Soluble Magnesium (Mg)	
Sulfur (S)	4.10%
4.10% Combined Sulfur (S)	
Iron (Fe)	1.20%
1.20% Water Soluble Iron (Fe)	
Manganese (Mn)	1.20%
1:20% Water Soluble Manganese (Mn)	
Zinc (Zn)	1.70%
1.70% Water Soluble Zinc (Zn)	

Derived from: Magnesium Sulfate, Ferrous Sulfate, Manganese Sulfate, Zinc Sulfate,

Pale Spots

Often confused with, and/or occurs with, iron deficiency. Yellowing of leaves with smallest leaf veins remaining green to produce a 'checkered' effect. Often seen in older leaves

Controls: Like with zinc and iron, soil application may not correct deficiency in alkaline soils because it may remain unavailable for plant absorption.

Foliar feeding is a better option.

Thrips

Brown or Gray Scars on Fruit and Leaves

Very small insects. Cause cosmetic damage by feeding on young fruit; often inside blossoms. Leaves of the tree may also be distorted.

Controls: Not necessary. If desired, sticky yellow traps can capture adult thrips. Insecticides are not recommended, as they reduce the predator insect population, allowing thrips to thrive

Thrips enjoy chewing on nectarines and citrus, especially Tangelos!

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College of Agriculture and Life Sciences

AZ1154

Revised 08/11

Diseases of Citrus in Arizona

Mary Olsen, Mike Matheron, Mike McClure and Zhongguo Xiong

Introduction

Although citrus is indigenous to southeast Asia, oranges were first planted commercially in central Arizona in the late 1800s. Today commercial production is centered in several warm and low-frost-risk areas of central and southwestern Arizona. A great number of citrus varieties are also widely planted in home gardens. Many diseases of citrus have been described world wide and have colorful and descriptive names such as: blue mold, green mold, gray mold, pink mold, pink nose, brown rot, black spot, black rot, black pit, yellow vein, yellow spot, rubbery wood, lumpy rind, curly leaf, corky bark, slow decline, spreading decline, and stubborn. Other names are rooted in the many international languages of citrus such as: Italian (impietratura and mal secco), Portuguese (tristeza), or Greek and Latin (cachexia, psorosis, exocortis, xyloporosis, cristacortis, and leprosis)

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College of Agriculture and Life Sciences

AZ1492

April 2009

Diagnosing Home Citrus Problems

John Begeman, Glenn Wright

PROBLEMS OF FRUIT

Fruit Drops Prematurely:

Causes:

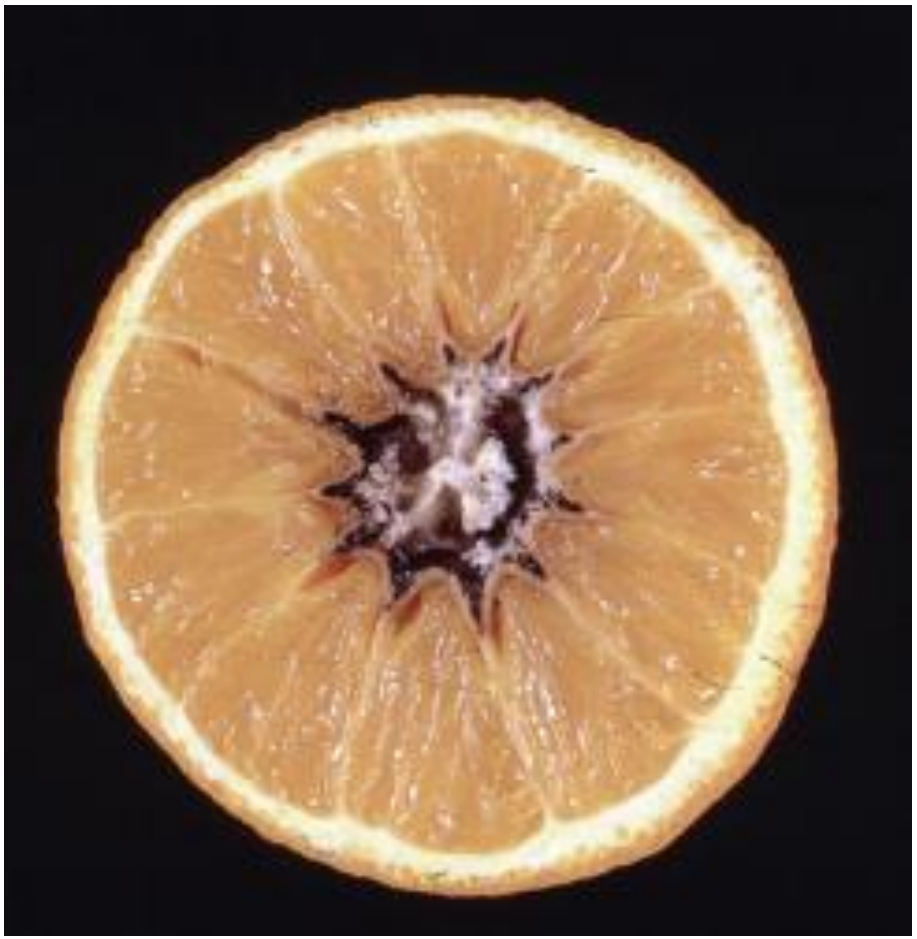
Natural fruit drop occurs during the spring. Trees shed excess fruit they cannot support. Fruit drop is heavier during hot, dry and windy weather and on trees receiving inadequate irrigation or inadequate nitrogen fertilization.

Controls:

Increase the amount and frequency of irrigation during periods of high heat, low humidity and strong winds. Do not under fertilize.

Citrus Problems

Black Fungus Inside Fruit



Causes: Alternaria fungus. Most common following rainy winters or springs.

Controls: None available. Dispose of affected fruit

Citrus Problems

Yellow Fruit Turns Green

Causes: Fruit on certain varieties of citrus, such as Valencia orange may turn from yellow to green as weather warms in the spring.

Controls: None required. Fruit quality is not affected.

Citrus Problems

Thick Peel, Puffy, Misshapen Fruit

Causes: A natural response of young citrus to high heat. Can be found on older citrus, especially grapefruit and oranges that have been over-fertilized.

Controls: Check irrigation. Reduce nitrogen fertilization rates.

Citrus Problems

Splitting Fruit

Causes: Inconsistent watering and fertilization practices or sunburn.

Controls: Maintain adequate moisture and follow recommended fertilizer applications. Infrequent, but deep watering maintains soil moisture at a more even level than does frequent, shallow irrigation. Soil mulches may also be used to enhance moisture retention.

Citrus Problems

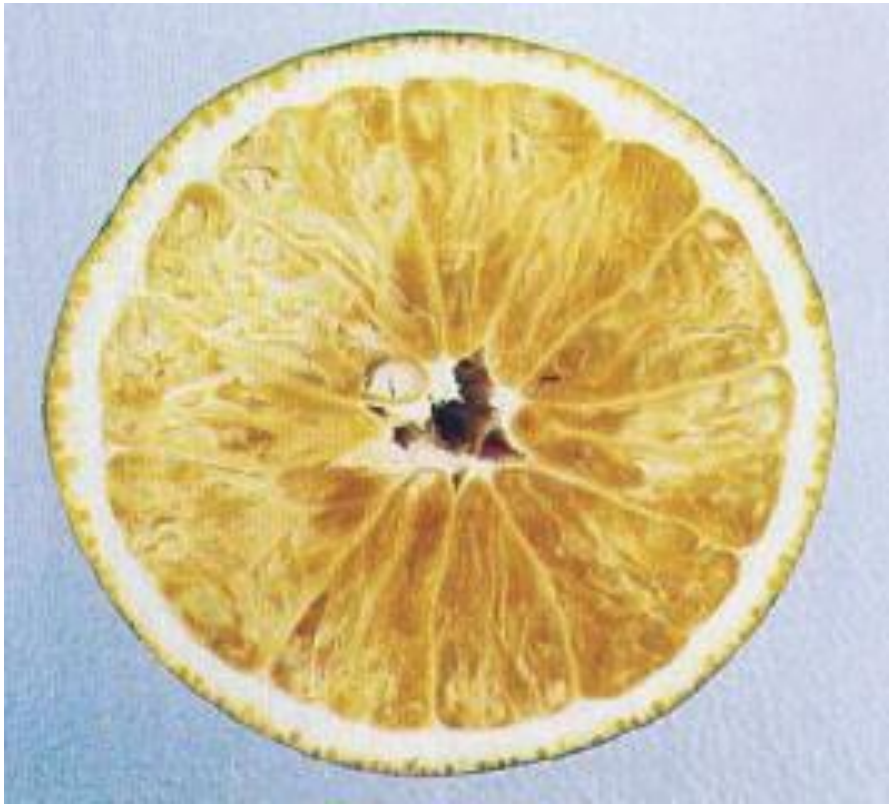
Fruit Drop, Bud Drop

Causes: Natural fruit drop occurs in spring as trees shed excess fruit they cannot support. It is heavier during hot, dry and windy weather and on trees receiving inadequate irrigation or inadequate nitrogen fertilization.

Controls: Increase the amount and frequency of irrigation during periods of high heat, low humidity and strong winds. Do not under fertilize.

Citrus Problems

Granulation, Dry Juice Sac



Causes: Oranges, grapefruit and tangerines are affected; especially those budded on roughlemon, volkameriana, macrophylla and trifoliate rootstocks. Cold injury may also result in granulation of fruit.

Controls: Good fertilization and nutrition practices and early season harvesting may alleviate this problem.

Citrus Problems

“Cigar” Shaped Leaf Curling

Causes: Moisture stress, insufficient water.

Controls: Increase expanse and depth of watering. Provide at least 3 drip emitters per tree. If basin watering is used, the basin should extend out to the edge of the branches and be enlarged as the tree increases in size. Wet soil to a depth of 2 to 3 feet.

Citrus Problems

Leaf Distortion, Cupping, Curling and Stickiness

Causes: Aphids.

Controls: Hose off with water or spray with a mild soap solution (mix one tablespoon of liquid dish washing detergent in one gallon of water).

Resources

Maricopa County Extension Master Gardener Plant Help Desk

- The Maricopa County Extension Plant Help Desk provides research-based information to assist you with plant and pest problems.
- Email: maricopacountyplanthotline@gmail.com. Responses will generally be within a week
- Visit: 4341 E. Broadway Rd Phoenix, AZ 85040. Bring in a plant or pest sample. Location is in Southeast Phoenix, near Tempe.
- If a master gardener cannot answer your question, they will refer the question to University expert staff members.

Master Gardeners of Maricopa County

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Publications

Free Publications from the Extension:
Low Desert Citrus Varieties (AZ1001)
Diagnosing Home Citrus Problems (AZ1492)
Budding Citrus Trees (AZ1146)
Diseases of Citrus in Arizona (AZ1146)
Irrigating Citrus Trees (AZ1151)
Pruning Citrus (AZ1455)
Citrus Fertilization Chart for Arizona (AZ1671)
https://extension.arizona.edu/pubs

Books available from the Extension
Desert Landscaping for Beginners - Chapter 11: Citrus
UA Publication - Citrus Guide