Home Orchards
Fruit and Nut Trees

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Master Gardener Training – February 2018

Environmental Considerations

Light

8 hours per day during the growing season

With less light:

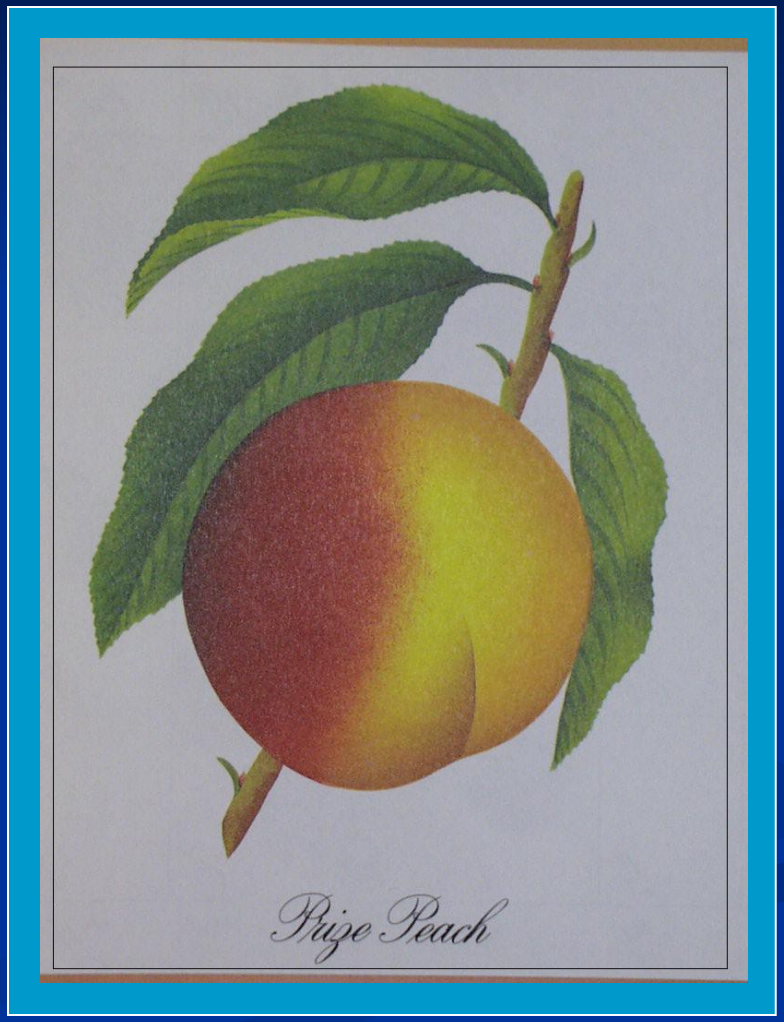
spindly growth

less fruit

less flavor

Your Home Orchard

- Fruit Tree Selection
  - Climate
  - Chilling hours
  - Heat units
- Variety Selection
  - Climate/soil
  - Taste
  - Harvest period
  - Space
  - Pollination



Site Selection

- 8 hours of full sun
- Shelter from high winds
- Frost or freezing concerns
  - Some trees may benefit from warm south wall
- Ready water supply
- Avoid planting where fruit falls on walks or driveway
- Soil should be at least 3 ft deep

Keeping Trees Small

- Genetic Dwarf
- Dwarfing Rootstock
- Semi Dwarf Rootstock
- Summer Pruning

Environmental Considerations

Climate: Winter Chill

- Without enough chill
  - Delayed foliation
  - Prolonged "straggly" bloom
    - Poor pollinator overlap
    - Rain more likely!
  - Poor fruit set
    - Buds not mature
    - Buds fall off (apricots)
  - Prolonged harvest period
  - Check chill at: UC Fruit & Nut Research & Information Center: fruitsandnuts.ucdavis.edu/chillcalc

Chilling Hours

Type Of Fruit/Nut	Approx. Hours At 45F Needed To Break Dormancy
Almond	250-500
Apple*	500-1000
Apple (low chill)	400-600
Apricot*	300-800
Cherry, sour	1,200
Cherry, sweet	700-800
fig	100
Filber(hazelnut)	800
Kiwifruit*	300-800
Peach/nectarine	500-800
Pear*	700-800
Pear (Asian)	350-450
Pecan	250

Chilling Hours

Type Of Fruit/Nut	Approx. Hours At 45F Needed To Break Dormancy
Persimmon	100-200
Pistachio	800
Plum, American*	300-600
Plum, European*	600-800
Plum, Japanese	250-700
Plumcot	400-600
Pomegranate	100-150
Quince	300
Walnut	500-700

*indicate lower chill varieties available

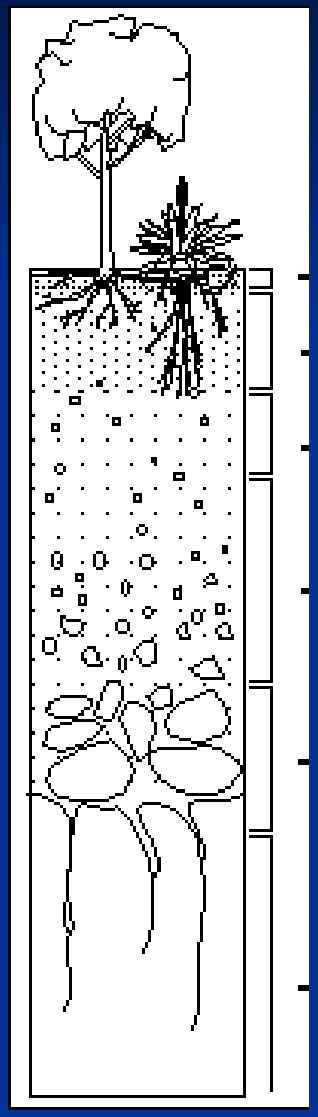
Environmental Considerations

Climate:

Spring & Summer temperatures

Watch out for spring frosts	These like hot summers	These like cooler summers
Almonds	Almonds	Berries
Apricots	Peaches	Red apples
Early plums	Nectarines	Apricots
Early peaches	Some plums	

Environmental Considerations



SOIL DEPTH: 3-5 feet, uniform

Environmental Considerations

Climate: Spring rain or wind can reduce set

Bees don't fly in the rain or wind greater than 5 mph

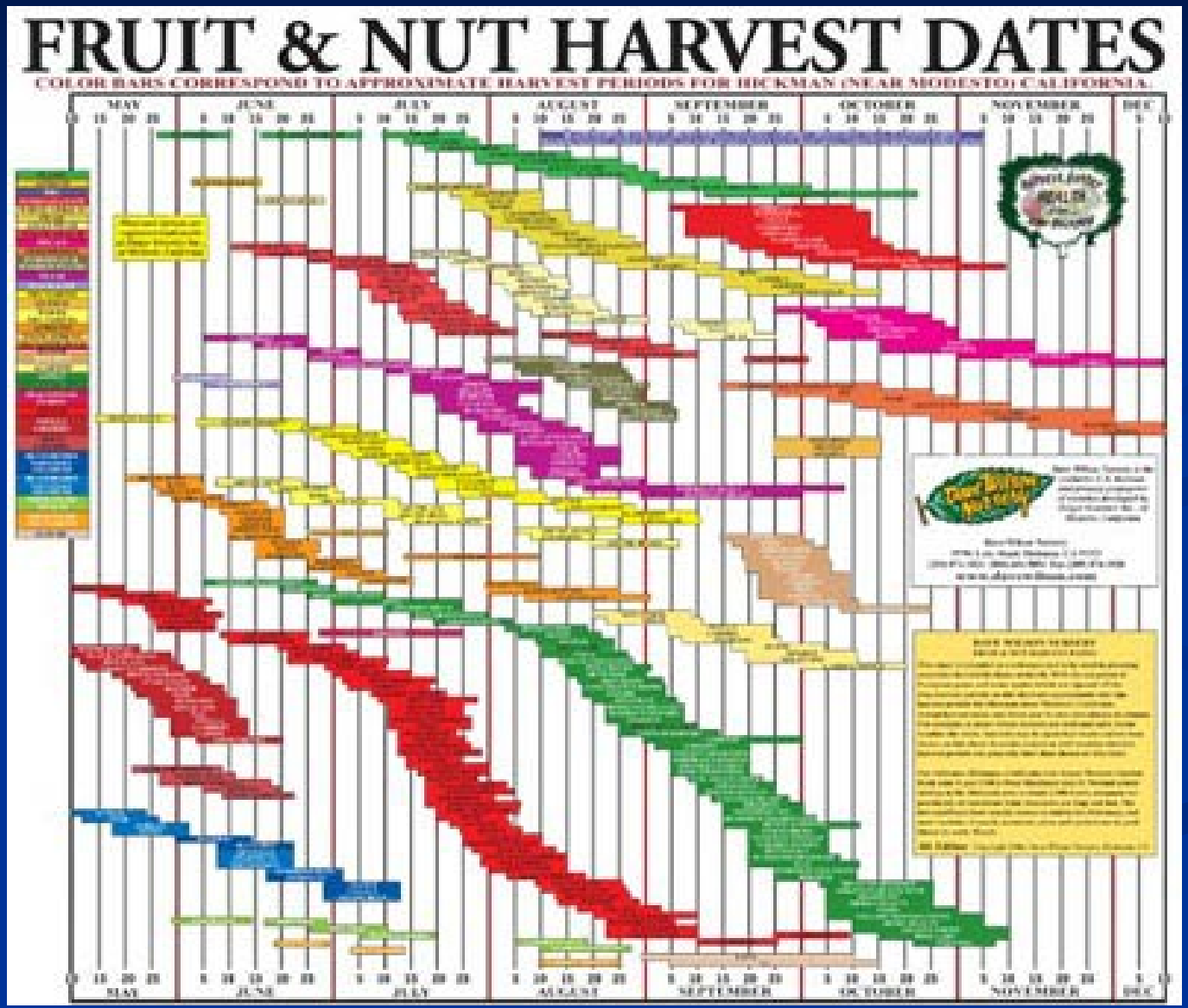
Stone fruit: Brown Rot

Pome fruit: Fireblight

Variety Selection

- Taste
  - Most important aspect
  - Fruit tasting, friends, farmers market, catalog descriptions, grocery stores, popularity, sugar to acid ratio, what growers grow locally
  - Other?
    - Ripening period
    - Insect and disease reistance
    - Productivity

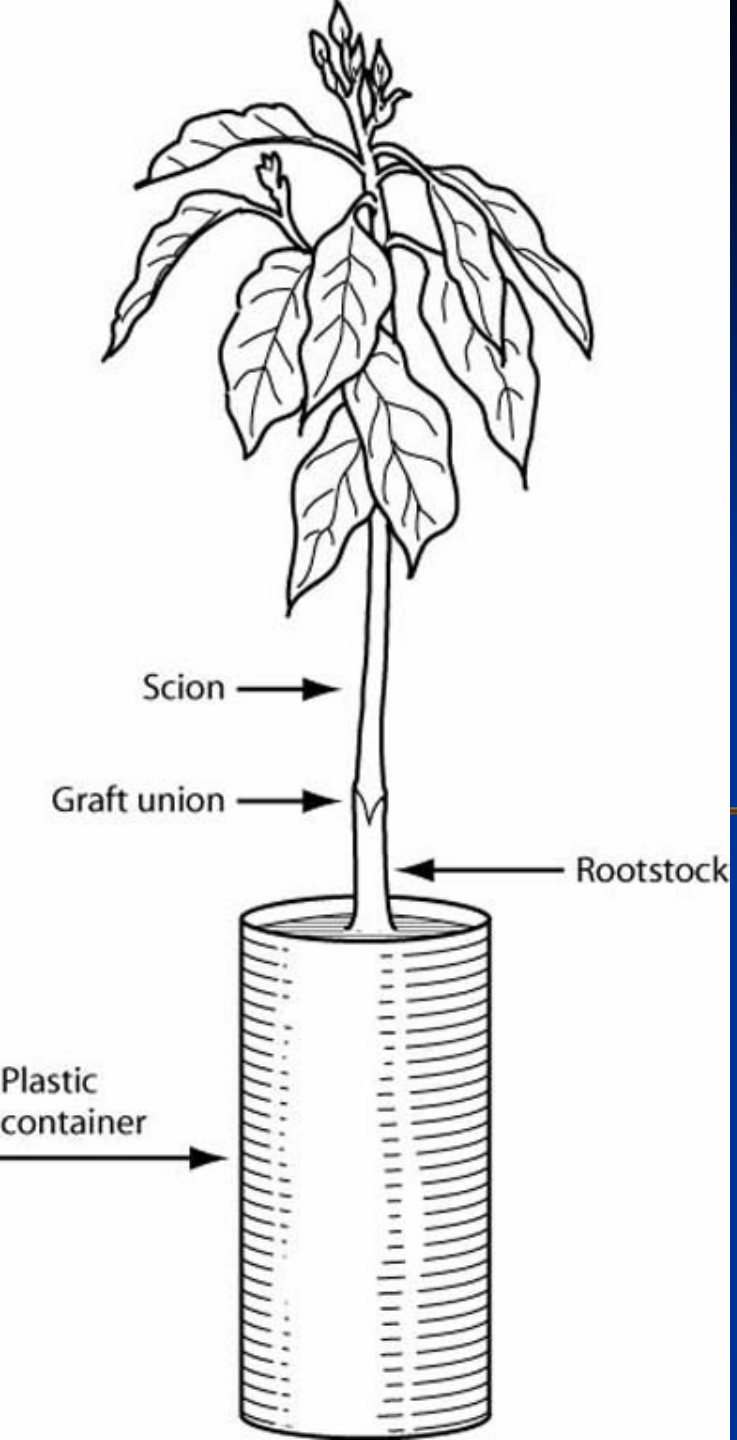
Variety Selection-Harvest period



Pollination

Self fruitful	Needs Cross Pollination
Apricots*	Almonds*
Figs	Apples*
Peaches	Cherries*
Nectarines	Pears*
Pomegranates	Plums (French Pluots & Apriums)*
Citrus*	Pistachio (male, female)
Walnuts (male and female flowers) *	Kiwi fruit (male, female)
Avocado (male and female flowers) *	
* Some varieties need X pollination	*some varieties are self fruitful

What is a rootstock?

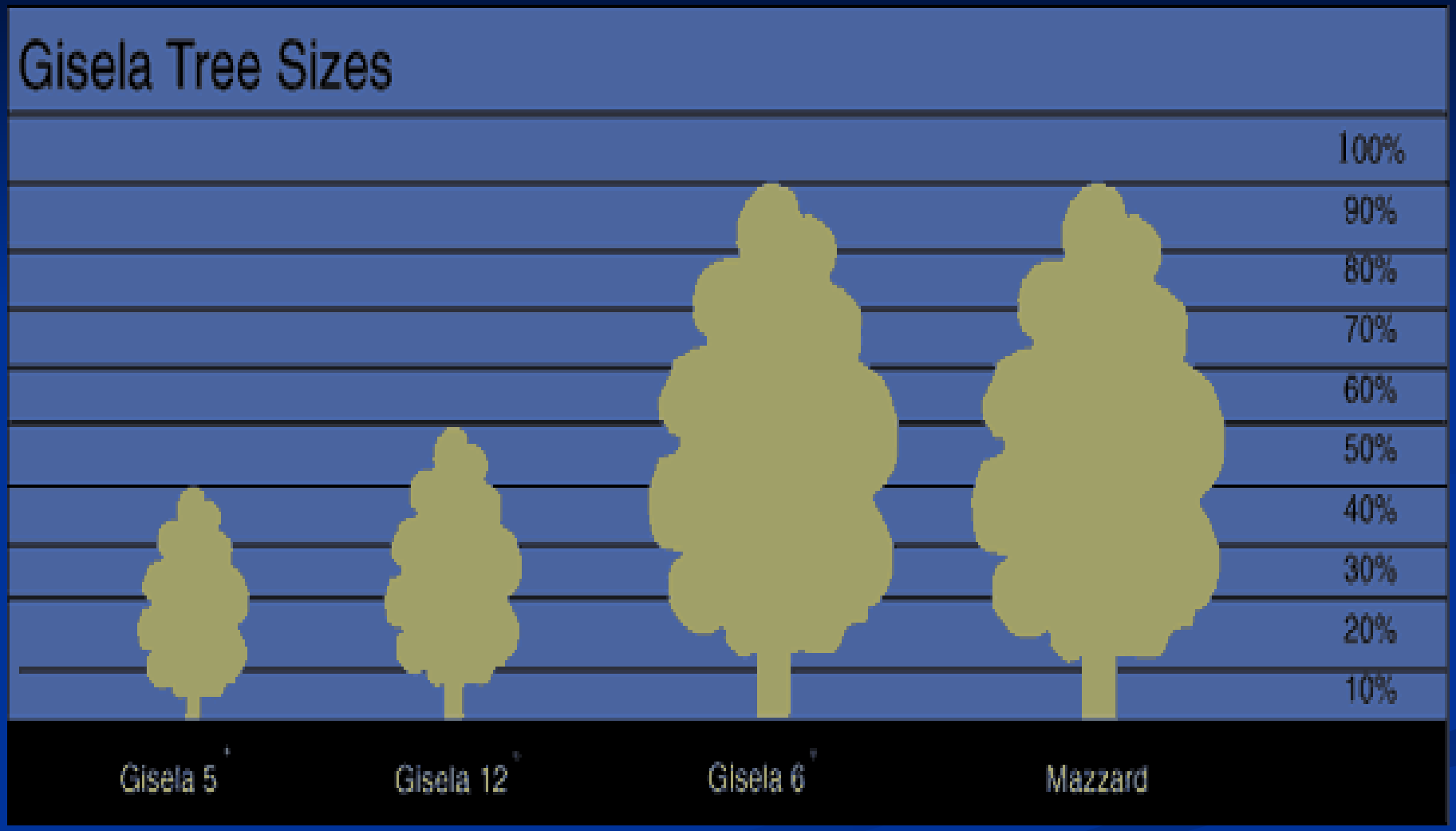


Why do we use Rootstocks?

- Better anchorage
- Soil adaptability, marginal soils
- Pest resistance
  - Root rot, nematodes, root aphids, Armillarea root rot
- Control tree size (dwarfing rootstocks)
  - Apples, cherries, (pears)
- Early bearing
- Cold Hardiness (citrus, avocadoes

Rootstocks: Tree Size

Type of Fruit	Standard Rootstock	Dwarfing Rootstock	
Walnuts	25 – 30’	NA	
Cherries	20-25’	10-12’	Giesla
Apples	18-20’	5-14’	EMLA#, MM#
Pears	18-20’	12-15’	Quince
Apricots, plums	15-18”	12-15’	Citation
Peaches, nectarines	12-15’	NA	(genetic dwarfs)
Figs	15-30’	NA	
Pomegranate	15-20’	NA	


Gisela Tree Sizes
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
Gisela 5
Gisela 12
Gisela 6
Mazzard

Rootstocks: Pest Resistance

	RR	CG	ORF	BC	RKN	VW	BL	WAA
STONE FRUIT								
Nemaguard	S	S	S	S	R	VS	----	----
Citation	R	S	S	S	R	SR		
Mariana	SR	SR	R	VS	R	VS		
CHERRY								
Mahaleb	VS	SR	S	R	R	?	----	----
Colt	R	S	?	R	?	?		
APPLE								
M7	SR	S	R	----	----	R	----	S
M111	SR	S	R			R		R
WALNUT								
No. Ca. Black	S	S	R	----	R	R	S	----
Paradox	R	VS	R		?	R	S	

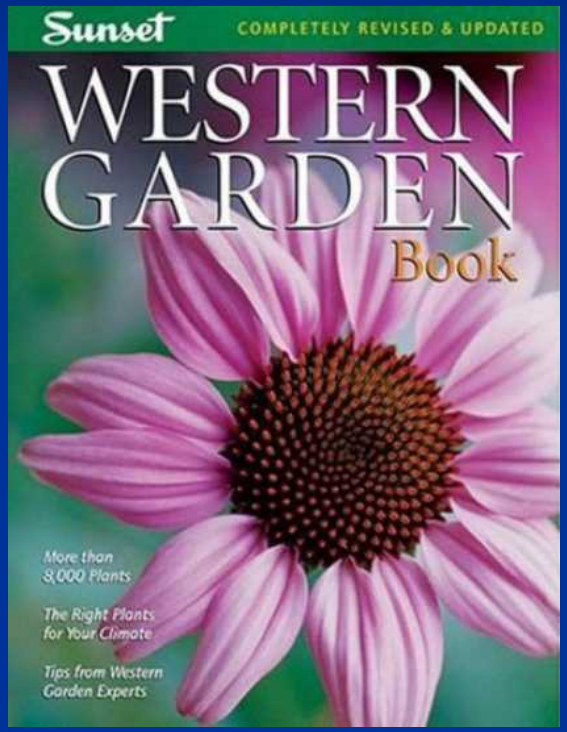
S = Susceptible VS = Very Susceptible SR = Somewhat Resistant R = Resistant

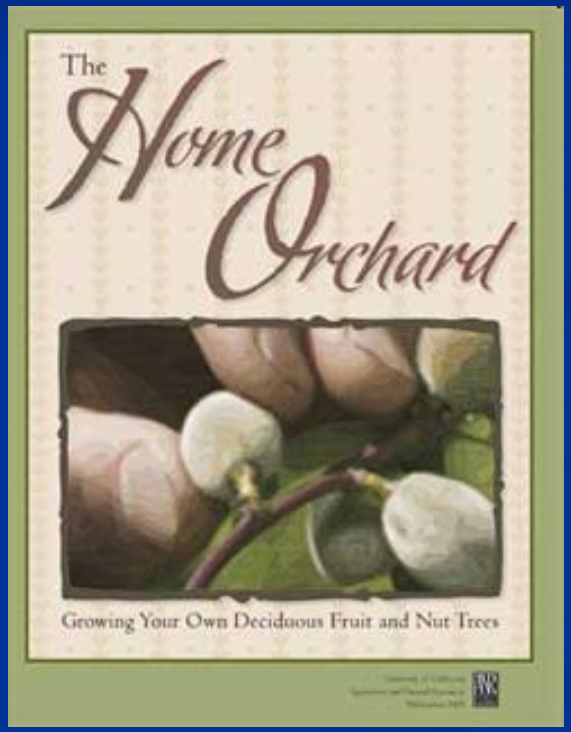
Rootstocks: How long till they bear?

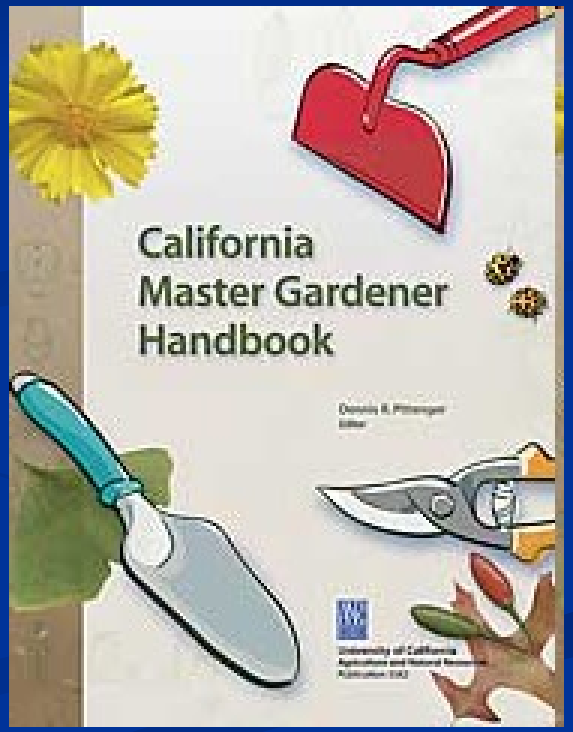
Type of Fruit	Standard Rootstock	Dwarfing Rootstock
Apples, cherries, pears,	4-8 years	3-5 years
Walnuts	5-8 years	NA
Apricots, plums	4-7 years	3-6 years
Peaches, nectarines, figs, pomegranate	3 years	NA
Grape	2-3 years	NA
Berries	1 year	NA

Variety and Rootstock Selection

Resources







Planting - Container or Bare Root?

- Plant bare root in Jan/Feb
  - Or later if held in cold storage (refrigerator)
- Ideal size of bare root should be about ½ to 5/8ths inch in diameter
- Containers can be planted most any time
  - May have less crown gall-potted tree grown in the pot
- Most trees are containerized in the nursery

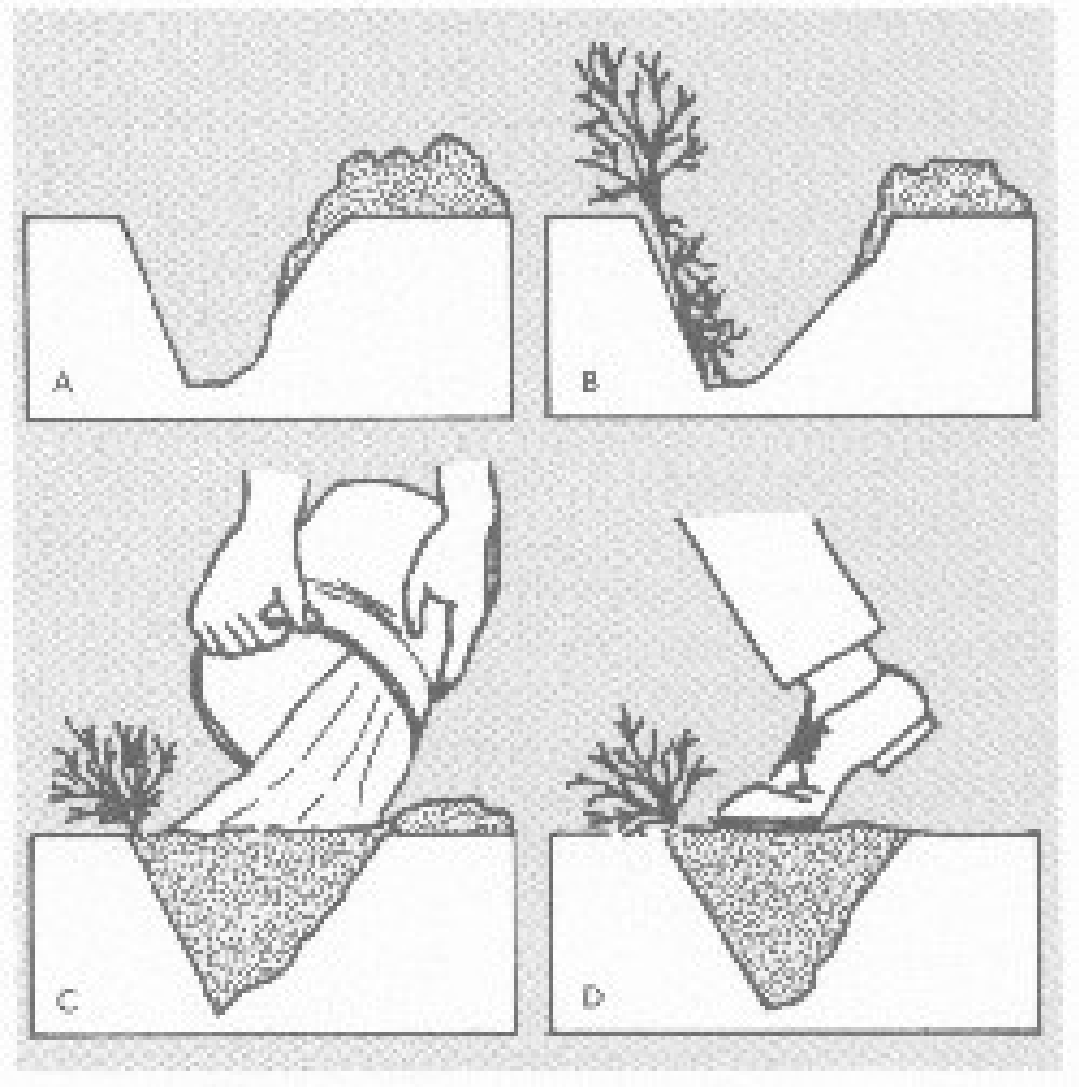
Planting the Orchard

Winter/Spring: Dormant, bare root trees

Handling Bareroot Trees

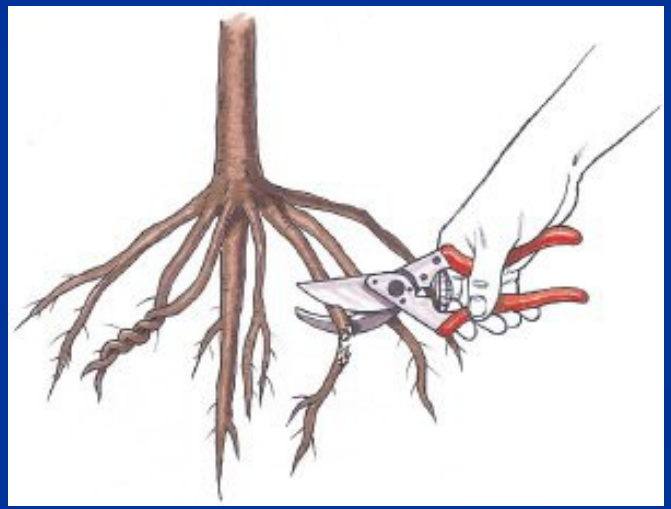
- Never let trees dry out or freeze
- Keep in moist burlap, tarps, chips etc. for up to 48 hours
- "Heel in" if you cannot plant right away.
  - Avoid heeling into redwood, or cedar sawdust or rice hulls

Heeling in



Planting the Orchard

- Soil should be moist NOT WET
- The hole: deep as the roots & as wide
- Fertilizers or amendments?
  - Not recommended
- **Plant high** at least as high as nursery
- Water in fi necessary



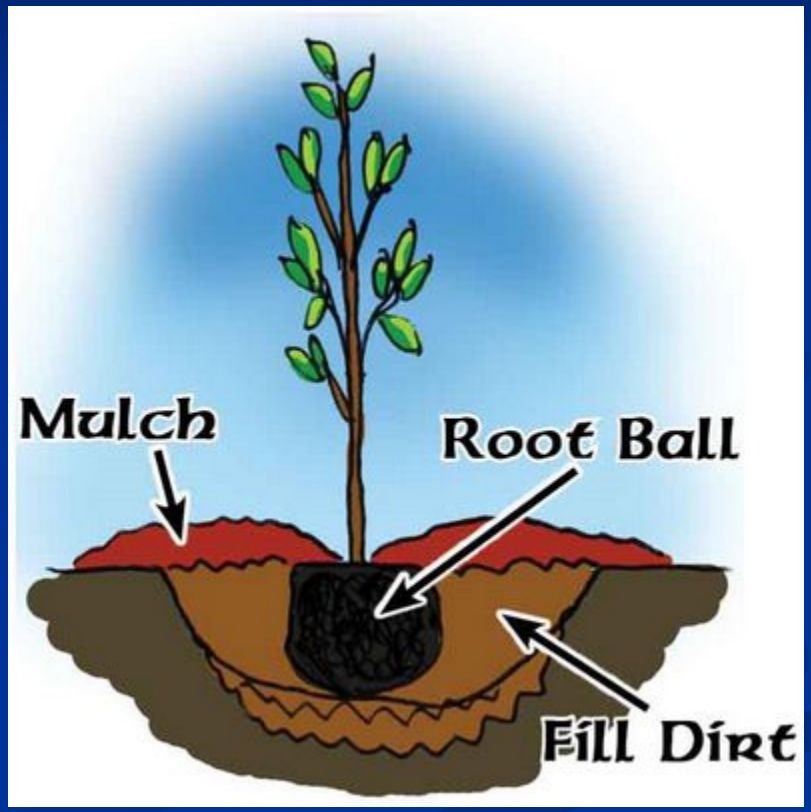
Planting Bareroot

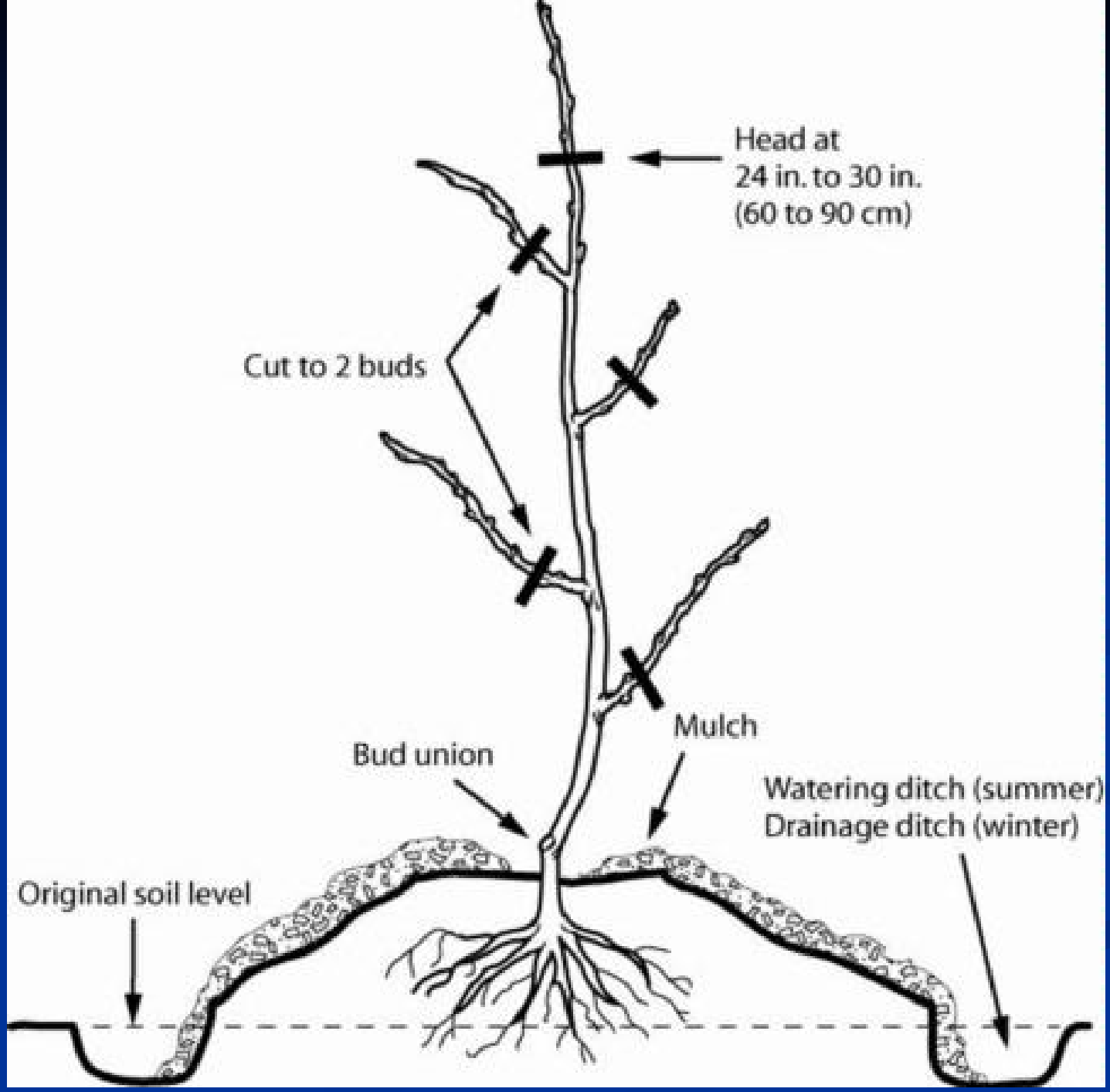
- Cone shape
- Orientation of bud union away from sun
- Planting depth
- Trim damaged or roots that don't fit

Preparing The Planting Site

- Dig as wide and as deep as the root ball.
- If heavy soil, plant high- berm or mound
- What about organic amendments?

  no




Head at
24 in. to 30 in.
(60 to 90 cm)
Cut to 2 buds
Mulch
Bud union
Watering ditch (summer)
Drainage ditch (winter)
Original soil level

Sunburn protection

White wash- 50-50 interior latex and water, South west side especially Tree wraps if herbicides are to be used

Caring For the Tree the First Year

- Fertilizer
  - May not be necessary the first year
  - Can apply in late May or June- 1-2 oz actual N/tree
    - i.e. 5 oz of 20% N = 1 oz actual
- Irrigation

Begin water watering after the trees have grown about 6 inches- check soil moisture

Necessary to wet the root ball – especially potted trees

Pruning Basics- Why prune?

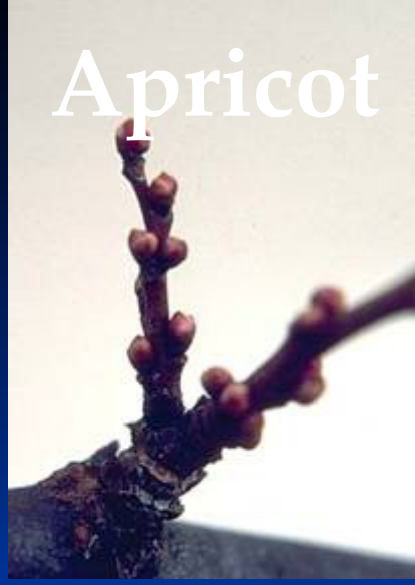
- For training to produce a vigorous, mechanically strong, framework
- To obtain a well-shaped tree for convenience of orchard management
- For optimal capture and distribution of sunlight throughout the canopy
- Promote fruit size (crop reduction technique)
- Stimulate new fruiting wood (bearing wood renewal)
- Regulate crop production over years (decrease alternate bearing)

Timing of Pruning

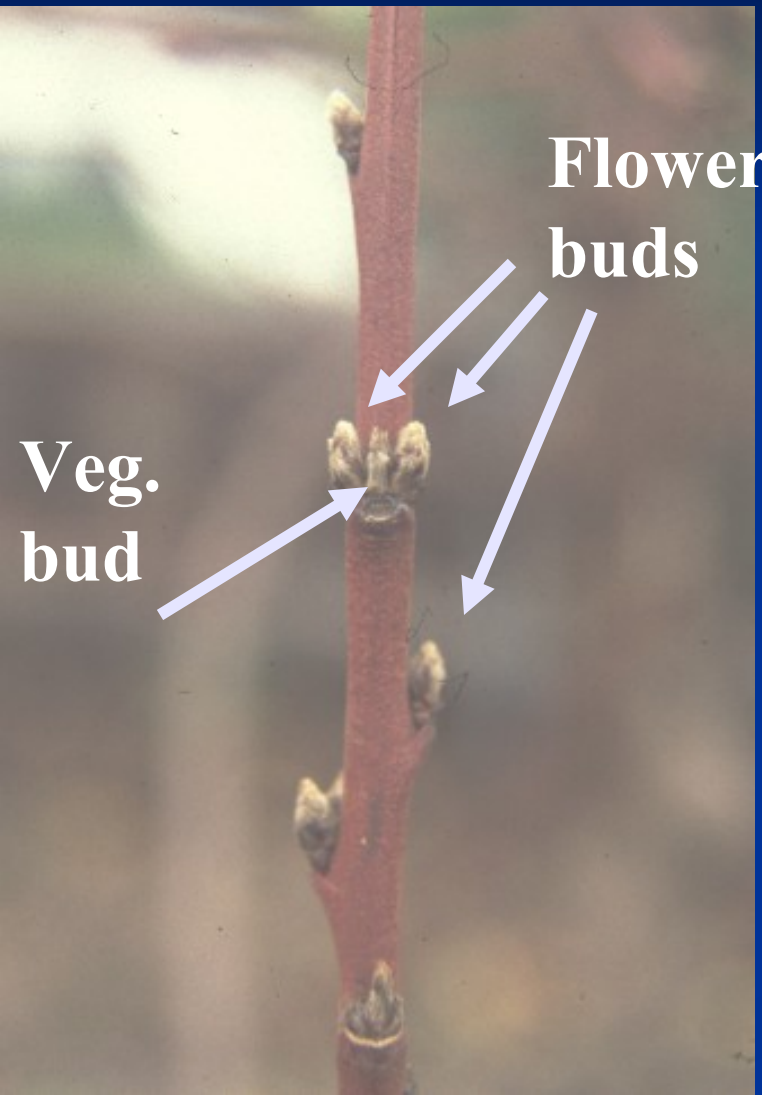
- Dormant Vs. Summer
  - Dormant = invigoration
    - Used to promote growth and shape tree
  - Summer = devigoration
    - Used control tree size and promote light infiltration into the canopy

Spurs short bearing shoots- Stone fruits

Leaf buds and flower buds separate – Stone fruits
Mixed buds- pome fruits



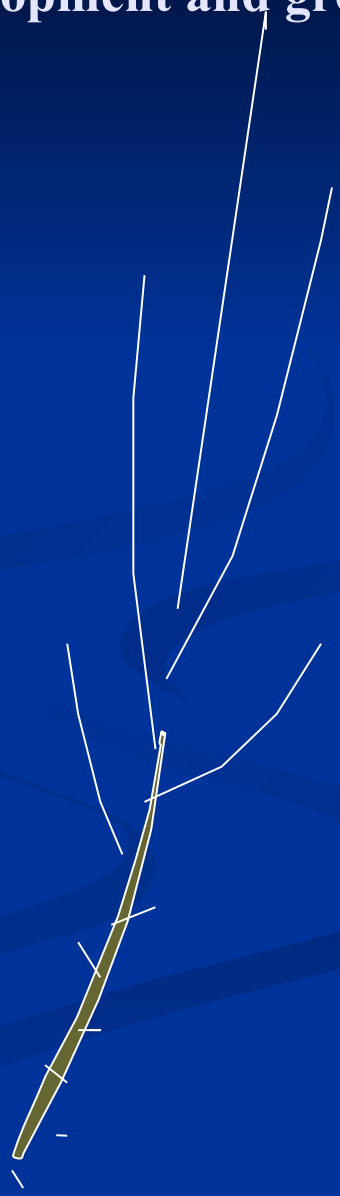
Peach Fruiting Branches



Apical dominance: the influence or control of shoot development and growth of lower buds or shoots by more apical buds or shoots

Three manifestations of apical dominance

- Correlative inhibition: suppression of lateral shoot growth by a vigorously growing apical meristem during the current season's growth.
- Apical control: tendency for terminal and distal lateral shoots to depress the growth of more basal (subordinate) shoots.
- Shoot epinasty: tendency for actively growing upper, distal shoots to influence the branch angle of basal shoots (usually making them wider).



If shoot is not pruned all new shoots will be shorter than parent shoot.

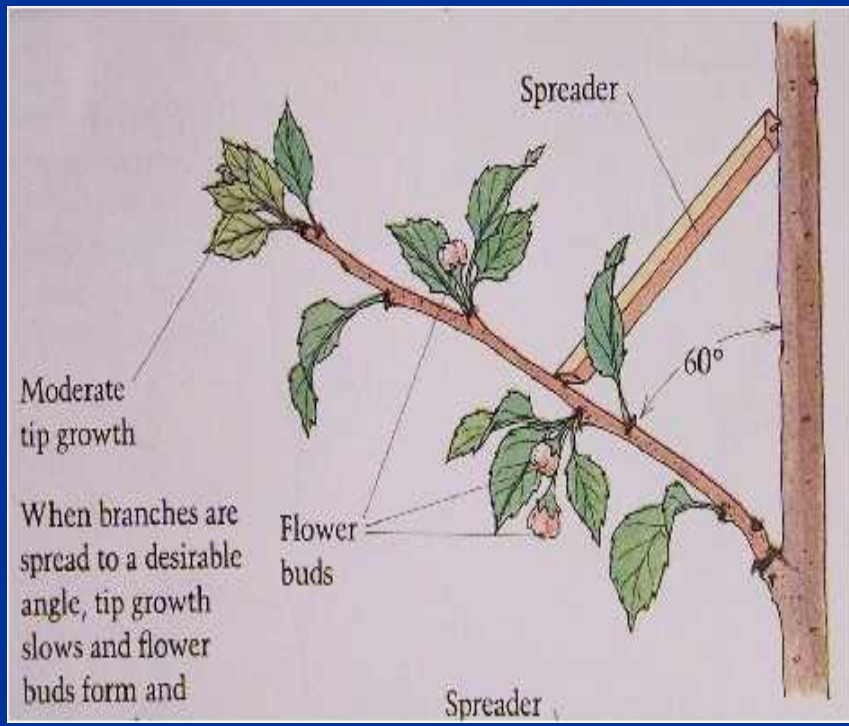
Pruning Cuts

1. Thinning Cut
   - Remove the whole branch
   - Redirects growth to leaders
   - Open's up the canopy

2. Heading cut
   - Remove top of a branch
   - Encourages branching
   - For training or hedging

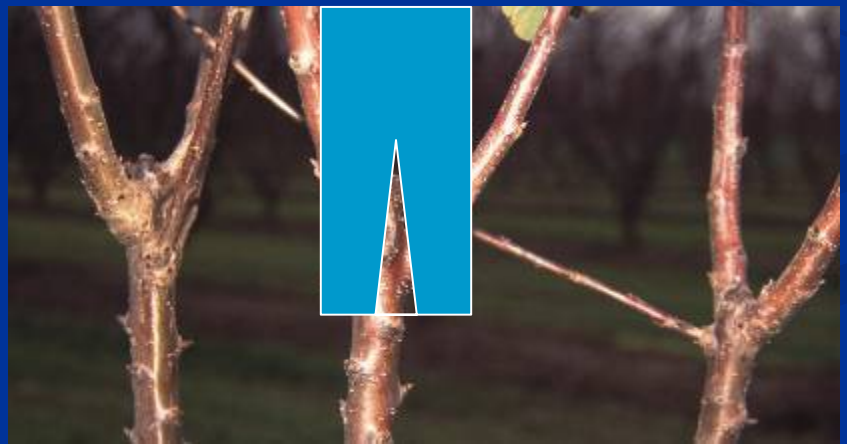
Limb Selection

- Scaffold limbs
  - 45-60o branch angle
    - Strongest attachment
    - Balances vegetative vigor and fruitfulness
  - Distributed around & along trunk
- Lateral limbs
  - Upright branches
    - More vigorous & vegetative
  - Horizontal branches
    - Less vigorous & more fruitful



Heading Cut

- Removal of part of branch or shoot
- Used to promote branch development, especially on young trees
- Stimulates growth just below cuts
- Can reduce sunlight penetration



Thinning & Heading Cuts on Plum Tree

Proper Pruning Technique

- Loper orientation- hook up
- Cut just oustside of the branch collar
- Wound dressing – generally not necessary

Pruning Systems

Open Vase

Central Leader

Open Center

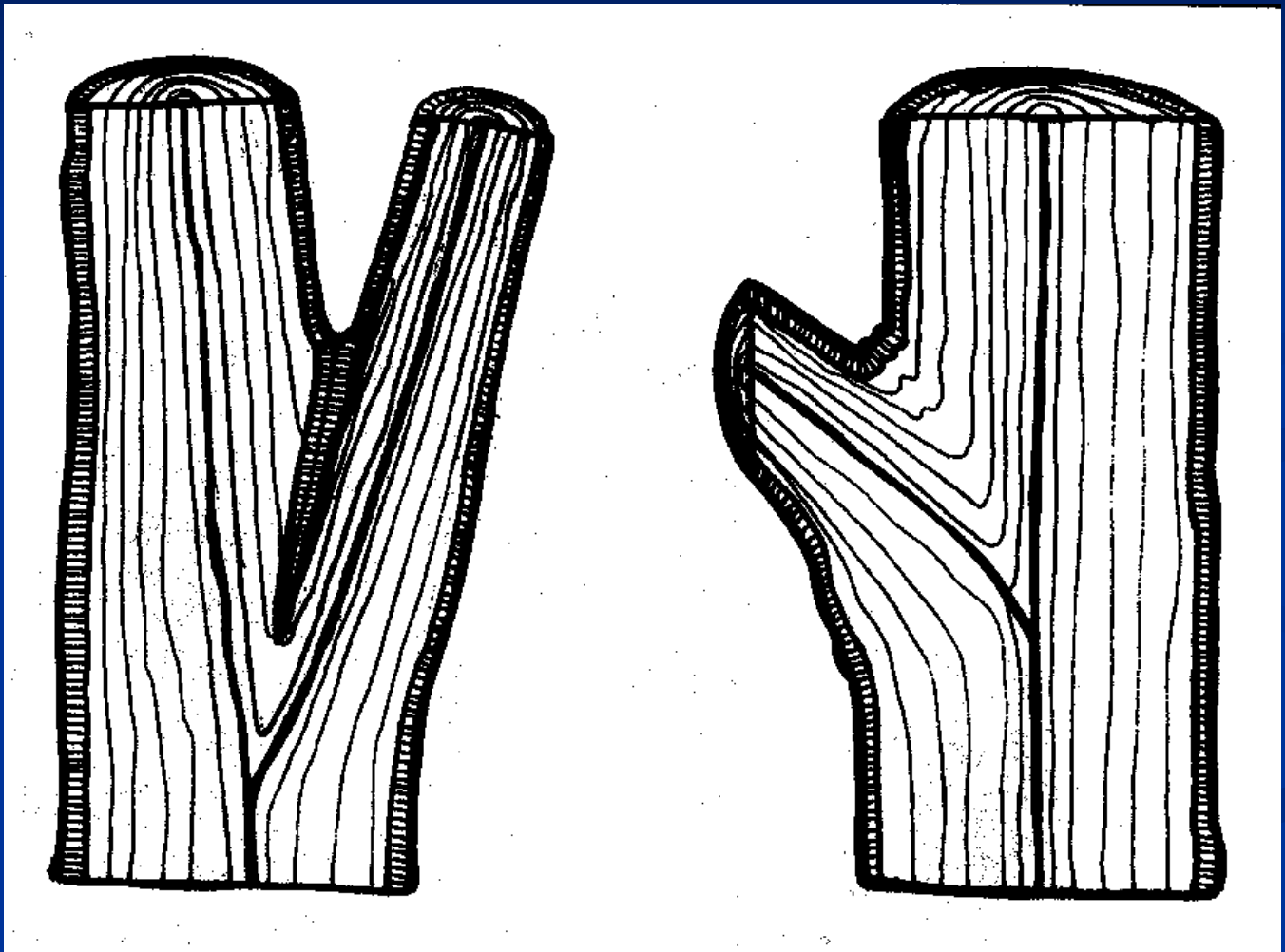
- Most common method
- Stone fruits and almonds; also use for apples, pears pears, figs, persimmons
- Select scaffolds during first 2 growing seasons, touch up in dormant season

Primary Scaffold Selection

- 3-4 scaffolds with an upward, outward orientation (45 degrees)
- Equally spaced around tree
- Significant vertical spread – more than 2 inches
- Well attached limbs, avoid limbs with narrow angles of attachment and included bark
- Strongest primary on north
- Avoid 2 opposite scaffolds with an upper one in the middle
- 2 well attached scaffolds are better than 3 poorly attached scaffolds


Visible
Bark Ridge
Included
Bark

Narrow vs. Wide Branch Angles



Pruning Systems

Open Vase

Pruning a One-Year-Old Peach

Pruning a Two-Year-Old Peach

Almond 1st dormant pruning

Before 2nd dormant pruning:

- Thin to maintain an open center
- Select two or three secondary limbs 70 cm to 1 m from trunk on each primary, evenly spaced
- Remove competing limbs

After 2nd dormant pruning:

- *open center*
- *note amount of brush on the ground*

3rd & 4th dormant pruning:

- *Continue previous program*
  - *Open center*
  - *Fill upper periphery of canopy*
  - *May require very little pruning after the training is complete*


Unpruned 2nd Dormant
Long Pruned
Lightly Tipped
Prune Trees
More pruning = less early Production

Tying

- 2nd-4th dormant
- Early Spring
- As high as possible to support major upright limbs
- Tie loose
- Concentrate on limbs that need to remain upright

Pruning Systems

Open Vase after 1st year

Pruned Three-Year-Old Peach

Pruning Systems

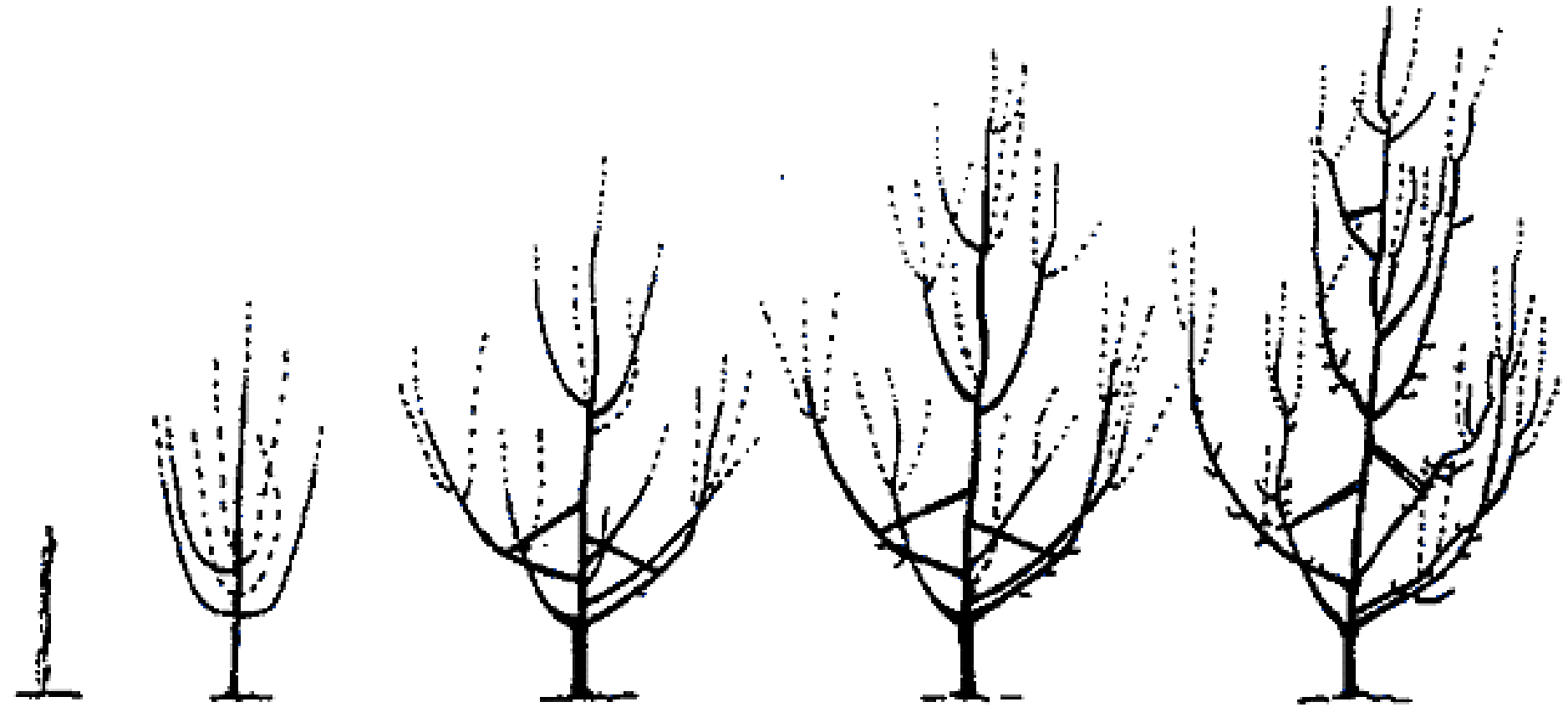
Open Vase - mature

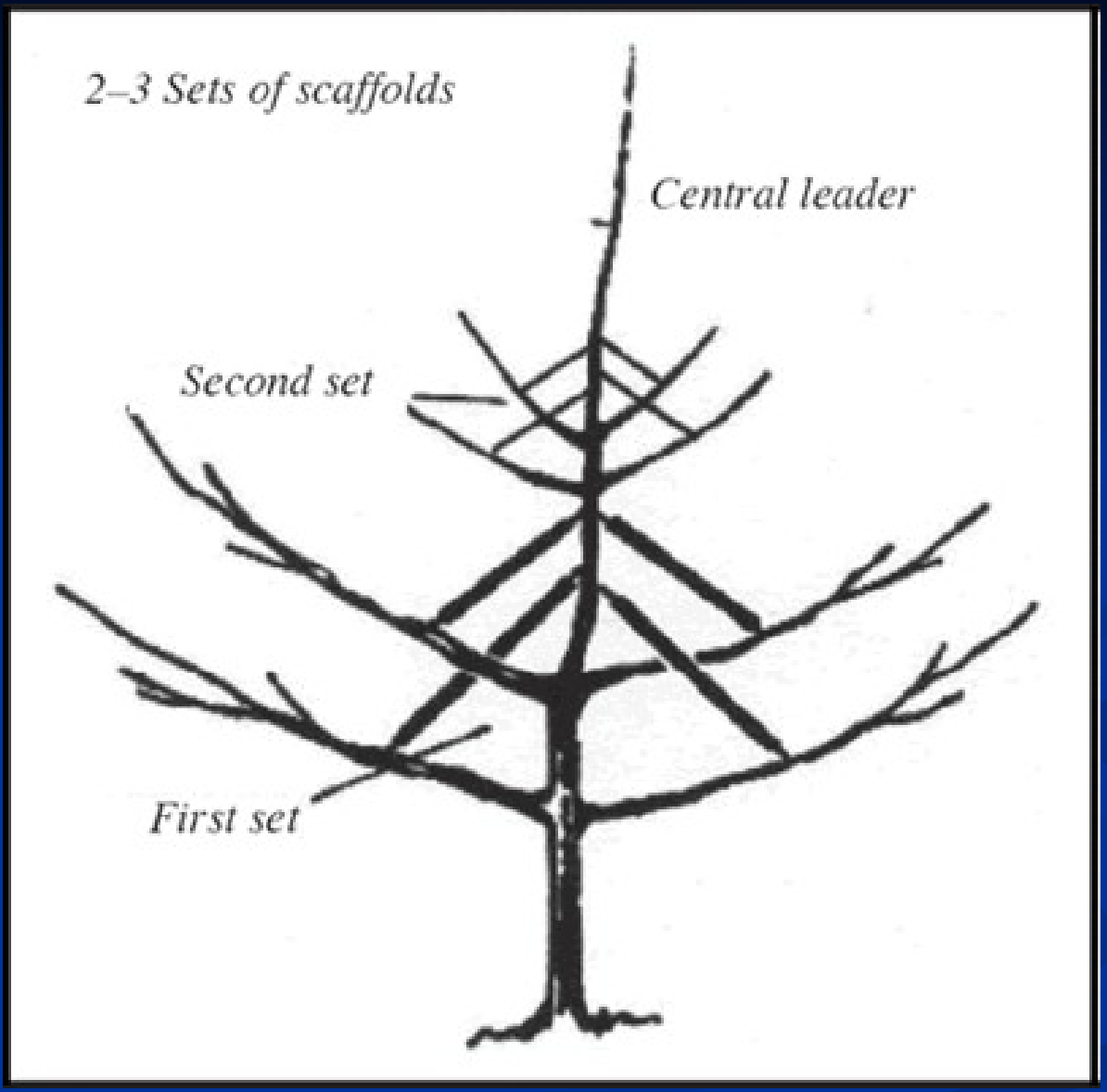
Central Leader

- Appropriate for apples, pears, pecans, persimmons, walnuts, pecans
- At planting
  - If no leader, select upright growing shoot to force into central leader position
  - Select laterals to form “Christmas Tree Shape”

Pruning Systems

Central Leader




2–3 Sets of scaffolds
Central leader
Second set
First set

Modified Central Leader

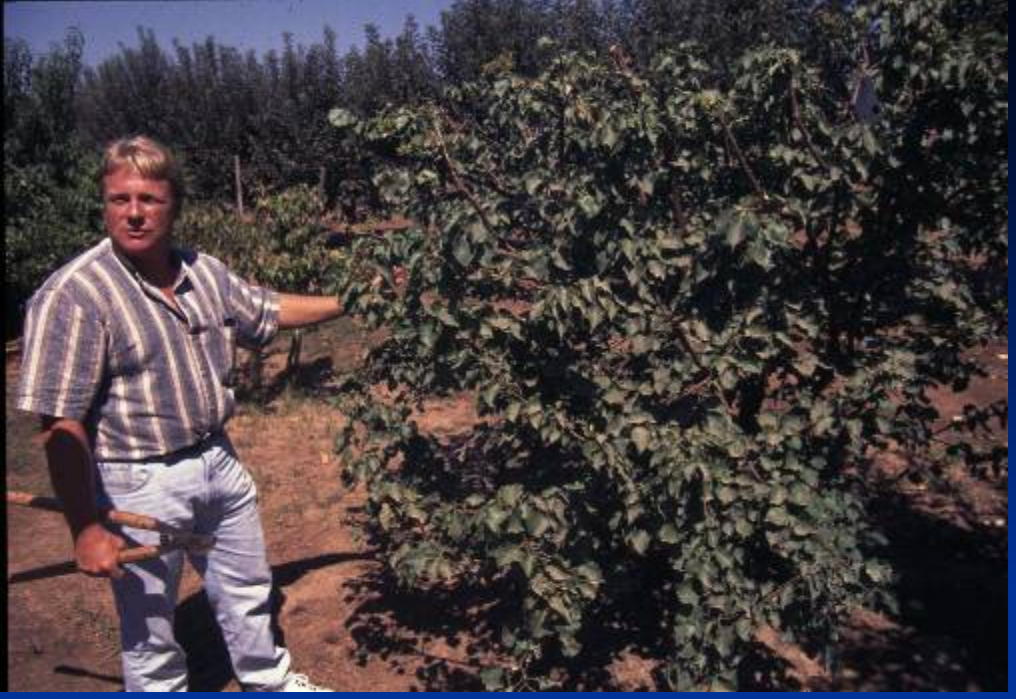
- Appropriate for pistachios, walnuts, almonds, apples, pears, persimmons
- At planting
  - If no leader, select upright growing shoot to force into central leader position
  - Head back when leader reaches desired height
  - During the first or second season, select primary scaffolds as we did with vase shape

Training Walnuts – Modified Central leader

- Select vigorous shoot and train up the stake
- 1st dormant head at desired height- 6 to 8 ft, remove necked buds (walnuts)
- 2nd- 3rd dormant select primary scaffolds-remove necked buds
- After 5 to 7 scaffolds are selected prune or allow the central leader to grow outward to open the tree

Fruit Bushes

- Advantages
  - Tree maintenance without ladder
  - Trees for small spaces
  - Sequential ripening
- Disadvantages
  - Less fruit
  - No shade
  - Timing of pruning critical



Fruit Bushes Kept at Desired Height

Fruit Bushes

Pruning – Years 1 & 2

- At planting, head trees to 18-24 in.
- Mid-spring – cut back new growth by half
- Mid-summer – cut subsequent growth back by half
- Thinning cuts for sunlight penetration
- May need to prune 1-2 more times

Cutting New Shoots in Half

Mid-Summer

Fruit Bushes

Pruning Mature Trees

- Cut back new growth above selected tree height 2-3 times during growing season
- Thinning cuts for sunlight penetration

Mature Fruit Bush

Maintaining Tree Height

Cherry, Pome Fruits Ideal for Fruit Bush

Apricot, Plum/Pluot Fruit Bushes

Excessive Growth

Apricot, Plum/Pluot Fruit Bushes

Excessive Growth

Pruning Mature Trees

- Control tree size and shape
- Manage light with canopy
- Renew fruit wood
- Control crop
- Improve fruit size and manage alternate bearing.

Renewing Fruitwood

For fruit that is produced on:

- 1 year old shoots (Peach, nectarines, kiwi, grape)
  - Remove 30-50% of the growth
- Spurs (almonds, apricots, cherries, plums, apples, pears)
  - Remove 20% of growth
- Current season's growth (fig, citrus, persimmon, quince, pomegranate)
  - Remove 0-20% of growth

Methods

- Thinning cuts to thin and open canopy, allow light to filter through the tree maintain health of fruiting wood
- Heading cuts to promote growth and increase vigor

Methods

- Thinning cuts to thin and open canopy, allow light to filter through the tree maintain health of fruiting wood
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Pruning Mature Fruit Trees

1. Prune according to plant vigor
2. Prune out dead or diseased wood
3. Prune out crossing branches
4. Prune out branches growing to the inside
5. Prune out unnecessary watersprouts and suckers
6. Thin fruit wood if necessary
7. Control tree height by cutting to outside laterals at desired height.

Removing Old Fruiting Wood

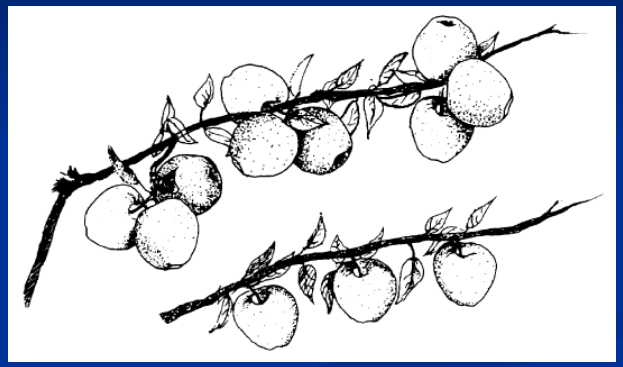
Cut back 2-year-old branches to healthy 1-year-old branches

Pruning Resources

- **Free Publications:**
  http://anrcatalog.ucdavis.edu/FruitNutTreesintheHomeGarden
  - Training and Pruning Deciduous Trees
  - Pruning Overgrown Deciduous Trees
- **Videos/DVD:** http://anrcatalog.ucdavis.edu/
  - Pruning & Training Fruit & Nut Trees (DVD)
  - Pruning Fruit Trees (VHS)
  - Training Young Fruit & Nut Trees (VHS)

Do I Need to Thin the Fruit?

- Reduce alternate bearing
  - within 1 month of bloom
  - Before pit hardening
- Increase fruit size
  - after natural drop (May)
  - 4-6” between fruits,
  - 1 fruit per spur
  - earlier thinning = bigger fruit and reduced alternate bearing
- Reduce limb breakage from heavy set



Orchard Care: Fertility

- Do you need to add fertilizer?
  - Deep clay or loam soils – maybe not
  - Sandy soils – yes
  - Let symptoms be your guide: look for yellowing or poor growth http://homeorchard.ucdavis.edu/fertilizing2.pdf
- When?
  - Anytime during active growth (March – Sept)
    - Not a lot just before harvest
    - Split applications – especially with sandy soils
    - Irrigate after application – only available to plants from the soil solution

Orchard Care: Fertility

- What kind & how much
  - Nitrogen: most common need
    - Zinc & Iron & Potassium may also be needed
  - Organic: Composts or manures or legume cover crops
    - Once in the fall – they break down slowly
    - ~ 20 – 40 lbs of manure, 1- 2” layer of compost
  - Conventional: store bought fertilizer
    - 2-6 applications during the growing season (Apr-July)
    - Up to 1 lb. of actual Nitrogen/per tree per year
      - Let tree growth be your guide
      - Ammonium sulphate (21-0-0): 1 lb N = 5 lb fertilizer

Pest Management Resources

http://www.ipm.ucdavis.edu/

University of California • Agriculture and Natural Resources

UC IPM Online

STATEWIDE INTEGRATED PEST MANAGEMENT PROGRAM

UC IPM

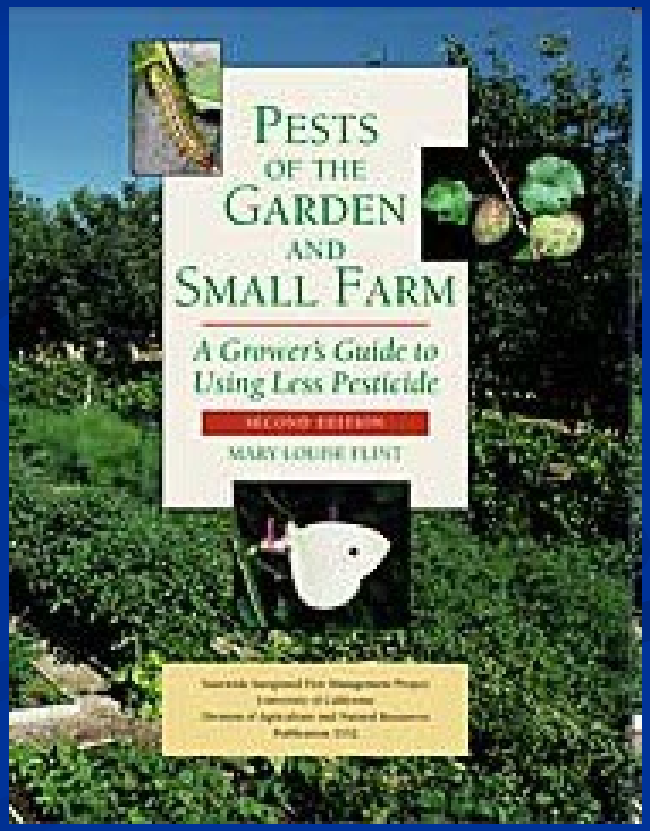
How to manage pests

Manage and identify insects, mites, diseases, nematodes, weeds, and vertebrates

- Homes, gardens, landscapes, and turf *(including Pest Notes)*
- Agriculture and Floriculture *(Pest Management Guidelines)*
- Natural Environments
- Exotic and Invasive Pests

Use tools to help make decisions

- Weather Data & Products
- Degree Days
- Interactive tools and models



COMMON PESTS: Peach Leaf Curl

- Peaches & Nectarines only
- Leaf distortion & drop
- Spray BEFORE budswell
  - Copper or lime sulfur

See UC IPM Peach Leaf Curl Pest Note:
http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn7426.html

COMMON PESTS: Aphid Leaf Curl

- Plum, apple and other fruits
- Look for aphids or cast skins inside the curled leaf
- Beneficials usually control
- Prune out damaged branches
- Dormant spray

COMMON PESTS:

Brown Rot- Monolinia species

- **Apricots**, peaches/nectarines, cherries, plums
- Infects bloom during wet weather during bloom
- Kills blossoms & twigs
- Causes gumming

COMMON PESTS: Brown Rot

- Rots fruit, kills twigs
- Spray BEFORE rain
- Remove infected twigs and fruit

See UC IPM Brown Rot Pest Note:
http://www.ipm.ucdavis.edu/PMG/GARDEN/FRUIT/DISEASE/aprbrownrot.html

COMMON PESTS: Powdery Mildew

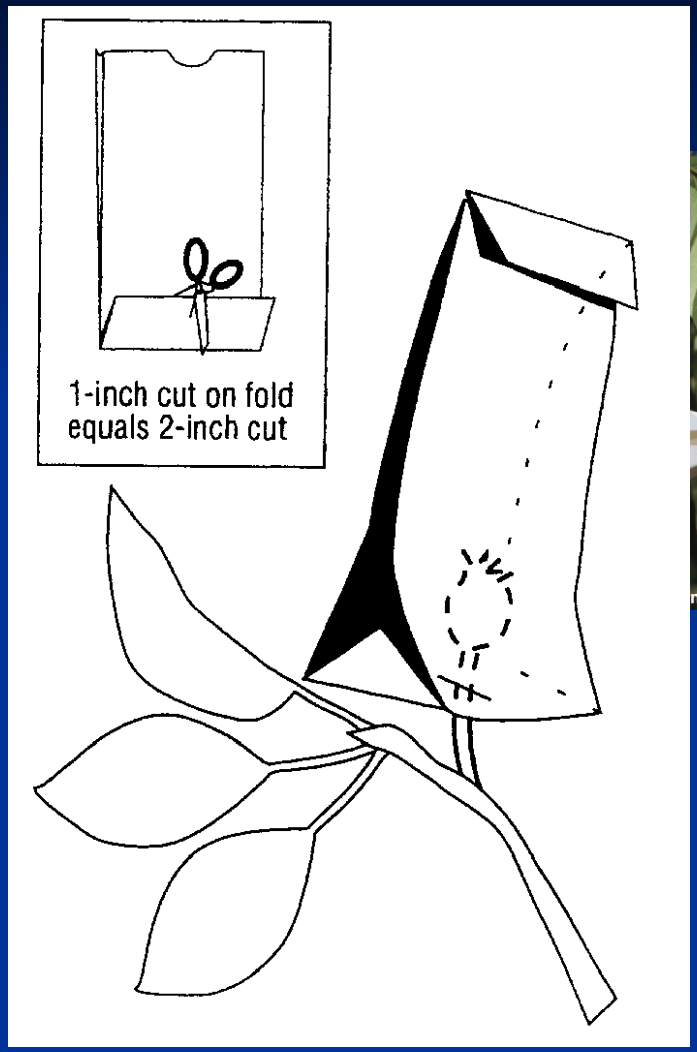
- Common on grape (except Concord Vitus labrusca)
- Leaf pull at bloom
- Dust sulfur- weekly starting at 6 " shoot growth until veraision

UC IPM Powdery Mildew Pest Note:
http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn7494.html

COMMON PESTS
Codling Moth

- **Apples**, pears, quince, walnuts
- Worse in hot climates
  - Hot: 50-80% damage
  - Mild: 15-25% damage
- Control Options
  - Sprays- time W/ DD
    - Carbaryl (Sevin)
    - Spinosad
    - Summer oil
  - Traps & Sanitation
  - Bagging

COMMON PESTS
Codling Moth



- Traps & Sanitation
- Bagging
- Choose early Varieties
  - i.e. Gala

See UC IPM Codling Moth Pest Note:
http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn7412.html

More information

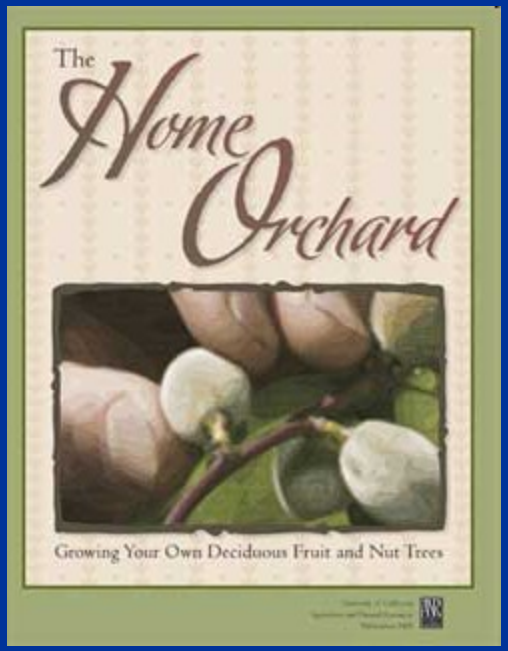
Websites:

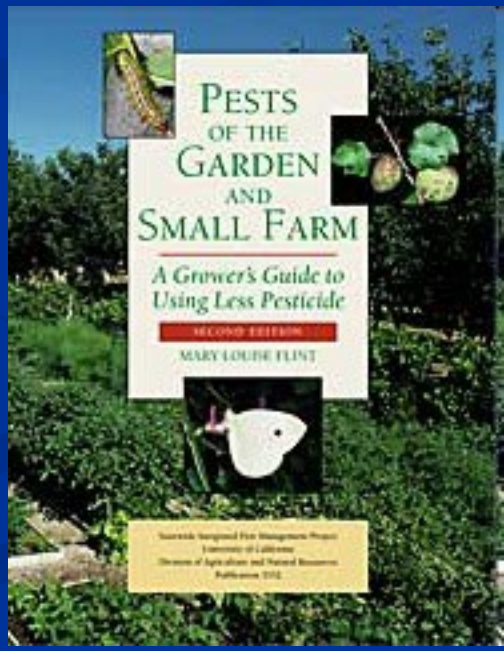
- UC Fruit & Nut Research & Information Center: http://fruitsandnuts.ucdavis.edu
  - Backyard orchard
  - Weather Services : Winter chill, rainfall
- UC IPM Program: http://www.ipm.ucdavis.edu/
  - Homes, gardens, landscape, and turf (including Pest Notes)
- California Rare Fruit Growers – Golden Gate Chapter http://www.crfg.org/

More information

Publications:

- University of California Agricultural Publications: http://anrcatalog.ucdavis.edu





More information

Free Publications:

- University of California Agricultural Publications: http://anrcatalog.ucdavis.edu/FruitNutTreesintheHomeGarden/
- Fruit Trees:
  - Planting and Care of Young Trees
  - Thinning Young Fruit
- Calendar of Operations for Home Gardeners
  - Almonds, Apples & Pears, Apricots, Cherries, Peaches & Nectarines, Plums, Walnuts

Citrus in the Sacramento Valley

- Varieties
  - Navels, Valencias, Mandarin
- Rootstocks
  - **Trilfoliate**-more cold tolerant
  - Troyer Citrange – more vigorous
- Problems
  - Dry root rot – Frost Nucellar Navel on Trifoliate
    - Use Old line Navel on Roubidoux Trifoliate

Varieties to Consider… This is by no means an exhaustive list.

Mandarin and mandarin hybrids

Satsuma mandarins: Kuno Wase, Okitsu Wase, Dobashi Beni, **Owari**

Clementine mandarins

- Algerian, Fina, Caffin, Fina Sodea, Oroval, **Clemenules** (Nules)

Other mandarins and mandarin hybrids

- W. Murcott Afourer (Afourer), Pixie, Gold Nugget, Shasta Gold TM, Tahoe Gold TM , Yosemite Gold TM, Page, Minneola, Kinnow, Dancy, Daisy, Seedless Kishu, Sunburst, Fallglo, Fairchild, Kara, Fremont, Fortune, Robinson, Lee, Nova, Encore

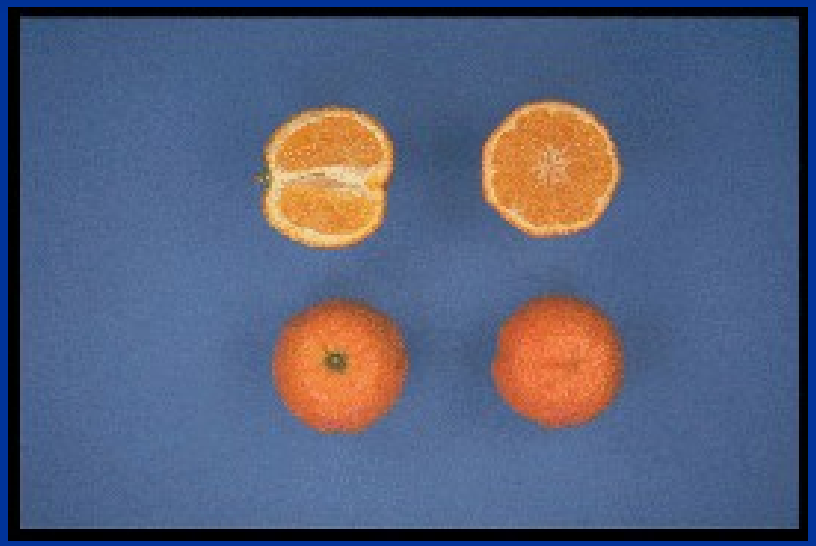
Mandarins: Seedless vs. Seeded

- Seedless – mixed blocks or isolated
  - All Satsumas- Owari, Okitsu Wase, Kuno Wase Dobashi Beni, Tango (irradiated selection from Murcot Afourer)
  - Mandarin Hybrids- Shasta Gold, Tahoe Gold, Yosemite Gold
  - Seedless Kishu and Pixie
- Seedless if isolated
  - Clemintine selections
  - W. Murcot Afourer
  - Page, Minneola, Orlando and Nova

Satsuma Mandarins

- The progenitor of the Satsuma group of mandarins probably originated in China but was transported centuries ago to Japan, where it has become the major type of citrus planted.
- The Satsuma is well adapted to cool subtropical regions of Japan, Spain, central China, and southern South Africa and has a low heat unit requirement for fruit maturity.

Clementine Mandarin



Clemenules clementine

- 'Clementine' trees are densely foliated, moderately large and have consistently high yields. Fruit quality is excellent but attainment of minimum marketable size is sometimes a problem.
- Most popular fruit on east coast market
- Harvest slightly after Owari Satsuma
- Can be seedy if cross pollinated

W. Murcot Afourer and ‘Tango’

- Harvest in March through April
- Unique flavor
- Highly productive
- W. Murcot Afourer is seedy
- Tango is an irradiated seedless variety

Citranges

- Citranges are hybrids of sweet orange and trifoliate orange, both of which are used themselves as rootstocks.
- Several have been produced, including Rusk, 'Morton', 'Benton', 'Carrizo', 'Troyer' and 'C- 35'.

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Citrus Thrips

Fruit damage is economically important, because scarring makes the fruit undesirable for fresh market (this is especially true for export markets).

- Fruit are susceptible to damage from petal fall until the fruit is about 1.0 inches in diameter.

Seco
Insta
First

Mites

- Mites are related to spiders and are an common pests although they reach damaging levels only occasionally. The most damage mite is the two spotted mite.

Trees should be kept healthy and well-watered.
Most of the time, predatory insects and mites are sufficient to keep mite populations under control.

California Red Scale

- CRS is one of the most important pests of Californaia citrus. Lemon is the most susceptible host, followed by grapefruit and then orange. CRS is also found on other ornamental plants, particularly *Euonymous* and holly.

California Red Scale

- Damage can occur on all parts of the tree, including leaves, twigs, branches and fruit. CRS sucks plant sap, reducing the vigor of the tree.
- Fruit with scale are downgraded at the packinghouse, although this will change as high-pressure washers become more common.

California Red Scale

- Severe infestations can cause leaf and fruit drop, twig and limb dieback.
- Most damage occurs during the summer and fall months, when populations are the greatest.

California Red Scale

- Insecticides for use on CRS include Guthion, Carbaryl, Lorsban, Supracide, Ethion, Malathion, Dibrom, Vydate, oils, rotenone and Imidan.
- For the homeowner, soap sprays may be effective.
- California research shows some resistance to Lorsban and Supracide.
- Insecticides should be applied when CRS is in the crawler stage.

Phytophthora

- The most diagnostic symptoms of Phytophthora foot rot are found at or below the soil level. Longitudinal cracking of bark, accompanied by profuse gumming, usually is positive evidence of infection. Soil removal around affected trees will reveal bark that appears watersoaked, slimy, reddish- brown, or, in late stages, black.
- Physical removal of this decayed tissue (by rubbing between your fingers) reveals the whitish, central root tissue (stele).

Phytophthora

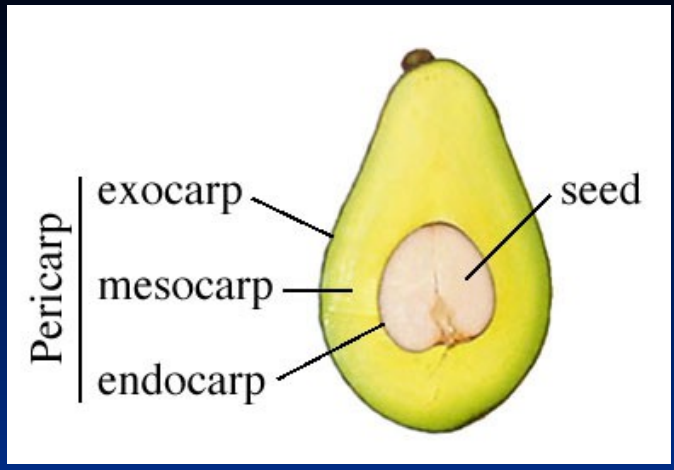
- Control:
  - Proper planting depth
  - Resistant rootstocks
  - Proper planting location
  - Encourage drainage
  - Ridomil or Aliette

Dry root rot of citrus

- Dry root rot is a destructive but localized disease occurring sporadically in California (Sacramento Valley) South Africa
- Only trees weakened by some other factor are attacked. Sacramento Valley Frost Nucellar Navel on Trifoliate rootstock
- Citranges, citrumelo, Macrophylla, rough lemon and Cleopatra mandarin appear to be more susceptible than sour and sweet orange rootstocks
- A moist dark decay develops in the bark, which later becomes dry and cracked
- The wood below the bark is not decayed but is hard and dry with a brown, gray or purple stain


The Avocado
(Persea
americana)

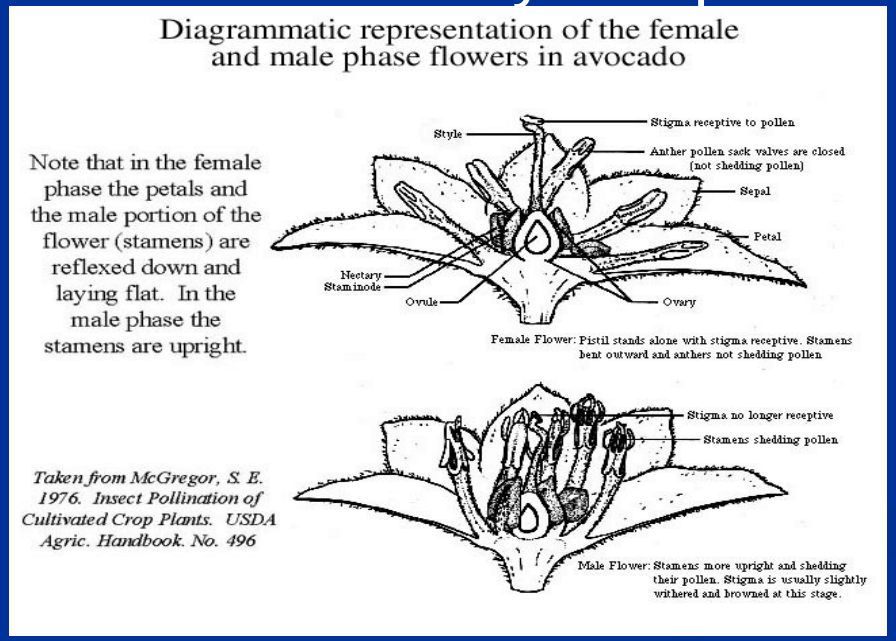
Taxonomy and Physiology



- *Persea americana* Mill
- Member of the *Lauraceae*
- Evergreen trees reaching heights of up to 60ft (cv. Hass usually ~20ft depending on rootstock)
- Shallow rooted and poor water uptake
- Usually less than 0.1% of the flowers set fruit
- Flowering and fruit set is dependent on temp.

The Unique Avocado Flower

- "A" and "B" type flowers
  Nature has provided for avocado cross-pollination by creating varieties of two kinds.
- The "A" type is female in the morning of the first day and male in the afternoon of the second day
- The "B" type is just the reverse: its flowers are female in the afternoon and male the following morning
- Commercially bee pollinated



Growing Avocados in the Sacramento Valley- Recreational only

- Plant in protected areas
- Be prepared to protect from freezes
- Accept occasional losses.
- Use cold tolerant varieties and rootstocks
- Plant both A type and B type

Varieties

- Varieties of mexican heritage are more cold tolerant- Bacon, Mexicola, Zutano, Stewart, Duke
- Central American or mixed heritage are less cold tolerant – Hass, Fuerte, GEM
  - Hass can be grown but must be protected and is more risky.
    - Grow in protected areas, protected with heat lambs, under tree watering etc.

Pollination Groups

- Bacon, Zutano, Fuerte
- Mexicola, Hass

Rootstocks

- Use rootstocks with mexican heritage for cold tolerance.
  - Toppa Toppa
  - Mexicola
  - Duke

Home Propagation

- Wash the avocado pit
- Carefully push three toothpicks into the thickest width of avocado pit about a 1/2" deep
- Suspend the pit over a glass filled with water
- Place the glass in a bright windowsill
- When the stem grows to about five or six inches pinch out the top set of leaves. In another two or three weeks new leaves will sprout and their will be more roots