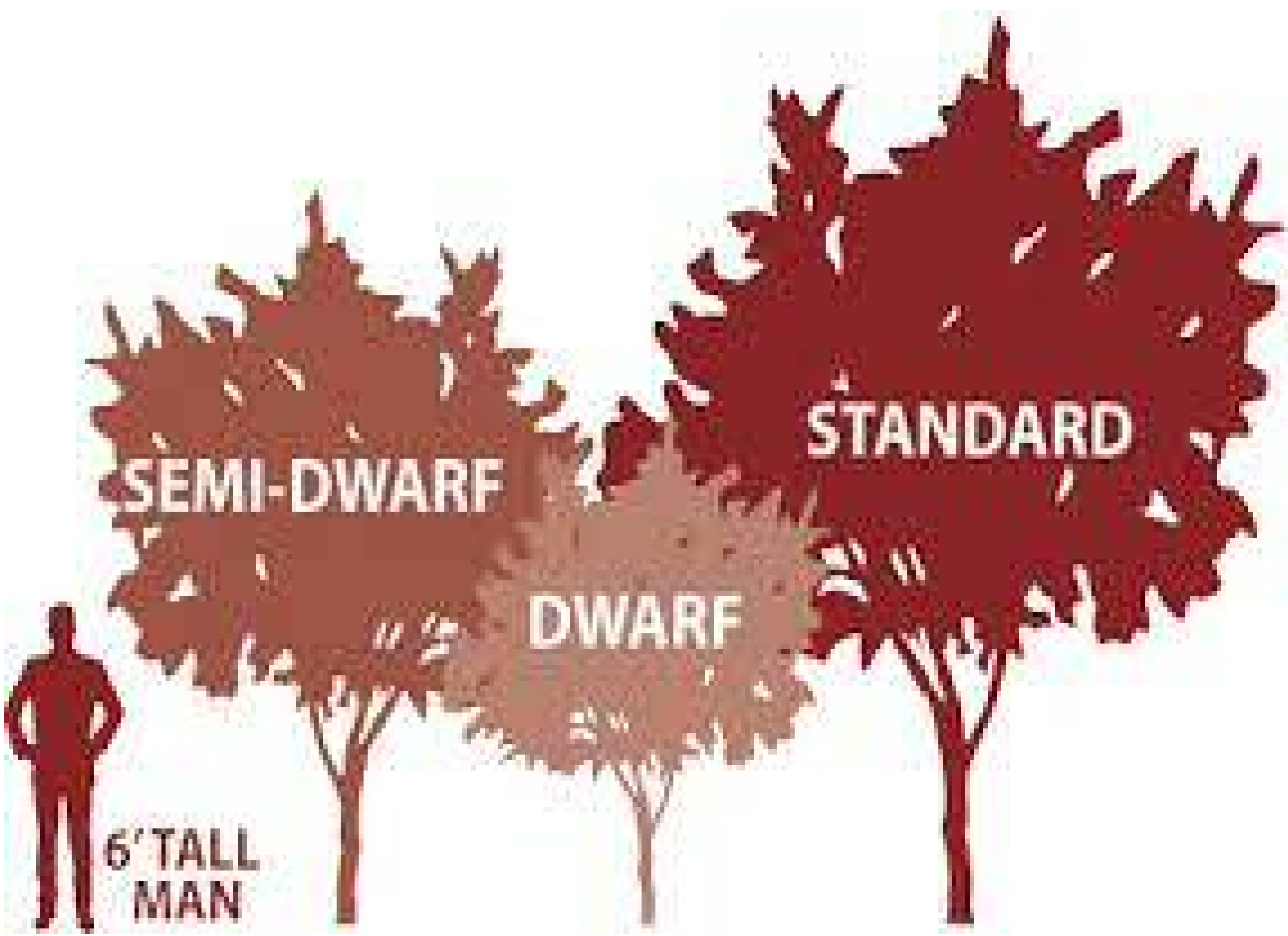
Varieties

- choose one that you will want to eat often, as you will have them much of the year (Four Winds Citrus Variety Chart link in your Resources list)
- certain citrus mature earlier than others (see early ripening handout)
- Unique varieties:
- Blood orange: red flesh is antioxidant rich. Often sweeter than other oranges
- Yuzu: very little, but very flavorful juice used by chefs. Believed to be a cross between a sour mandarin and ichang papeda
- Keiffir lime: regular lime with bumpy skin. Attractive tree with segmented leaves that are extremely fragrant and prized by chefs.
- Buddhas hand: not much juice, but very fragrant pith and rind. Odd shaped and often used as an ornamental
- Australian finger lime: oblong green lime with many small lime-flavored orbs inside. Called "citrus caviar"


SEMI-DWARF
DWARF
STANDARD
6' TALL MAN

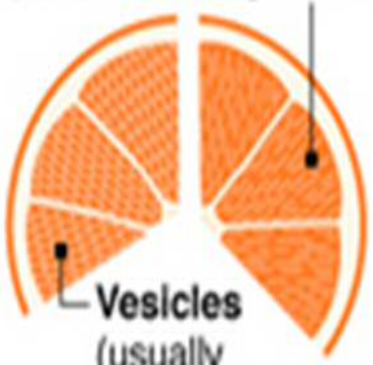
Standard varieties of citrus trees often grow to a height of 20 to 30 feet and the canopy -- or width of a tree -- can spread to 18 to 30 feet depending on the variety. Dwarf citrus trees are significantly shorter and narrower, which provides greater flexibility in planting location. Most varieties top out at 8 feet in height with a proportionally smaller canopy. Despite the differences in height and width, regular, semi-dwarf and dwarf citrus varieties produce the same size fruit.

Cold snap

Citrus crops are very sensitive to freezing temperatures and frost; exposure for more than 30 minutes can damage a harvest.

Effect on fruit

Juice vesicles inside fruit rupture as ice crystals expand, ruin body of fruit

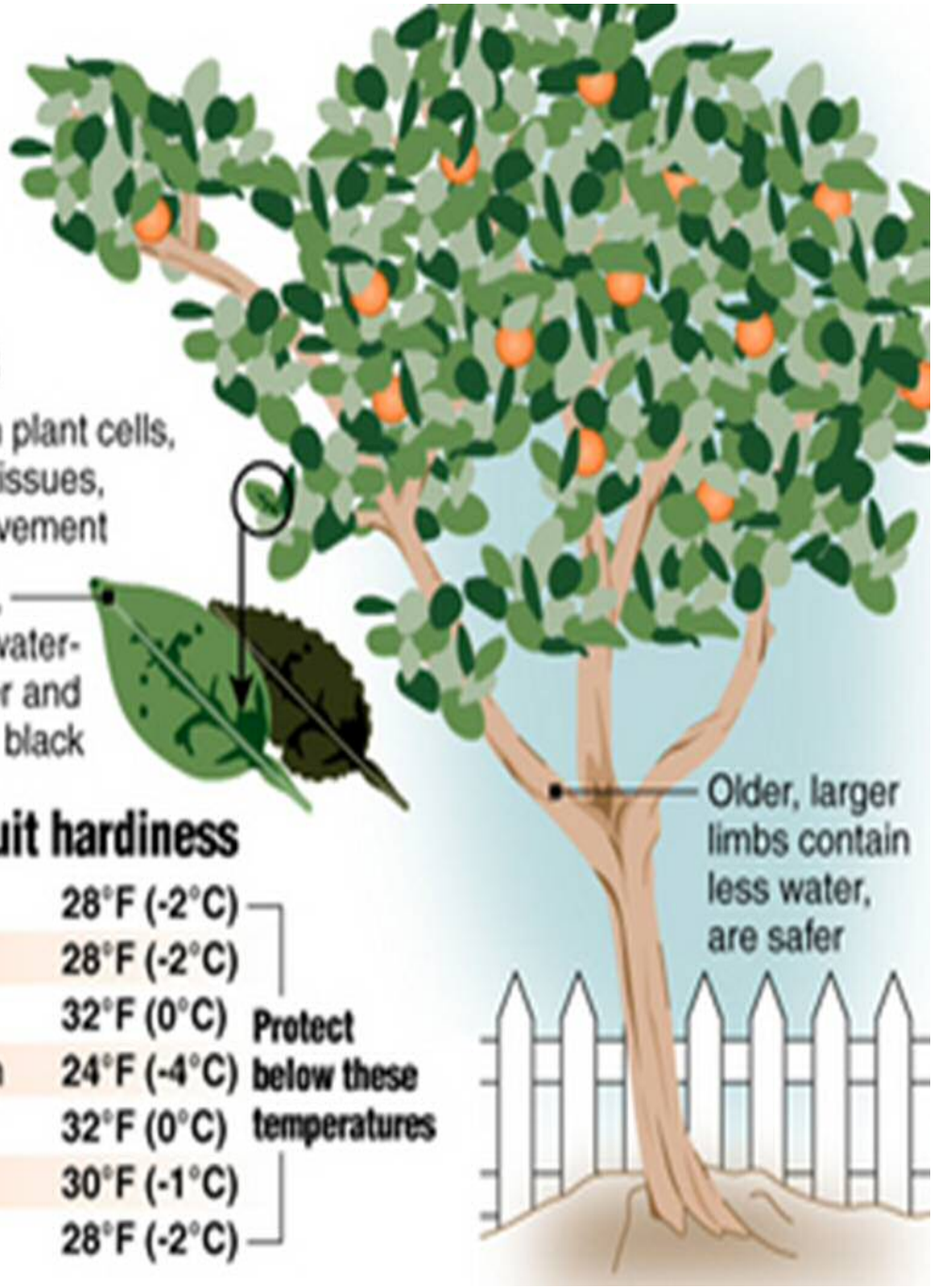


- Fruit can be used soon after frost, but becomes mushy, dries up quickly

Effect on trees

Ice crystals form in plant cells, taking water from tissues, disrupting fluid movement

- Damaged leaves, twigs first appear water-soaked, then wither and turn dark brown or black



Examples of fruit hardiness

Navel orange	28°F (-2°C)
Clementine	28°F (-2°C)
Tangerine	32°F (0°C)
Satsuma mandarin	24°F (-4°C)
Lemon	32°F (0°C)
Sweet lime	30°F (-1°C)
Grapefruit	28°F (-2°C)

Protect below these temperatures

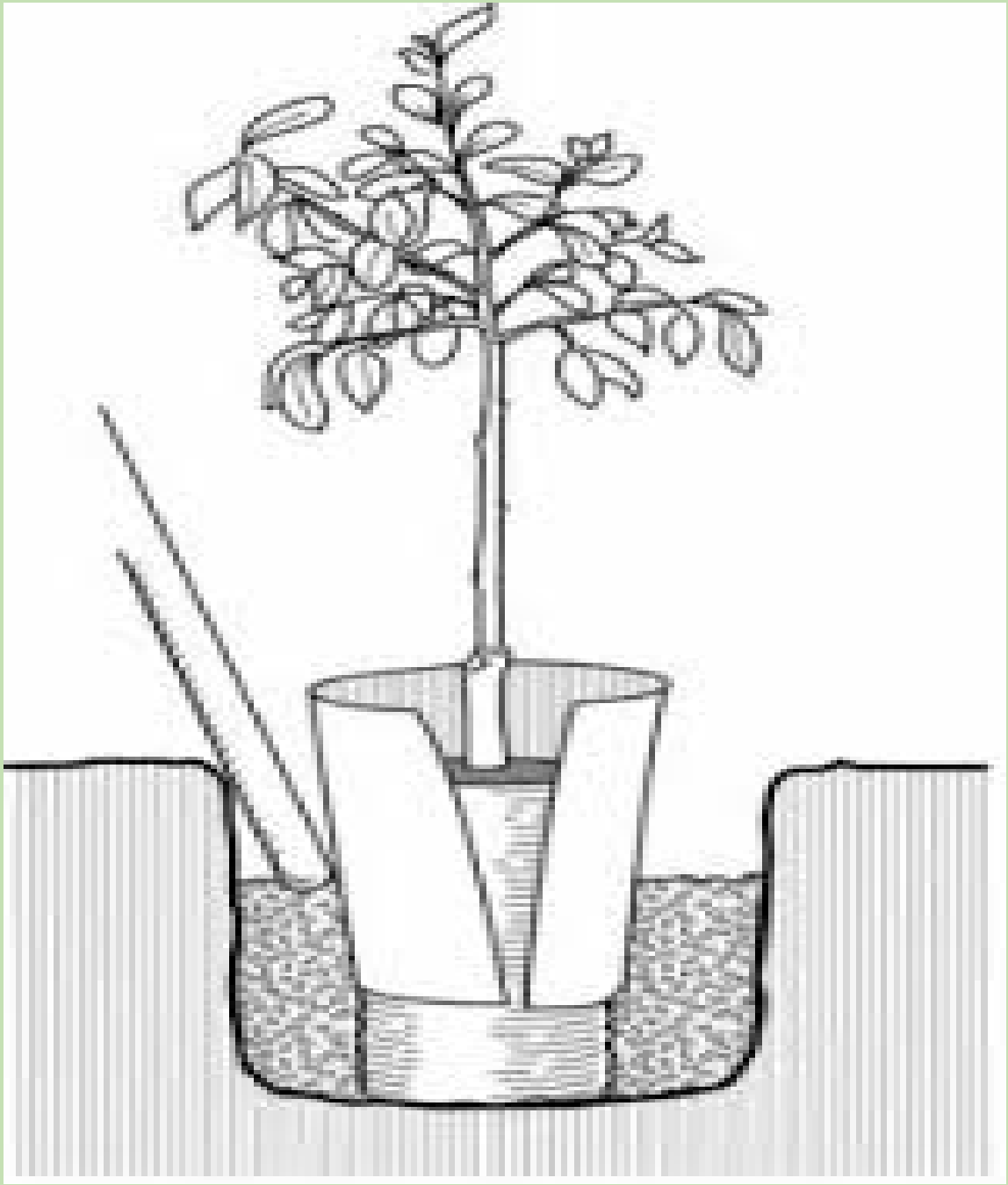
Source: University of California, Four Winds Growers

-First off DO NOT PRUNE! Those damaged leaves can actually provide protection for the plant until the air warms up. The plant needs to rally and recover. Pruning might just put it over the edge. Sometimes the plants must remain with that 'raggedy' appearance until as late as June and in some cases a full year. Be patient.

-The damaged tree now has a much smaller canopy and thus a somewhat reduced water requirement. If you have your tree set up to receive water for a large tree cut back the water to that of a smaller tree until the tree recovers its original size. Over watering will cause the tree another stress point. As the tree recovers increase the water to accommodate that recovered growth.

-If you didn't remove the fruit when frost was predicted you will find out the reason for that suggestion. The fruit left on a frost damaged tree will be dry and desiccated because, as I said, the cell walls have burst and released all the liquid within. The compost pile is the most probable destination of this fruit. It is important to remove this damaged fruit as the tree will try to maintain it and leaving it on the tree will also affect next year's fruit crop.

When the covering is directly on the plant the frost that has accumulated on the outside of the cover transmits the freezing temperatures to the foliage. The end result could be as damaging as if you hadn't covered your plant at all. Here is a quick and easy solution. Place your, now that the season is over, unused tomato frames over the frost tender plants. When frost is predicted you can just throw a cover over the frame and 'voila' protection. Inelegant but effective.



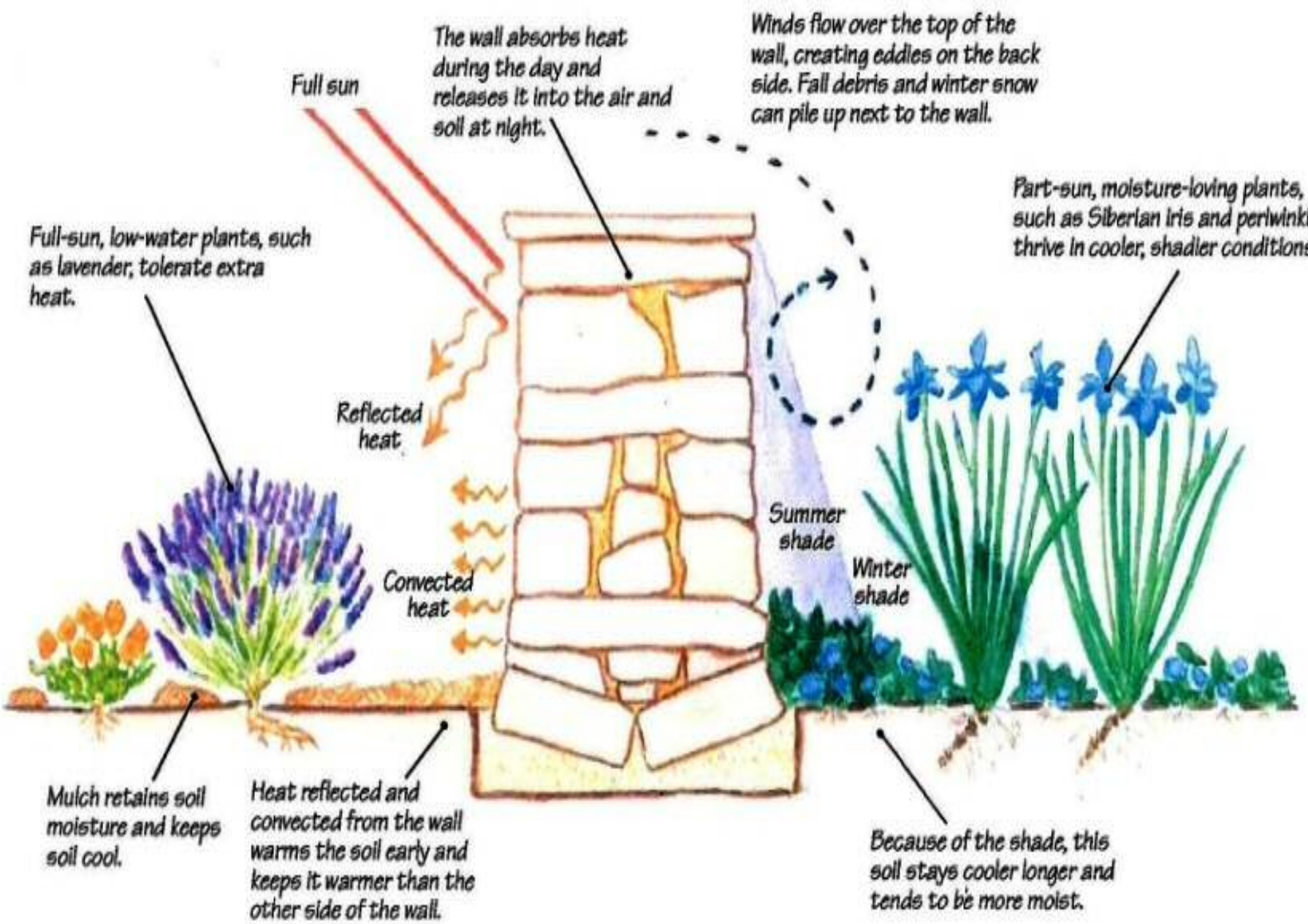
Planting
- plant in late spring, soon after frost, so that tree will have as much time as possible to become established before fall rains
- dig the hole much wider than the root ball, deep enough that root ball sits about one inch higher than ground level (tree will settle after planted, do not want a well around trunk where water will pool)
- never grip by truck alone

Container Planting
- all citrus do well in containers when young. For long term choose dwarf or ultra dwarf varieties
- containers are easier to move to move favorable conditions, but are more susceptible to effects of heat and cold


8
7
Lake Berryessa
Calistoga
St. Helena
15
14
29
14
Napa
12
15
15
Sonoma
14
4
15
17
17
37
80
Vallejo
15

Climate

- we are in sunset zone 14
- most citrus does well in Napa. The exception is grapefruit, which likes it hotter and drier.
- we do get cold periods and freezes during which you will have to protect and cover your trees.
- when you are reading about a tree, and see "cold tolerance" referenced, know that it refers to the tree it's self, and not the fruit
- if you plan properly, and care for your trees, you can have citrus almost all year round


Full sun
The wall absorbs heat during the day and releases it into the air and soil at night.
Winds flow over the top of the wall, creating eddies on the back side. Fall debris and winter snow can pile up next to the wall.
Part-sun, moisture-loving plants, such as Siberian iris and periwinkle, thrive in cooler, shadier conditions.
Full-sun, low-water plants, such as lavender, tolerate extra heat.
Reflected heat
Convected heat
Summer shade
Winter shade
Mulch retains soil moisture and keeps soil cool.
Heat reflected and convected from the wall warms the soil early and keeps it warmer than the other side of the wall.
Because of the shade, this soil stays cooler longer and tends to be more moist.


Microclimate on a Hill
Sun's rays
Shaded slope
Sunny slope

Microclimates

- small areas where the climate conditions differ from the surrounding areas
- slope: south is warmest, north is coolest
- hard and dark surfaces absorb heat during the day and radiate it at night
- dense vegetation shields the surrounding earth from sun, helping it retain water and stay cooler
- water features increase humidity around them, large bodies of water retain and radiate heat

PRUNING GUIDELINES

Tools: loppers, saw, clippers
10% bleach and water solution

Four Winds Growers “Pruning Your Citrus”

Pruning Guidelines

Young citrus should be pruned as little as possible. Removing green leaves retards growth and increases the amount of time required to begin to produce fruit.

--Prune just prior to bloom or after fruit set and prune in dry season. Minor pruning can be done at other times but avoid late-season pruning which can stimulate excessive tender growth susceptible to be injured by frost.

Diagonal cuts when Pruning -- angle it to the direction you want the new growth to go.

PRUNING GUIDELINES

Leave fruit, prune branches in Spring

Four Winds Growers “Pruning Your Citrus”

Pruning Guidelines

Always prune in dry season so disease doesn't spread.

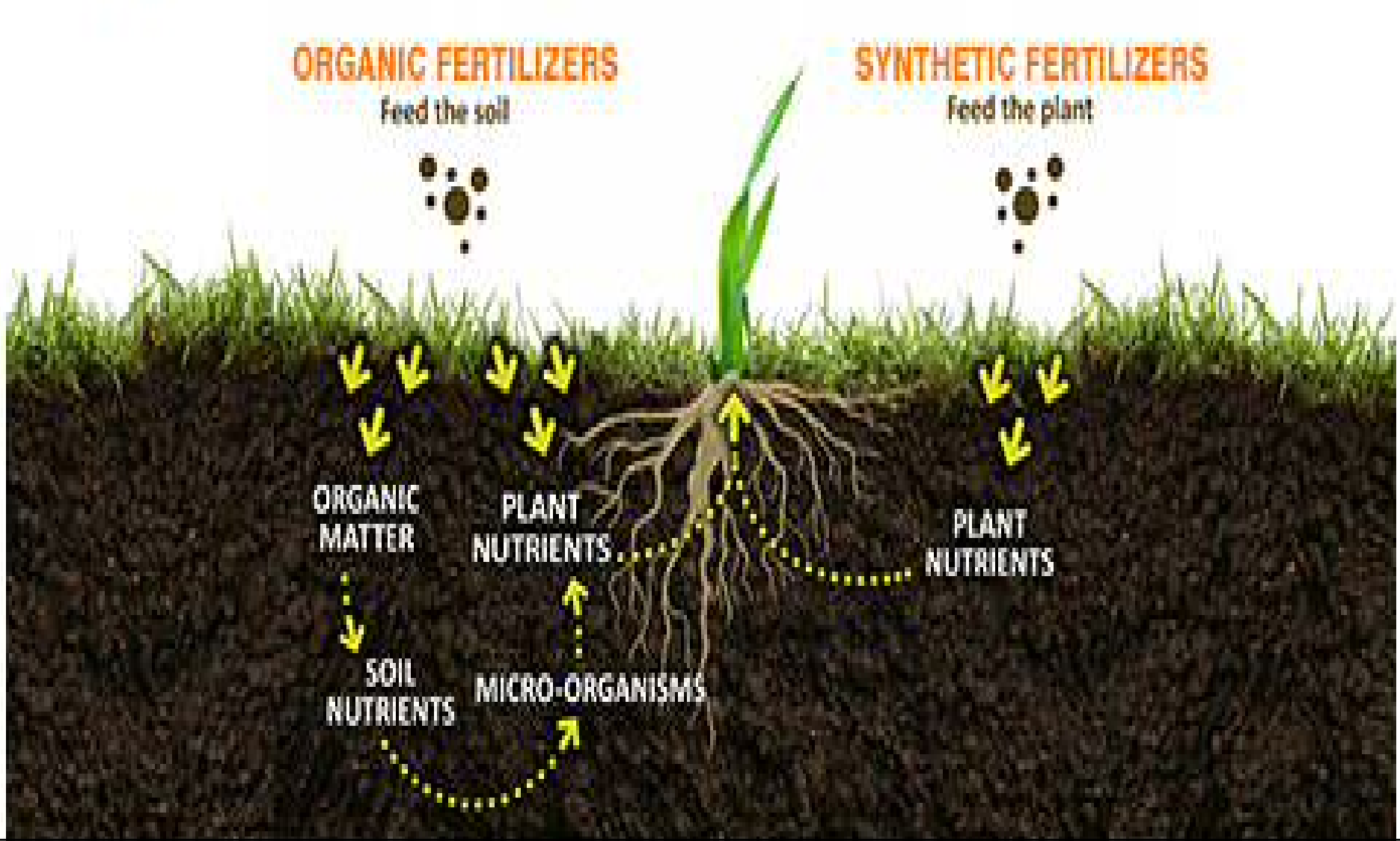
Suckers: if suckers come below the graft line or union bud-- if from the trunk cut it all the way back to the trunk. If from the ground cut down all the way to ground. You may find long thorns on some of the suckers that are allowed to grow some due to a different rootstock.

Fruit should be harvested when it has developed full color and, most importantly, full flavor. Some varieties, such as Valencia oranges, may be greenish in appearance but still fully ripe. Citrus turn color in fall when they are exposed to cold temperatures, but this does not affect the fruit sweetness. Navel oranges may not be ready to harvest until the late winter, and Valencia oranges are usually mature in the summer.

The best place to store the fruit is on the tree. Once you pick the fruit, it does not increase in sweetness or ripen more fully. However, if you do pick the fruit, it will keep for about 4 to 6 weeks under refrigeration.

Juice from lemons, limes, and Valencia oranges can be frozen for up to 4 months.

Organic vs. Synthetic Fertilizers



a 0-10-10 + iron that feeds the roots and makes blooms & the iron makes for juicy fruit and strengthens the trunk. Also, I have found that Citrus enjoy coffee, grounds or liquid (cooled) at any time during the year.

Mature citrus needs nitrogen
- **After last Frost and Before Sept.**
- **Avoid late-season**

Micronutrient deficiencies (see handout)
(such as iron or zinc)
- **Foliar application to new growth**
- **Sulfated form to the soil**

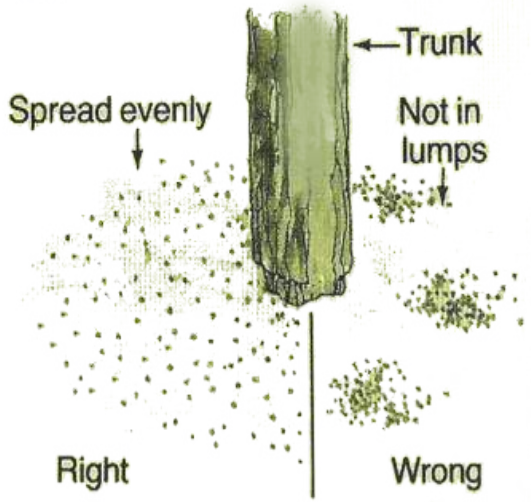
Balanced fertilizing program
N-P-K (at least a 12:12:12 ratio)
Nitrogen, Phosphorous, Potassium
Except for after Aug and after the last frost in April. Then we recommend a

- **Fertilizer – a substance added to the soil to provide essential plant nutrients**
- **Most Napa valley soils are clay based and retain nutrients well**
- **Citrus requires an acidified fertilizer**
- **Buy fertilizers intended for citrus and <u>follow label directions</u>**

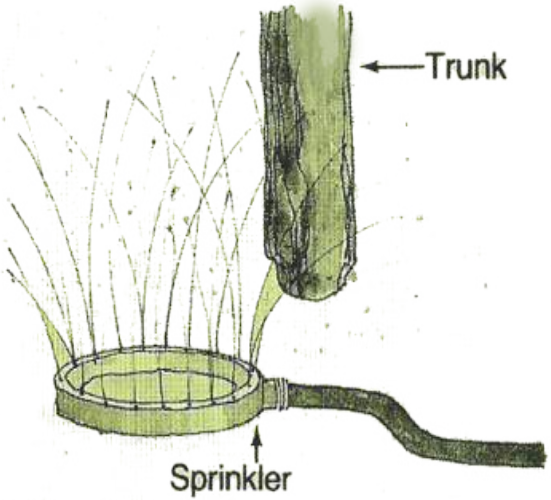
This slide shows you the difference between Organic and Synthetic fertilizers. Think of it this way: Synthetic fertilizers feed the plant and organic fertilizers feed the soil. With synthetic you get instant results but it must be reapplied often. Organic slowly feeds and builds the soil for slower longer lasting results.

How to Fertilize

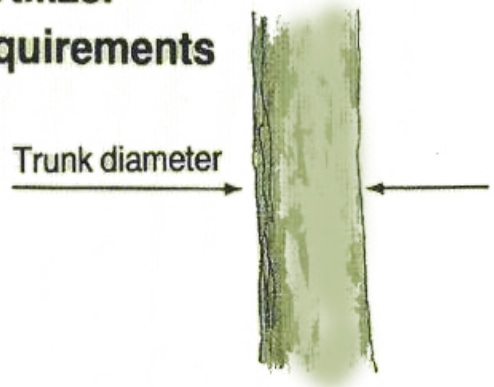
Application



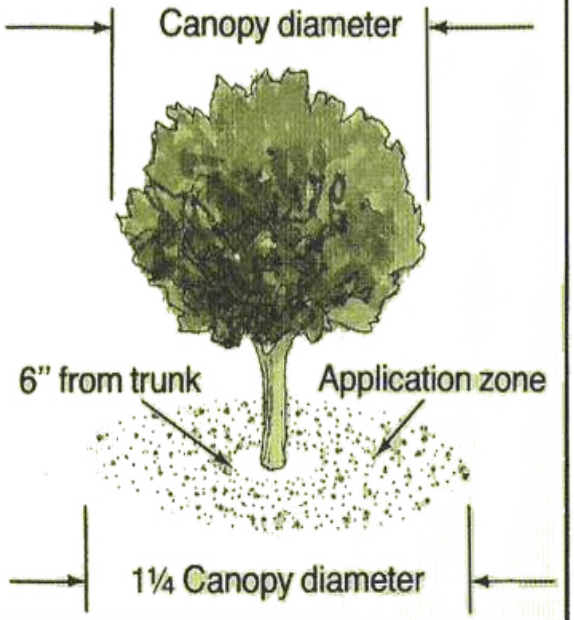
Apply Nitrogen before Rain or Sprinkling



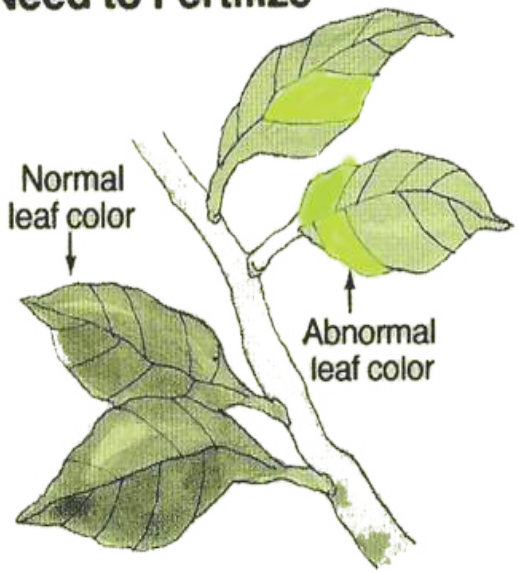
Estimating Fertilizer Requirements



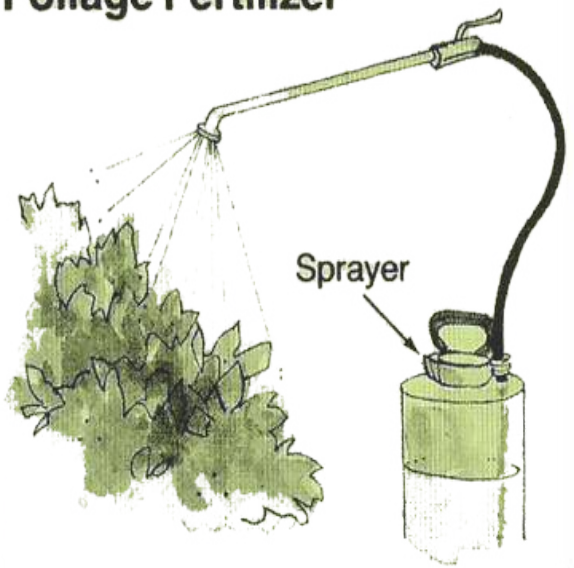
.1-.2 pounds actual nitrogen per inch of diameter is a frequently recommended method of determining fertilizer needs.



Need to Fertilize



Foliage Fertilizer



-spread evenly not in clumps
-you should always water first before fertilizing. Watering first insures that the tree is hydrated and will ‘sip’ the fertilizer slowly as opposed to gulping and thus the chance of burning the roots. (drinking coke fast)
-1-2 lbs. actual Nitrogen per inch of diameter of trunk is often recommended
-apply 6 in from trunk out to 11/4 canopy diameter
-check leaves to see if application is needed
-foliage fertilizer is an available option

BIOTIC
&
ABIOTIC
DISORDERS

-**Biotic** plant problems are caused by living organisms like fungi, bacteria, insects, vertebrate pests etc.

-**Abiotic** plant problems are caused by nonliving factors like drought, over watering, kids, dogs, etc.

Examples of Abiotic problems are:

SUNBURN: Especially Lemons

Paint with white, water based, latex paint (1:1 with water)

PREMATURE LEAF AND FRUIT DROP

Can be caused by sudden temperature change

Too much or too little moisture

Nutrient Deficiency

ROOF RATS

-Roof Rats gnaw on electrical wires, wooden structures, and fruit on trees. Rats are active throughout the year, and mostly at night.
-Cut back all limbs at least 5 ft. from buildings, overhead wires and fences.
-Reduce shelter and nesting sites of rats. Eliminate debris and wood piles.
-Baits and rat-sized snap traps placed in trees are the most effective control measures.

CITRUS LEAF MINER

-Moth lays eggs

-Larva burrow through leaf like the Bologna between two pieces of bread

-Mostly cosmetic effects new growth only

-Sprays and Oils ineffective due to the fact the larva is BETWEEN top and bottoms leaf…….Bologna

-You can squish them

-Whiteflies are tiny, sap-sucking insects that may become abundant on citrus, especially during warm weather. They excrete sticky honeydew and cause yellowing or death of leaves.
-This honeydew can often coat the leaves to the point of retarding the photosynthesis abilities of the plant.
-The best strategy is to prevent problems from developing in your garden or landscape by encouraging natural enemies to provide adequate control.
-Ants can often be found as they harvest the honeydew…….so control the ants.

CALIFORNIA RED SCALE (this pic)

Armored scale sucks fruit and plant tissue

Leaves yellow and drop

Twig dieback, occasional death of the tree

- Damage most visible late summer/early fall
- Does not secrete honeydew
- Lemons most susceptible

SOFT SCALE

They suck plant juices from leaves and twigs.

Fruit and leaves are covered with honeydew and sooty mold.

Scale found on leaves and twigs, rarely on fruit.

Tree vigor may be reduced.

Again, Ants use the honeydew and are often found defending scale. Get rid of the ants.

For horticultural oil sprays to be effective you must target scale BEFORE they are armored in their nymphalid stage

GOOD GUYS TO THE RESCUE

THESE ARE BENEFICIAL INSECTS

LEFT TOP: LACE WING which loves whiteflies

LEFT BOTTOM: soldier beetles which also love whiteflies

RIGHT TOP: Parasitic Wasps which can find those pesky leaf miner larva & bore into the bodies of the leaf miner and the hard shell of the scale insect & lay their eggs. Those eggs hatch and begin consuming their hosts until they emerge ready to lay their own eggs.

RIGHT BOTTOM: Everyone's favorite the Lady Beetle which likes to dine on white flies as well a many other 'bad guys'

These insects are why the UC IPM discourages the use of pesticides as using them will kill **ALL** insects not just the bad ones.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UC Statewide IPM Program
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-They eat holes in the leaves and fruit and leave slime trails
-They are most active at night and early morning when it's damp
-Go out in the early morning or at night to hunt for them
-Band the trunk of the tree with a copper barrier to remove access
-Keep foliage off the ground, called skirt pruning
-Destroy by crushing, feeding to chickens, putting them in a 1:1 solution of ammonia and water, or let them die happy by drowning them in a shallow bowl of beer.

Citrus Greening Disease (Huanglongbing)

The Asian citrus psyllid is a tiny, mottled insect about the size of an aphid. Each nymph produces a waxy tubule from its rear end to help clear the sugary sap it has fed on. The tubule's shape—a curly tube with a bulb at the end—is unique to the Asian citrus psyllid and can be used to identify the insect

The disease it causes, huanglongbing, is fatal to citrus trees and there is no known cure.

As the disease progresses, the fruit size becomes smaller and the juice turns bitter. The fruit might remain partially green, which is why the disease is also called citrus greening. The fruit becomes lopsided and tends to drop prematurely.

Efforts are underway to introduce parasitic wasps from the Asian citrus psyllid's native range into California. The most promising of these, Tamarixia radiata, strongly prefers ACP, and under ideal conditions can significantly reduce psyllid populations.

The lost to the Florida Citrus Industry has been in the Billions and it is slowly working its way here to California. As of January 2016, areas of San Francisco, San Mateo, and southern Alameda counties have been quarantined to prevent any part of the tree to leave the area.

CONTACT THE CALIFORNIA AGRICUTLURAL DEPARTMENT IS YOU SEE EVIDENCE OF THIS PEST!!!

FOR UC RESEARCH

UC

IPM

citrus

- Integrated Pest Management (IPM)
- Prevention (cultural practices)
    - Correct Plant in correct place
    - Maintain tree & garden health (correct watering, fertilization, pruning, and sanitation to create a balanced ecosystem
- Minimize and target intervention

UC IPM PEST NOTES

For research on Any subject just type in

UC IPM OR

PEST NOTES

FOR REASEARCH BASED, REGIONALLY APPROBRIATE INFORMATION