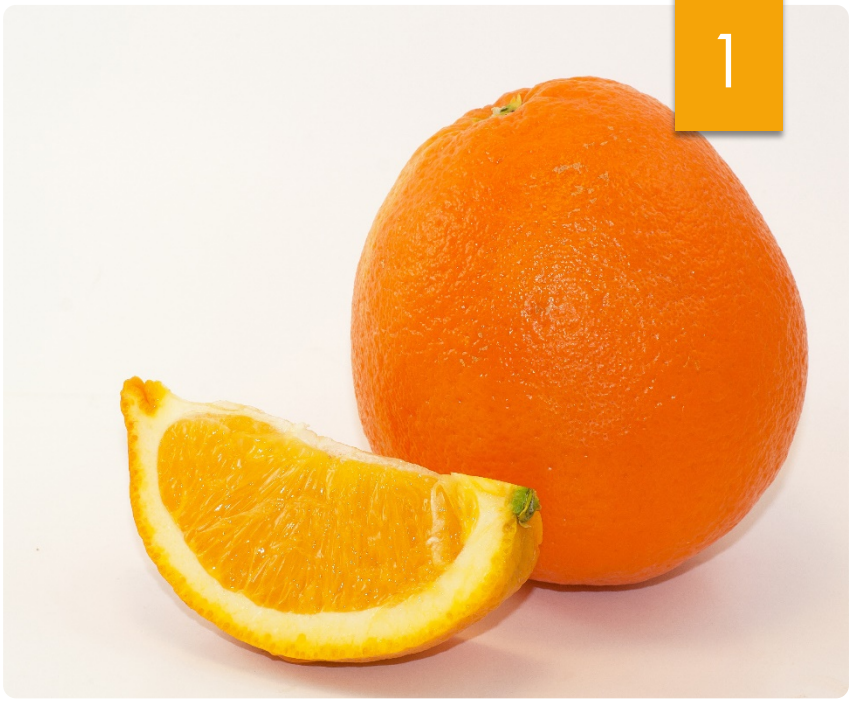
THE UNIVERSITY OF ARIZONA
COLLEGE OF AGRICULTURE AND LIFE SCIENCES
COOPERATIVE EXTENSION
Yuma Agricultural Center



Citrus Trees – How to Keep Them Healthy and Productive.

(and you happy!)

GLENN C WRIGHT, UNIVERSITY OF ARIZONA

Find the best spot to plant them

- Good soil drainage is essential!
- Avoid areas where frost might be a problem
  - Avoid the bottom of slopes and/or depressions
  - Select the tops of slopes, higher areas, and areas that will radiate heat, such as near a wall
- Don't plant too close – 10 feet apart or more is good spacing.
- Avoid areas where winds are especially strong

Choose the best variety

- All citrus grow rather well in most parts of Phoenix and Yuma. Areas surrounding Tucson can be colder.
- Most are self-fertile
- Shop around!
- Rootstock is equally as important as variety

Oranges

- Navels
  - Early, mid-season and late
  - Best for fresh eating, juice will become bitter with time.
  - Sometimes quality problems where there is sandy soil.
- Valencia's
  - Late-season fruit
  - Best for juicing, difficult to peel
  - No problems when planted in sandy soil.
- All oranges are fairly cold tolerant

Oranges

- Sweet oranges
  - Early, mid-season and late
  - Best for fresh eating, juice will not become bitter with time
- Blood oranges
  - Colors in response to cold weather
  - Mid-season and late season
  - Some best for juicing and others for eating fresh

Mandarins (Tangerines, tangelos, tangors)

- Wide variety
- Some seedless and others not
- Some will be seedy if pollinated and seedless if not pollinated.
- Sometimes fruit quality problems if grown on sandy soils.
- Fairly cold tolerant

Grapefruit and Pummelo

- Excellent quality in Arizona, does best in the heat.
- Flavor improves as fruit ages.
- Red, white and pink varieties.
- Pummelo bigger than grapefruit
- Pummelo sweeter than grapefruit
- Both are fairly cold tolerant

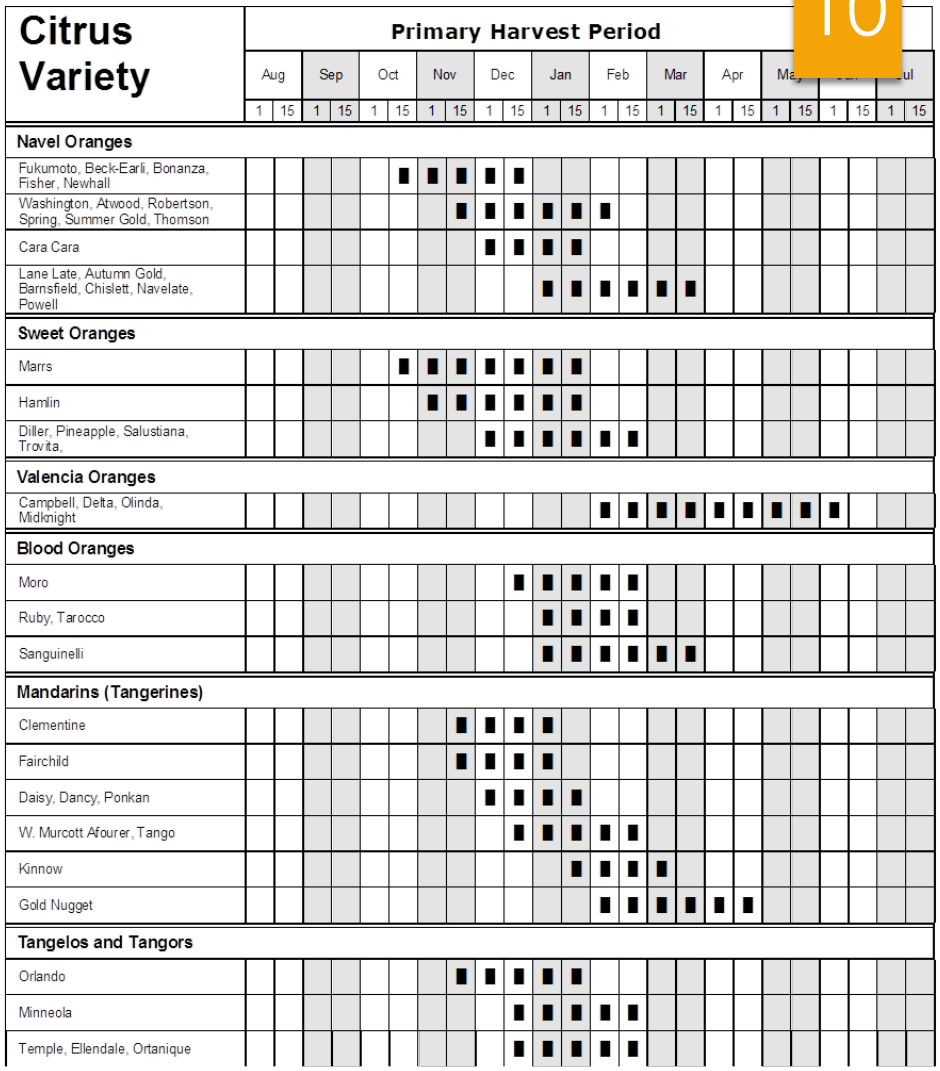
Lemons and limes

- Good in the desert
- Big yields
- Not particularly cold tolerant
- Lemons are the commercial citrus in AZ

Other Exotic Citrus

- Kumquats, limequats
- Sweet lemons
- Australian finger limes
- Ornamental (Sour) orange

Citrus Harvesting Chart



Citrus Variety	Primary Harvest Period																													
	Aug		Sep		Oct		Nov		Dec		Jan		Feb		Mar		Apr		May		Jun		Jul							
	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																														
Fukumoto, Beck-Earli, Bonanza, Fisher, Newhall						■	■	■	■	■																				
Washington, Atwood, Robertson, Spring, Summer Gold, Thomson								■	■	■	■	■	■																	
Cara Cara									■	■	■	■																		
Lane Late, Autumn Gold, Barnsfield, Chislett, Navelate, Powell											■	■	■	■	■	■														
Sweet Oranges																														
Marrs						■	■	■	■	■	■	■																		
Hamlin							■	■	■	■	■	■																		
Diller, Pineapple, Salustiana, Trovita,									■	■	■	■	■	■																
Valencia Oranges																														
Campbell, Delta, Olinda, Midknight													■	■	■	■	■	■	■	■	■									
Blood Oranges																														
Moro										■	■	■	■	■																
Ruby, Tarocco											■	■	■	■																
Sanguinelli											■	■	■	■	■	■														
Mandarins (Tangerines)																														
Clementine								■	■	■	■																			
Fairchild								■	■	■	■																			
Daisy, Dancy, Ponkan									■	■	■	■																		
W. Murcott Afourer, Tango										■	■	■	■	■																
Kinnow												■	■	■	■															
Gold Nugget													■	■	■	■	■	■												
Tangelos and Tangors																														
Orlando								■	■	■	■	■																		
Minneola										■	■	■	■	■																
Temple, Ellendale, Ortanique										■	■	■	■	■																

Citrus Harvesting Chart

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	Aug		Sep		Oct		Nov		Dec		Jan		Feb		Mar		Apr		May		Jun		Jul							
	1	15	1	15	1	15	1	15	1	15	1	15	1	15	1	15	1	15	1	15	1	15	1	15						
Grapefruit																														
Duncan									■	■	■	■	■	■	■	■	■	■	■	■										
Marsh										■	■	■	■	■	■	■	■	■	■	■	■									
Flame, Redblush (Ruby Red), Rio Red										■	■	■	■	■	■	■	■	■	■	■	■									
Texas Star Ruby											■	■	■	■	■	■	■	■												
Pummelo and Pummelo Hybrids																														
Oroblanco							■	■	■	■	■	■	■	■																
Cocktail								■	■	■	■	■																		
Tahitian (Sarawak), Reinking									■	■	■	■	■	■	■															
Melogold									■	■	■	■	■																	
Chandler										■	■	■	■	■	■															
Lemons																														
Eureka		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■														
Lisbon			■	■	■	■	■	■	■	■	■	■	■	■	■	■														
Variegated Pink Eureka				■	■	■	■	■	■	■	■	■	■	■																
Improved Meyer						■	■	■	■	■	■	■	■	■	■	■														
Ponderosa	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■						
Limes																														
Mexican, Key, West Indian	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■						
Tahiti, Bearss, Persian	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■														
Kumquats, Kumquat Hybrids and other Specialty Citrus																														
Meiwa, Nagami, Fukushu (These can have an occasional fruit year-round)					■	■	■	■	■	■	■	■	■	■	■	■														
Tavares							■	■	■	■	■	■	■	■	■	■														
Calamondin	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■						
Australian Finger Lime	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■						

Choose the best rootstock

Moderately Vigorous and Dwarfing Rootstocks

- Types:
  - Standard Types: Sour orange, Carrizo citrange (typically 12 to 16 ft tall)
  - Semi-dwarf: C-35 citrange, Swingle Citrumelo, and trifoliate orange (8 to 12 ft tall)
  - Dwarf: Flying Dragon, Cuban Shaddock. (less than 8 ft)
- Moderately vigorous to dwarfing, all sensitive to high pH soils, except sour orange.
- Citranges and trifoliate orange may require iron application, particularly in light, sandy soils.

- Impart good to excellent fruit quality (high juice content, good sweetness, smooth peel, thin peel, good interior and exterior color).
- Best for oranges, grapefruit, mandarins, tangelos and kumquats.

Highly Vigorous Rootstocks

- Rough lemon, macrophylla and volkameriana
- Vigorous, sensitive to cold, and impart poor fruit quality.
- Rough lemon sensitive to *Phytophthora*
- Best for lemons and limes, and Minneola tangelos. **Fruit of other varieties using these rootstocks will be poor quality!**
- All are standard-sized

Purchase and Plant well!

- Buy a tree with a tag for rootstock and variety (Keep the tags!)
- Plant in the spring after the chance of frost is gone until June, or plant mid-September through October.
- Any type of soil is OK, as long as there is drainage (No caliche)
- Plant high (graft union should show)
- Soil amendments not needed unless there are rocks.
- Assure that roots can penetrate surrounding soil
- Tamp out air pockets.
- Make a well around the tree for irrigation.
- Irrigate

Water properly

- Water more as the tree gets older
- Water less in the winter than in the summer.
- Water to a depth of 2-3 feet (Use a probe)
- **A larger wetted pattern will lead to a larger tree, a smaller wetted pattern will keep a tree small.**

Is citrus a low water use tree?

- No!

Irrigation efficiency

- Remove turf from around citrus
- Irrigate trees using their own line
- Irrigate more frequently on sandy or gravelly soil
- Better to irrigate less frequently with more water to avoid salt accumulation in the root zone.
- Avoid sprinkling the foliage.

APPLICATION INTERVALS FOR IRRIGATING CITRUS TREES[1]					
	Month				
Time after planting	Dec - Feb	Mar - Apr	May - Jun	Jul - Sep	Oct - Nov
0 - 1 month	every 2 - 3 days				
2 - 3 months	every 3 - 5 days				
4 months - 1 year[2]	14 days	7 - 10 days	5 - 7 days	2 - 5 days	5 - 10 days
1 - 2 years	14 - 21 days	10 - 14 days	7 - 10 days	7 - 10 days	10 - 14 days
3 years or older	21 - 30 days	14 - 21 days	14 days	10 - 14 days	14 - 21 days

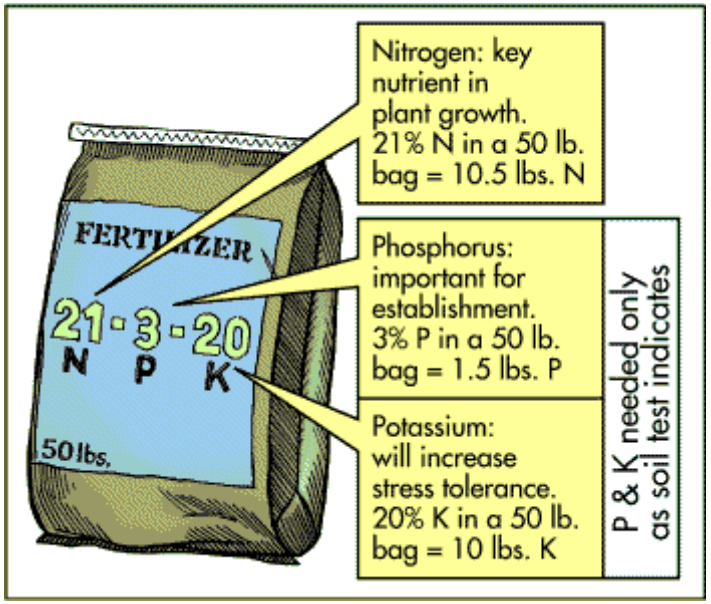
[1]Adapted from *Irrigating Citrus Trees*, AZ 1151, by Glenn C. Wright.

[2]Mature trees watered with drip or microsprinkler irrigation should also be watered at these intervals.

Fertilize!

- Do you like to eat?
- Citrus need N,P,K, Mg, Ca, S, Fe, Zn, Cu, Mn, and B
- They don't necessarily need "citrus food", but it is the most convenient.
- Granular conventional or slow-release is the best.
- Understanding the fertilizer analysis is important.
- Bag directions are not all that good.

Reading the bag



- Fertilizer labels have an analysis on them. For example:
  21-3-20 means that the material contains 21% N, 3% phosphorus as P_2O_5, and 20% K_2O

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.

Fertilizer application and timing

- Always incorporate and water in granular fertilizers.
- For oranges grapefruit and tangerines, apply all the fertilizer before July 1, in three or more equal applications (1/3 each time).
  - February 15th, April 15th, June 15th (or just before you leave for the summer).
- For lemons and limes, apply fertilizer in 3 or more equal applications, from February 1 until October 31. Apply 2/3 to ¾ in spring and ¼ to 1/3 in fall.
  - February 15th, April 15th and October 15th.

Pruning Citrus

- Citrus trees do not need to be “shaped” annually.
- Pruning is needed in the following cases:
  - To remove suckers or watersprouts.
  - To remove undesirable or dead wood
  - To remove crossing or rubbing branches
  - To allow in light if production is low.
- Hedging is OK
- Make large cuts in mid to late February
- Small cuts can be made at anytime.

Don't Skirt the trees!

- Do not skirt the trees unless necessary.
- The best quality fruit comes from the lower 2/3 of the tree.
- A shady canopy eliminates the need for mulch.
- Skirting leads to sunburn

Do grow citrus in a pot!

- Smaller pot = smaller tree, Any rootstock will be dwarfed in a pot, but dwarfing rootstocks will remain smaller, longer.
- A root bound tree will require root pruning.
- Unglazed ceramic pots will require additional watering because of potential for water loss through the porous sides.
- Always have a drainage hole(s)
- Use well-drained soil
- Fertilize as if the tree were no more than 3 years old.
- Bring indoors if night temperatures are less than 32 degrees.

Don't spray herbicides around your tree without reading the directions!

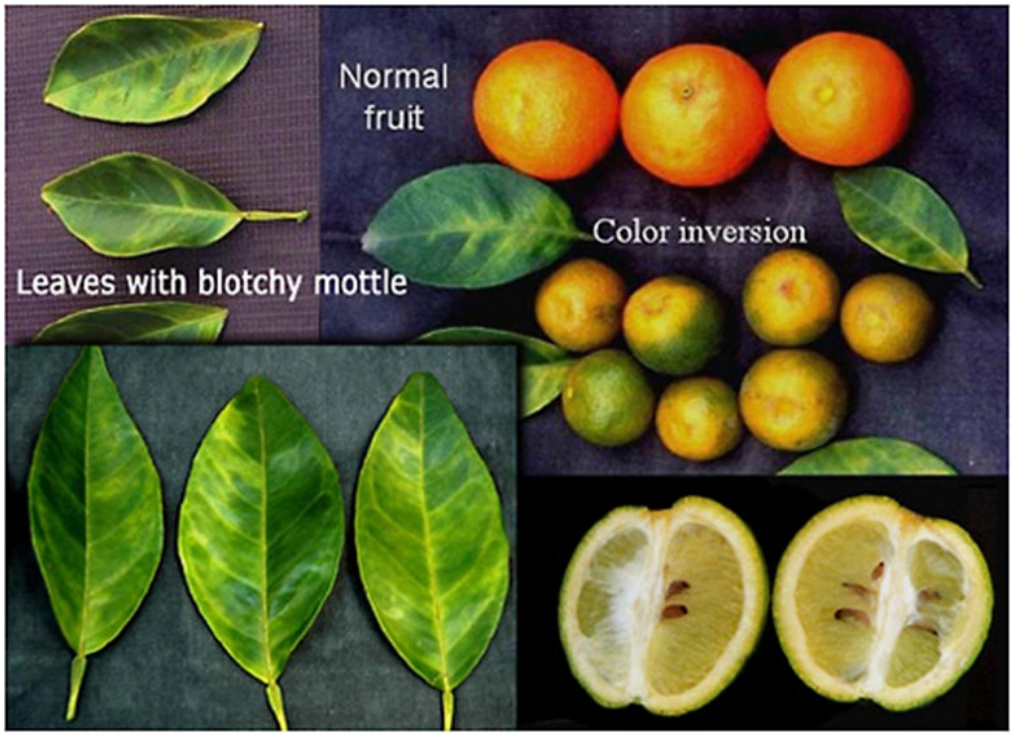
- Occurs when imazapyr is improperly sprayed on soil around citrus trees.
  - Ortho Groundclear Vegetation Killer - Imazapyr 0.2 to 0.47%
  - Roundup Extended Control – Imazapic 0.3%
  - Roundup Max Control 365 – Imazapic 1.6%
- Homeowners are not following the label directions.
- Herbicide must be flushed out of the soil with water, but it will take months to do so.

Watch for insect pests - Citrus Thrips

Watch for insect pests - Orange Dogworm

Watch for diseases

- Citrus greening
- Do not bring citrus trees, plant parts or soil into or out of Arizona
- Citrus fruit may be shipped out if it is washed and free of leaves, stems or soil.



Watch for diseases

Phytophthora

Alternaria

Watch for Predation

Woodpecker

Rat

Protect trees from Frost

- Plant in warm area.
  - Southern exposure
  - Cold air drainage
- Maintain weed free area around tree
- Irrigate before frost begins.

Cold Protection for Citrus

- 28F for more than 12 hours is needed to cause significant damage
- Provide and/or maintain supplemental heat
  - Christmas lights
  - Heater
  - Shop lamp
- Wrap tree in a blanket or burlap (using a frame as needed)
- Protect the trunk

Enjoy!