Citrus Course for Pinal County Master Gardeners

Citrus Care For The Arizona Master Gardener – 2011
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Citrus Flower Biology
- Citrus flower in the spring after sufficient cold temperatures
- Flowers are sensitive to water stress
- Flowers are sensitive to cold
- Flowers are not sensitive to over-fertilization

Effect of the Environment on Flowering
- Flower bud induction begins when vegetative growth stops during the winter rest period (when trees are not apparently growing).
- Winter pruning can reduce spring flowering.
- At this time vegetative buds develop the capacity to flower.
- About 850 hours of temperatures below 68°F for several weeks are necessary for this to occur.
- In the subtropics, this is the primary cause of floral bud initiation.

Shoot Growth
- Shoot growth occurs in waves, or flushes at clearly defined times.
- The spring flush(es) contain vegetative and reproductive shoots.
- Summer and fall flushes are usually only vegetative.
- For older trees, the spring flush is primarily reproductive, and most growth occurs during the summer and fall.
Shoot Growth

- Elongation of vegetative shoots comes to an end through shoot tip abscission.
- Shoot tips that are about to abscise turn from green to yellow to black.
- Shoot tip abscission is less common in lemon.
- New growth begins from an axillary bud.

Citrus Fruit Biology

- Citrus initially sets much more fruit than will remain on the tree, so some fruit drop is normal.
- There are two normal drop periods in the spring.
- Citrus fruit are sensitive to drought stress and cold.

Pollination

- Oranges, limes, lemons and grapefruit can set fruit without the benefit of pollination.
- Some mandarins require cross pollination, others do not.
- Cross pollination will produce seeds in some mandarins.

Citrus Fruit Biology

- Citrus fruit turn color in response to cold weather.
- Citrus lose acid and gain sugar as they mature.
- There is not always a relationship between peel color and edibility.
- When the fruit tastes good, eat it!
Composition of Fruit

- Water (%) 88.0
- Calories 44.0
- Protein (%) 0.8
- Fat (%) 0.2
- Carbohydrates (%) 10.0
- Crude Fiber (%) 0.1
- Niacin 2.2
- Vitamin C 109.0
- Calcium 1.2
- Phosphorus 2.1
- Iron 2.5
- Sodium ---
- Potassium 4.2

% of US RDA*
- Vitamin A 4.0
- Thiamin, B1 6.4
- Riboflavin, B2 1.9

Citrus Root Growth

- The seedling taproot is lost when the seedling is dug for transport to the orchard.
- Citrus roots are dimorphic. There are 2 layers.
  - The upper layer (top 3 feet) are strong lateral roots which provide support for a dense fibrous mass. This mass of fibrous roots rapidly absorbs water and nutrients from the upper soil layers.
  - The lower layer is a reserve that prevents drought stress and takes up nutrients not absorbed by the upper layer.
- In sandy soils, root systems are typically deep.
- In clay or hardpan soils, root systems are typically shallow.
- Under drip or microjet irrigation, roots congregate in the wetted zone. This can be used to dwarf a tree.

Citrus Root Growth

- Functioning roots are either white, yellow or light brown.
- Root hairs aid roots in uptake.
- Root growth continues without stopping, once temperatures are sufficiently warm.
  - Growth is slow between 55F and 64F. A cause of winter yellows.
  - Growth increases with increasing temperature between 64F and 82F.
  - Maximum growth occurs between 82F and 95F.
  - Growth stops when soil temperatures are greater than 97F.
Who Should I Purchase My Tree From?

- Purchase from reputable nurseries or garden shops.
- Be sure you know your true tree age.
- Avoid roadside vendors.
- Do not purchase citrus by mail.
- Do not bring in trees from out-of-state.

Citrus Cultivars

- Citron
- Lemon
- Lime
- Grapefruit
- Pummelo
- Orange
- Mandarin
- Kumquat

Cultivar labels

Citrons

- Citron (C. medica) trees probably originated in the south China or the Indian Himalayas.
- Used as an ornamental or for candied peel.
Buddha’s Hand Citron

- Buddha’s Hand is typically grown as an ornamental tree, and for its fragrance.

Lemons

- Vigorous trees
- Acidic fruit
- May be harvested green or yellow, from late July until March
- Harvest when the fruit is big enough

‘Lisbon and Eureka’ Lemon

- Vigorous trees.
- Acidic fruit.
- Moderately frost tolerant; ‘Lisbon’ more frost tolerant than ‘Eureka.’
- ‘Eureka’ is thornless.

‘Improved Meyer’ Lemon

- Small trees.
- Hybrid of lemon and tangerine or orange.
- Moderately acidic fruit, with a yellow-orange color
- More frost tolerant than other lemons
- Good as an ornamental for growing in pots
‘Mexican’ or ‘Key’ Lime

- Small trees
- May be thorny
- May bloom continuously throughout the year
- Acidic, small fruit
- Fruit yellow when mature
- Very low frost tolerance

‘Bearss’ Lime

- Also known as the “Persian” or “Tahiti” lime.
- Larger fruit than the Mexican Lime
- Trees short-lived due to wood pocket disease.
- Quite frost sensitive.

‘Kaffir’ Lime

- Leaves commonly used in Thai cooking, particularly in *tom yam*, a fiery-hot, sour and very aromatic soup prepared from shrimps, chicken, or fish.
- Fruit juice added to fish and poultry dishes.

Pummelo

- Originator of grapefruit
- Large, seedy fruit
- May be white or pigmented
- Generally, do not have a bitter flavor
- ‘Chandler’ is a common variety. Also, ‘Tahitian’ (‘Sarawak’) and ‘Red’.
Grapefruit

- Large trees
- White, pink or red fruit
- Originated from pummelo
- Has a distinctive leaf petiole
- May be harvested from November until June, best flavor after January

‘Marsh’ Grapefruit

- Vigorous, tall tree
- 3½ to 4 inch diameter fruit
- Seedless
- Good flavor

Pigmented Grapefruit Varieties

- Vigorous, tall tree.
- 3½ to 4 inch diameter fruit
- Seedless
- Good flavor
- Redblush (Ruby Red) used to be preferred.
- Rio Red flesh color is 5 times more intense than Redblush. It is now the most preferred.
- Flame is a new variety from Florida
- Star Ruby is no longer recommended.

‘Oro Blanco’ and ‘Melogold’

- Grapefruit x pummelo hybrid
- Combines the seedlessness of a grapefruit with the lack of acidity of the pummelo.
- Ready to eat in December and January.
Oranges

- Medium to Large trees
- Most popular citrus in the world
- May be harvested from November until May

“Sweet” Oranges

- Early and mid-season varieties marketed in Arizona as “Arizona Sweets”
- Large tree
- Sweet, juicy fruit with few seeds
- Moderate frost tolerance
- Harvested November through February

‘Valencia’ Orange

- Late season, harvested from February until May
- Large tree
- Sweet, juicy fruit with few seeds
- Moderate frost tolerance
- May regreen in warm Spring months
- Best for juicing, has tough section walls

‘Navel’ Oranges

- Early through late-season, harvested from November until March
- Large tree
- Sweet fruit with no seeds
- Moderate frost tolerance
- Best for fresh eating, is not particularly juicy
**Blood Oranges**
- Mid-season, harvested from December until February
- Large tree
- Sweet, juicy fruit with some seeds and a distinctive flavor
- Flesh and peel color requires cool nights to develop

**Mandarins (Tangerines)**
- Small to Large trees
- Wide variety of fruit characteristics
- May be harvested from October until March

**Orange Ripening Chart**

<table>
<thead>
<tr>
<th>Early Season</th>
<th>Mid Season</th>
<th>Late Season</th>
</tr>
</thead>
<tbody>
<tr>
<td>October - December</td>
<td>November - February</td>
<td>January - April</td>
</tr>
<tr>
<td>Hamlin Sweet</td>
<td>Trovita Sweet</td>
<td>Valencia</td>
</tr>
<tr>
<td>Marrs Sweet</td>
<td>Shamouti Sweet</td>
<td>Natal</td>
</tr>
<tr>
<td>Fukumoto Navel</td>
<td>Salustiana Sweet</td>
<td>Lane Late Navel</td>
</tr>
<tr>
<td>Fisher Navel</td>
<td>Washington Navel</td>
<td>Chislett Navel</td>
</tr>
<tr>
<td>Beck Navel</td>
<td>Cara Cara Navel</td>
<td>Powell Navel</td>
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<tr>
<td></td>
<td>Moro Blood</td>
<td>Sanguinelli Blood</td>
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<td></td>
<td>Tarocco Blood</td>
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</tbody>
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**‘Clementine’**
- Mid-season, harvested from December until February
- Small to medium tree
- Fruit are small, easy to peel, and have a distinctive flavor, but may be seedy
- Seedless if grown in isolation
- Requires a pollinator for best production and fruit size.
- Moderate frost tolerance
‘Fairchild’
- Early to mid-season, harvested from November until February
- Small to medium tree
- Fruit are small, rather difficult to peel, and seedy, but with good flavor
- Requires a pollinator for best production
- Moderate to good frost tolerance

‘Kinnow’
- Late season, harvested from February until March
- Large tree
- Fruit are medium sized, not easy to peel, seedy, but are very sweet
- Tends to bear alternately
- Moderate to good frost tolerance

‘Minneola’ tangelo
- Grapefruit x tangerine hybrid
- Mid-season, harvested from December until February
- Large, vigorous tree
- Fruit are large, easy to peel, and juicy
- Moderate to good frost tolerance
- Susceptible to sunburn

‘Temple Tangor’ (Royal Mandarin)
- Mandarin x Orange hybrid
- Distinctive flavor and good color.
- Seedy
**Kumquat**

- Small fruit, native to the Far East.
- Cold hardy.
- Often used as candied fruit.
- ‘Meiwa’ and ‘Nagami’ are most common. Also ‘Fukushu’

**Limequats and Calamondins**

**Rootstocks**

- All citrus trees are budded to a rootstock.
- Affect vigor, productivity, fruit quality and disease resistance of citrus.
- Homeowners sometimes have a choice of rootstock.

**What does the rootstock look like?**

- Shoulder
- Rootstock
The bud union is identified by change in bark texture.

Flood Irrigation Water Line
Rootstock/Variety Union

Moderately Vigorous and Dwarfing Rootstocks

- Types:
  - Standard Types: Sour orange, Carrizo citrange, Troyer Citrange (typically 12 to 16 ft tall)
  - Semi-dwarf: C-35 citrange Swingle Citrumelo (8 to 12 ft tall)
  - Dwarf: Flying Dragon (less than 8 ft)

- Moderately vigorous to dwarfing, all sensitive to high pH soils, except sour orange.
  - Impart good to excellent fruit quality.
  - Sour orange sensitive to CTV
  - 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
- All are standard-sized
A Proper Citrus Planting Site Should:

- Have as good a soil as possible
  - Drainage
  - Caliche
- Not restrict growth
  - Roots
  - Tree
- Not expose tree to too much wind or cold
- Not be less than 10 feet from other trees.

Planting Time ...

- The best time to plant is March through June, or September and October.
- Citrus should not be planted in December or January, or July and August.

How Do I Plant My Tree?

- Dig a hole slightly wider, and slightly shallower than the root ball.
- Add soil amendments to fill earth, if desired, but not necessary.
- Remove citrus from pot or box.
How Do I Plant My Tree?

- Score the root ball if tree is root bound.
- Do not allow the root ball to dry out.
- Place the tree in the hole and fill with soil.

What About Organic Matter?

- Organic matter is not a necessity.

How Do I Plant My Tree?

- Tamp down, tamp down, tamp down.
- Water thoroughly.
- Check for settling.

How Do I Plant My Tree?

- Do not plant too deeply. If tree sinks following planting, reset it.
- Graft union should show.
Planting Depth

- Always plant at grade or above. Do not cover the bud union with soil.
- No need to bank dirt around the trunk - water will not hurt a tree trunk.
  - Assuming that the trunk is allowed to dry between irrigations.

Danger!

- Trees whose trunks are covered with moist soil will become diseased.
- Lesions caused by Phytophthora - usually fatal.

Pruning Citrus

- Citrus trees do not need to be "shaped" annually.
- Pruning is needed in the following cases:
  - To remove suckers (watersprouts)
  - To remove undesirable or dead wood
  - To remove crossing or rubbing branches
  - To allow in light if production is low.

Suckers
Young tree care

- Trunk must be painted to avoid sunburn if it is not shaded
- Use whitewash or other water-based or latex paint.
- Can use cardboard as well.

Pruning Citrus

- When removing large limbs that will expose previously shaded parts of the tree to the sun, protect those that remain from sunburn and resulting disease using white paint
- Severe pruning is best done in the late winter.
- Light to moderate pruning can be done at any time

Pruning techniques: Thinning out

- Thinning cuts tend to open up plants.
- That's because you selectively remove limbs at their base, and replacement growth, if any, doesn't fill the opening you created.
- These cuts allow light to penetrate the canopy.
- Thinning is the most desirable form of pruning, because it carefully removes branches without causing excess regrowth.

Pruning techniques: Heading Back

- Heading cuts are made by cutting back portions of shoots.
- Where each shoot is headed, bud breaks create two, three or four shoots from the rest of the shoot you headed. So the canopy gets thicker.
- Continuously heading or shearing can lead to a severely dense canopy that doesn't allow sunlight through and can lead to plant health problems.
- Typically done commercially or for ornamental purposes
Commercial Hedger

Pruning Citrus
- Do not skirt the trees.

How much do I irrigate my tree?
- I can’t tell you exactly!
- Everyone’s situation is different.

How do I irrigate my tree?
- Objective: Avoid stress
  - Leaf curl
  - Fruit size reduction
  - Flower and fruit drop
  - Tree death
Leaf Curl

- Drought Stressed
- Not drought stressed (Thrips Damage)

Proper Irrigation Requires:

- Proper watering depth
- Proper watering expance
- Proper irrigation timing
- Good efficiency

Proper watering depth

**LANDSCAPE WATERING GUIDELINES**

<table>
<thead>
<tr>
<th>New Plants &amp; New Offices</th>
<th>Seasonal Frequency — Days Between Waterings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Spring/Early Fall</td>
</tr>
<tr>
<td>Trees</td>
<td>15-20 days</td>
</tr>
<tr>
<td>Shrubs</td>
<td>15-20 days</td>
</tr>
<tr>
<td>Groundcovers &amp; Vines</td>
<td>15-20 days</td>
</tr>
<tr>
<td>Cacti and Succulents</td>
<td>5-7 days</td>
</tr>
<tr>
<td>Annuals</td>
<td>5-7 days</td>
</tr>
<tr>
<td>Warm Season Grass</td>
<td>5-7 days</td>
</tr>
</tbody>
</table>

Irrigation expance

- A basin should extend past the canopy.
- Drip emitter or sprinkler pattern should extend past the canopy.
- Provide a minimum of 3 drippers per tree.
Irrigation timing

- Basin or flood irrigation
  - Irrigate every 7 to 10 days in the summer (June through September)
  - Irrigate every 3 to 4 weeks in the winter (December and January)
- Check depth of irrigation to 24 - 36” using shovel or probe just before irrigating again
  - Soil should not be dry or soggy

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.
Citrus are sensitive to salt!

Leaching and Soil treatments
- Used to counter the effects of salty water.
- Leach – water for 12 to 24 hrs continuously, once or twice a year.
- Soil treatments – gypsum, liquid sulfur

Can I over-water my tree?
- Yes, if the tree is planted too deeply
- It is possible if soil is heavy, but virtually impossible where soils are light
  - Caliche layer
- Some will over-water in the winter
- Symptoms are leaf yellowing and defoliation

When fertilizing citrus, they can’t read, but you can
- Citrus do not care what type of fertilizer they get.
- They just care that they get enough of it.
- That’s where you come in.
Fertilizing Citrus

- One approach is to purchase fertilizer that contains all the nutrient elements that the trees need, rather than buying a single element fertilizer. This reduces chance for error.
- However, one must read and follow the directions!
- The alternative is to purchase single element fertilizers. This works too, and is cheaper.
- Always incorporate and water in granular fertilizers.

The essential element for citrus

- Nitrogen is the most important.
- Don't over or under fertilize
  - Over fertilization leads to dark green leaves, thick peel, large, puffy fruit and granulation.
  - Under fertilization leads to yellow leaves, leaf loss, small fruit.

Nitrogen deficiency
Nitrogen Deficiency Symptoms

- General yellowing of leaves
- Occurs on older leaves first, then on the younger ones.
- Leaves lifespan is shortened.
- Deficiency not to be confused with "Winter Yellows", which occurs because the soil is cool and roots cannot effectively take up nutrients, (chiefly N, Fe and Mn.)

How Do I Fertilize My Tree with N?

- N fertilization depends on tree age
  - Year 1: 0.00 – 0.25 lbs. N/tree
  - Year 2: 0.25 – 0.50 lbs. N/tree
  - Year 3: 0.50 – 1.00 lbs. N/tree
  - Year 4: 1.00 – 1.50 lbs. N/tree
  - Year 5 and older - 1.5 lbs N/tree
- Fertilize a little more on sandy soils.
- Fertilize grapefruits a little less (1.0 to 1.25 lbs. max.)
- Fertilize lemons a little more
- Be sure you know your tree age.
- Or, apply the amount recommended on the bag.

Reading the bag

Fertilizer labels have an analysis on them. For example: 15-30-15 means that the material contains 15% N, 30% phosphorus as $P_2O_5$, and 15% $K_2O$
Reading the bag

- Divide the pound of N needed per tree per year by the first number of the analysis (expressed as a decimal). This will give the amount of fertilizer to apply per tree per year.
- Example: For a mature tree requiring 1.5 lbs. N per year, and using 21-0-0 fertilizer, apply 1.5/0.21, or 7.1 lbs. Of 21-0-0 per year.

Apply fertilizers by weight using a scale, and by volume using a container

Follow the directions!

Fertilizer application timing for oranges, grapefruit and tangerines in Arizona

- For oranges grapefruit and tangerines, apply all the fertilizer before July 1, in three to six equal applications.
  - February 1st, April 1st, June 1st (3 applications)
  - February 1st, March 15th, May 1st, June 15th (4 applications)
  - Monthly, from February 1st through July 1st (6 applications)

Fertilizer application timing for lemons and limes in Arizona

- For lemons and limes, apply fertilizer in 3 to 6 equal applications, from February 1 until October 31. Apply 2/3 to ¾ in spring and ¼ to 1/3 in fall.
  - February 1st, April 1st and October 1st (3 applications)
  - February 1st, March 15th, May 1st, and October 15th (4 applications)
  - Monthly, from February 1st through May 1st, and September 1st and October 1st (6 applications)
Fertilizer choices – some are better than others.

- Granular and slow-release fertilizers are best unless one will be gone.

P fertilization

- P found in most compete citrus foods.
- Or, apply ammonium phosphate (11-48-0, or 18-46-0), triple superphosphate (0-45-0) or several organic sources.
- Apply P only once annually (March, or October), unless you are applying P as part of a complete fertilizer.
- Apply about 0.1 lb. P₂O₅ per tree per year of age, not to exceed 0.5 lbs.
- No tree ever died of too much P

Micronutrients

- Do not confuse with N deficiency!
- Iron and Zinc are most often necessary, Mn on occasion.
- Iron sulfate is not effective when soil pH is between 7.4 and 8.5.
- Ironite?
- Chelates or lignosulfonates are the best carriers for micronutrient application.

Iron and Zinc Deficiency Symptoms

- Intervernal chlorosis
- Occurs on younger leaves
- Zinc deficient leaves are generally small, whereas iron deficient leaves are not.
- Both deficiencies can occur in the same leaf.
Fe deficiency

Weeds and Ground Cover
- Weeds and groundcovers and grasses compete with citrus for water and nutrients.
- Weedy areas are colder than weed-free zones.

Subtropical Growing Regions
- All the US citrus growing areas are in the subtropics.
- Subtropics are defined as areas between 23.5 and 40° north and south latitude.
- These areas also have mean annual temperatures between 15 and 18C, with temperatures of 0C on a regular basis, and as low as -10C on occasion.
Cold Protection for Citrus

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

Provide and/or maintain supplemental heat
- Christmas lights
- Shop lamp
- Blanket or burlap (frame)
- Protect the trunk
An Unfortunate Result

Citrus Course for Pinal County Master Gardeners

An Unfortunate Result

Dead twigs mean no fruit this season.
Do not prune until the spring flush has hardened off (late Spring).
Regrowth will be slow.
First flush may collapse and die if underlying wood is damaged.
Must cut back to undamaged wood to avoid disease.

Caring For Freeze Damaged Citrus

Exposed trunks and limbs should be painted white to avoid sunburn.
Maintain coverage late March through October.
Irrigation should be reduced proportionally to the loss of canopy.
Avoids root rot
Increase gradually.

Hendersonula (Sooty Canker)

Hendersonula is a fungal wound pathogen that only invades citrus bark that has been damaged by freezing injury, sunburn, mechanical injury, or pruning wounds.
The fungus does not infect uninjured bark tissue. The fungus has a wide host range and causes disease in many plants unrelated to citrus.

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Increase gradually.
Caring For Freeze Damaged Citrus

- Nitrogen should be reduced proportionally to the loss of canopy
- If there is no fruit this year, make a fertilizer application in the fall to encourage leaf growth (oranges and grapefruit)
- Consider foliar feed if deficiencies appear.

Harvest the fruit
- Juice it, then freeze the juice.
- Damaged fruit will fall shortly

Citrus Insects and Diseases

- Insects
  - Aphids
  - Weevils
  - Psyllids
  - Fruit flies
  - Red Scale
  - Citrus thrips
  - Peel miner
  - Ants, termites
  - Orange Dog Werm
  - Salt Marsh Caterpillar
  - Whiteflies and mealybugs
  - Katydid

- Diseases
  - Phytophthora
  - Alternaria
  - Citrus Tristeza Virus
  - Wood rots
  - Rio Grande Gummosis

Asian Citrus Psyllid

- Report the Psyllid
ACP Adults and Nymphs

Photo by Mike Rogers, Univ. of Florida

Asian Citrus Psyllid Adults

Mediterranean Fruit Fly (Medfly)

Report any fruit fly
Medfly

California Red Scale

Citrus Thrips Damage
Citrus Thrips Damage

Mites

Citrus Peel Miner Damage

Citrus Leaf Miner
Wooly Whitefly

Orange Dogworm

Orange Dogworm
Saltmarsh Caterpillar

Citrus Mealybug

Sooty Mold

Katydid
Alternaria (Black Rot)

Phytophthora (Foot Rot)

Alternaria

Phytophthora Gummosis
Rio Grande Gummosis of Grapefruit

- Red oozing is typical

Hendersonula (Sooty Canker)

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Citrus Tristeza Virus

- The most destructive citrus disease worldwide
- Sour orange is particularly susceptible
- Not a problem in Arizona, now.
- Can be spread rapidly by the brown citrus aphid.

Symptoms of Huanglongbing

- Symptoms of HLB in pummelo, Florida City
An early sign of the disease is yellowing of the leaves. Leaves with HLB disease have a blotchy yellow pattern that is not the same on both sides of the leaf.

Leaves with nutrient deficiencies (Zinc is an example) have the same yellow pattern on both sides of the leaf.

HLB leaf symptoms can range from slight to nearly completely yellow.

HLB in Grapefruit

HLB in Lemon
HLB in orange
Fruit symptoms of HLB in Brazil

Photos: Jose Luiz Rodrigues

HLB disease prevents the fruit from developing the proper color.

The lower half of the fruit may remain green, which is why this disease is also sometimes called citrus greening.

Even more devastating, HLB causes the fruit to be small, oddly shaped, with aborted seeds and bitter juice.

The fruit grows crookedly, forming uneven segments.
Within 3 to 5 years after HLB infection, the tree stops bearing fruit and eventually dies. There is no cure for the disease!

This citrus tree in a backyard in Florida is obviously very sick, with few leaves and no fruit.

Symptoms may not show up in the tree until 1 to 2 years after it becomes infected.

Another disease carrier?
Other Problems

- Leaf drying
- Sunburn
- Fruit splitting
- Granulation
- Chimeras
- Varmints
- Sheepnose

Mesophyll Collapse

- Found on west and south side of tree.
- Due to sun exposure

Sunburn
Fruit Splitting

Potential causes:
- Low N status of tree
- Uneven watering
- Large crop load
- Sunburn
- Genetics (some varieties are prone to splitting)

Granulation

- Pick fruit early
- Pick small fruit
- Don’t over-fertilize with N
- Choose a non-vigorous rootstock
- Don’t overwater
- K fertilization?

Chimeras

Sheepnose

- Sheepnose occurs on young grapefruit subject to high temperatures during the cell division stage (Stage I).
- Excessive cell division in the albedo occurs.
- Don’t over fertilize with N
- Will become less common as tree ages.
Gophers and Other Varmints

- Generally chew on the bark and cause girdling and occasionally tree death, or eat tree roots
- Also include rabbits, coyotes and deer.
- Woodpeckers can damage fruit

Woodpecker Damage

Ant Damage

Snail damage
Another Varmint