



Home Orchards

Fruit and Nut Trees

Bill Krueger

Farm Advisor:
Tree Crops

Tree Crops Glenn County,
Olives Tehama County



Master Gardener Training –
February 2011

Environmental Considerations

Light

8 hours per day during the growing season

With less light:

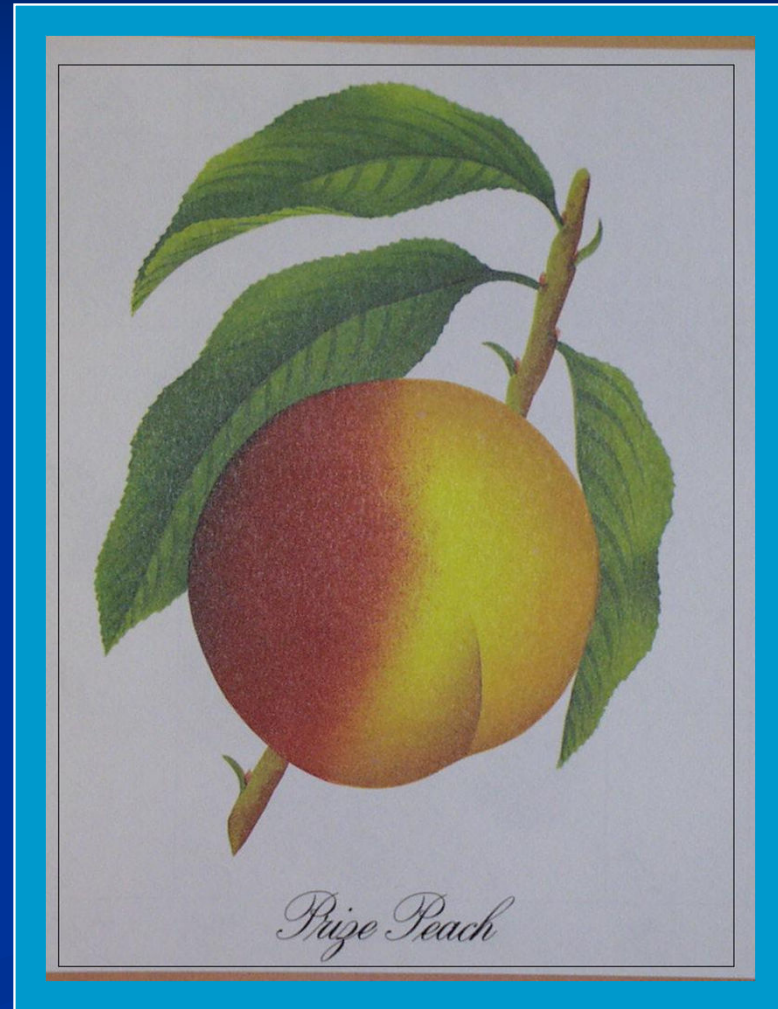
spindly growth

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
- 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



Environmental Considerations

Climate: Winter Chill

- Without enough chill
 - Delayed foliation
 - Prolonged 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

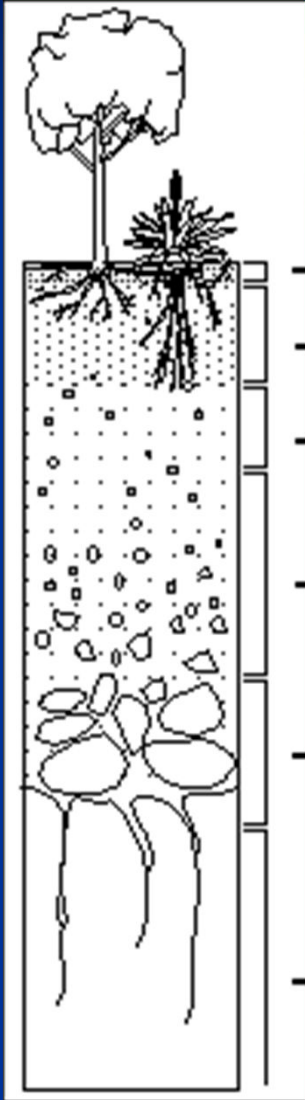
Climate:

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 can reduce set



Bees don't fly in the rain



Stone fruit: Brown Rot



Pome fruit: Fireblight

Variety Selection

■ Taste

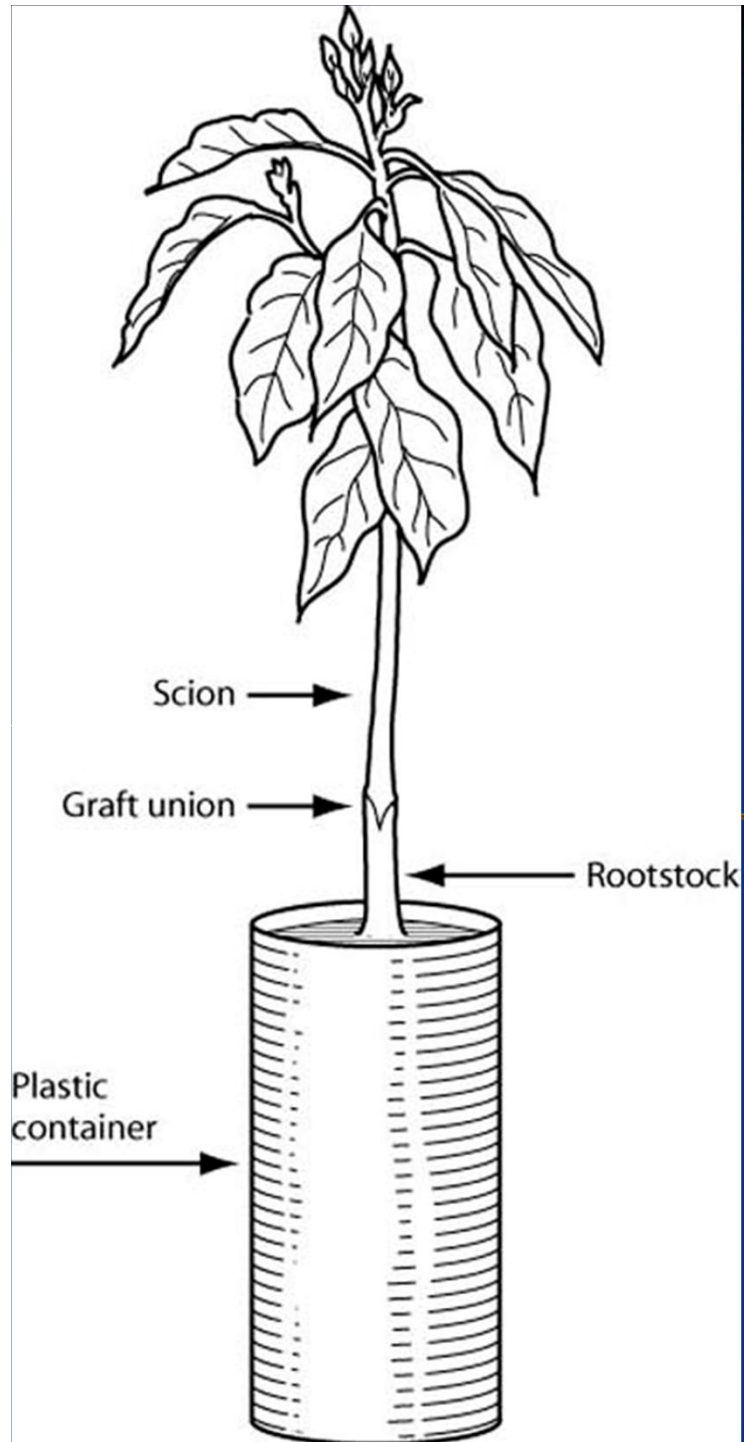
- Most important aspect
- Fruit tasting, friends, farmers market, catalog descriptions, grocery stores, popularity, sugar to acid ratio, what growers grow locally
- Other?

Pollination



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

What is a rootstock?



Why do we use Rootstocks?

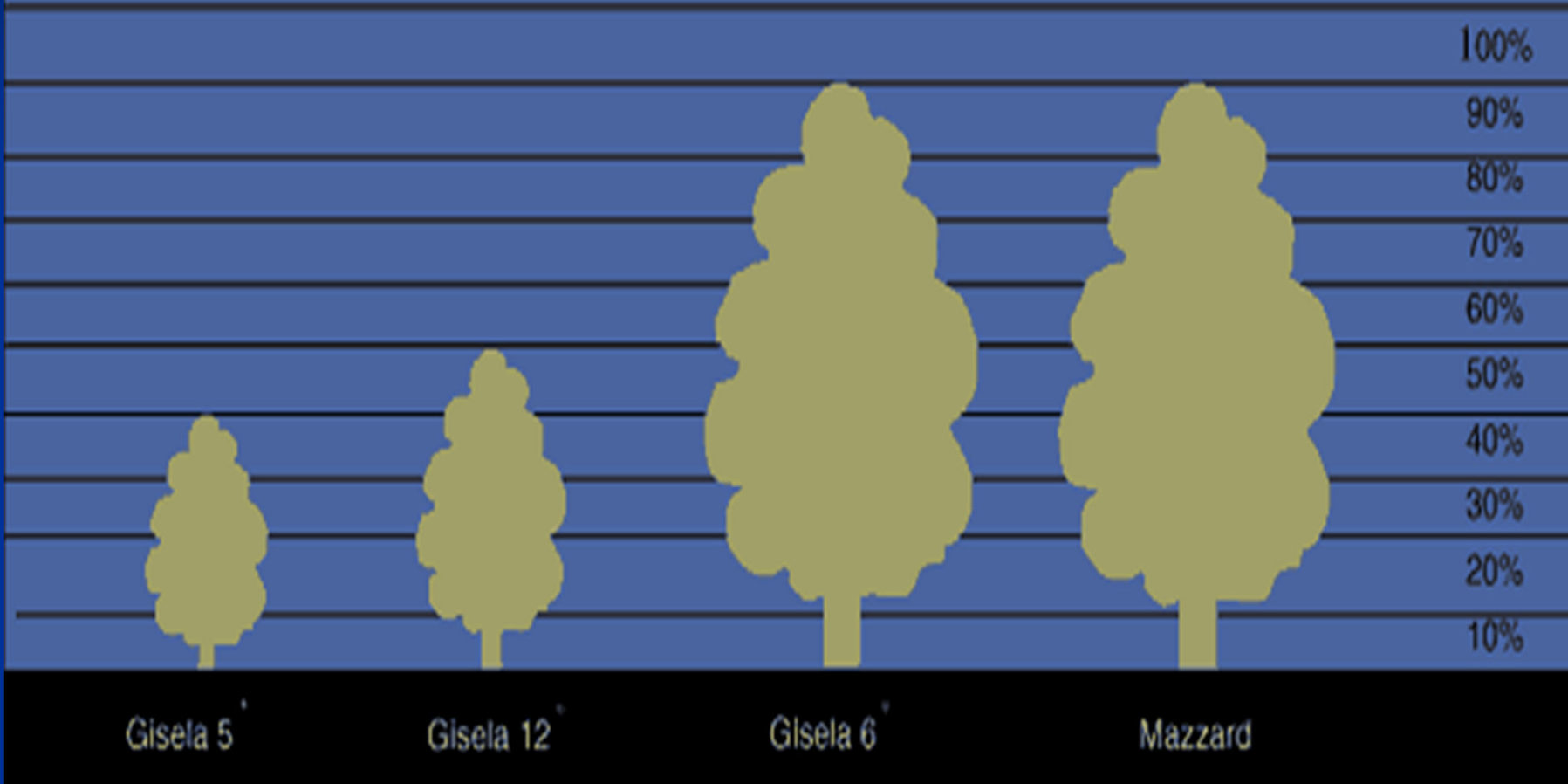
- Better anchorage
- Soil adaptability
- Pest resistance
 - Root rot, nematodes, root aphids
- Control tree size (dwarfing rootstocks)
 - Apples, cherries, (pears)
- Early bearing



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



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

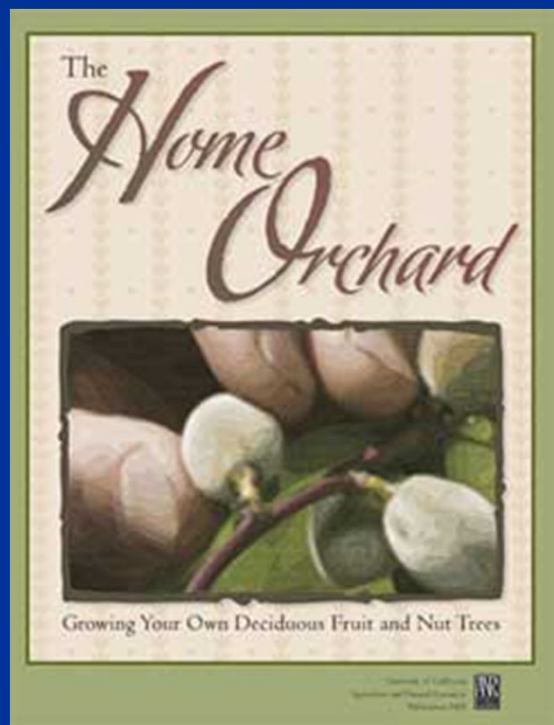
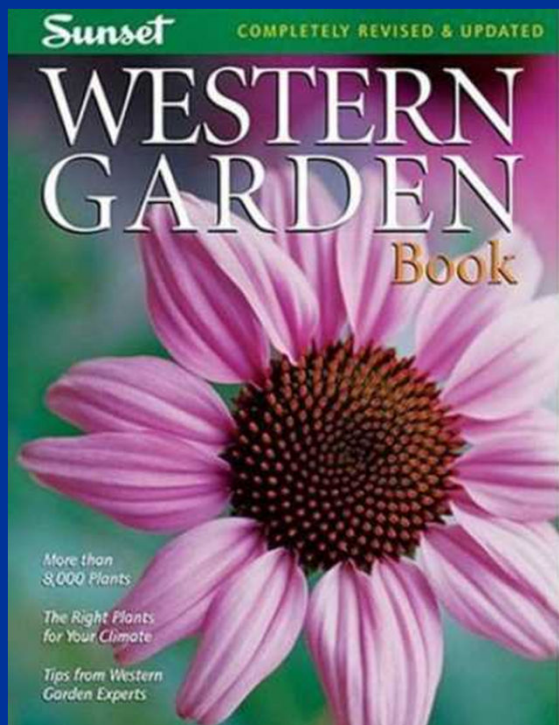
R = Resistant

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



Container or Bare Root?

- Plant bare root in Jan/Feb
- Ideal size of bare root should be about $\frac{1}{2}$ to $\frac{5}{8}$ ths inch in diameter
- Containers can be planted most any time
 - May have less crown gall
- Most trees are containerized in the nursery

Planting the Orchard

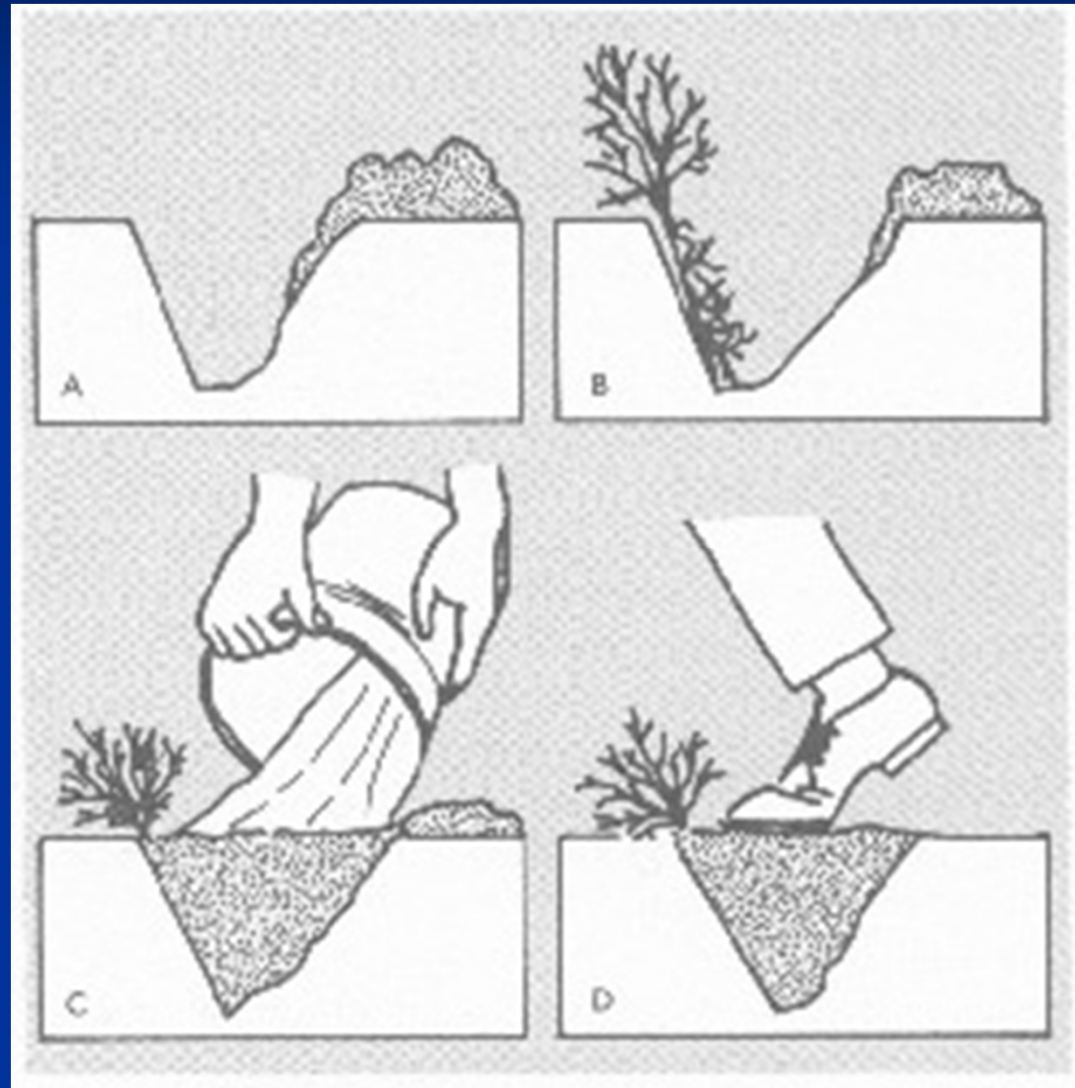
Winter/Spring: Dormant, bare root trees



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

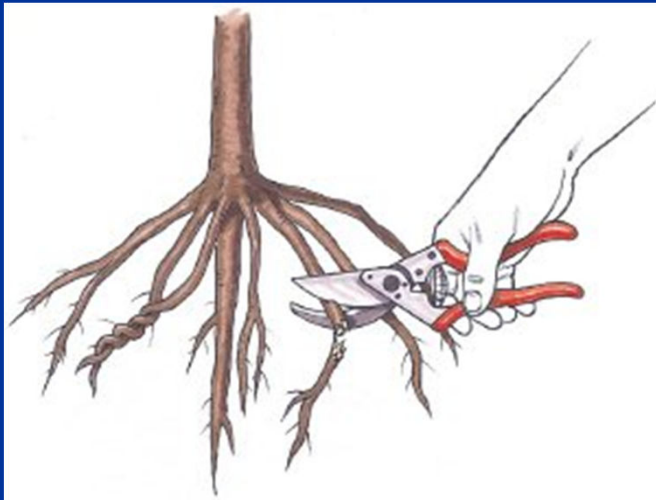
Heeling in



Planting the Orchard



- Soil should be moist **NOT WET**
- The hole: deep as the roots & twice as wide
- Fertilizers or amendments?
- **Plant high**



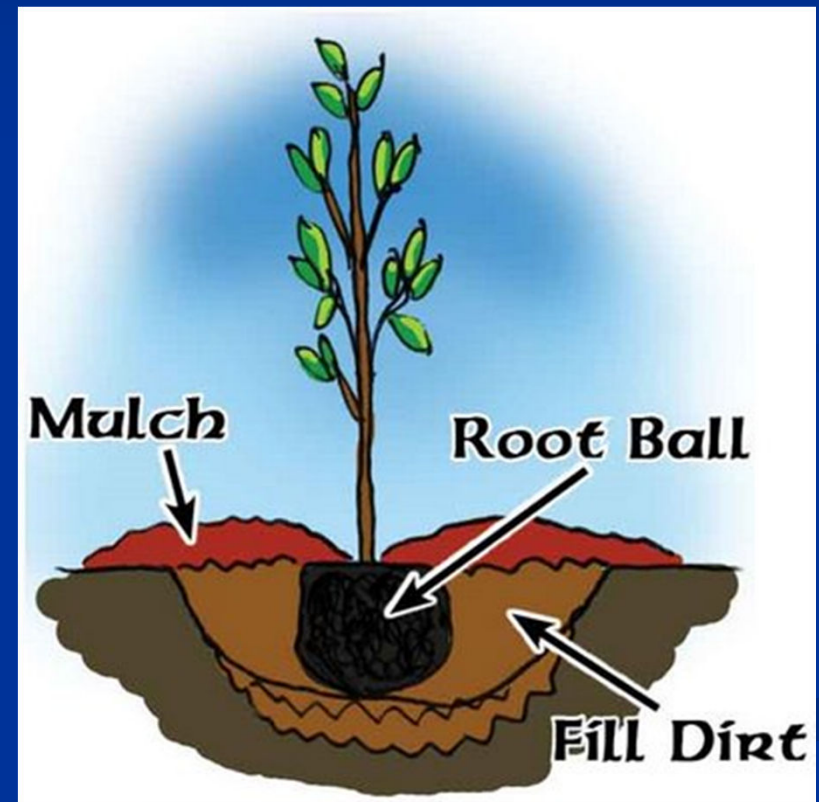
Planting Bareroot

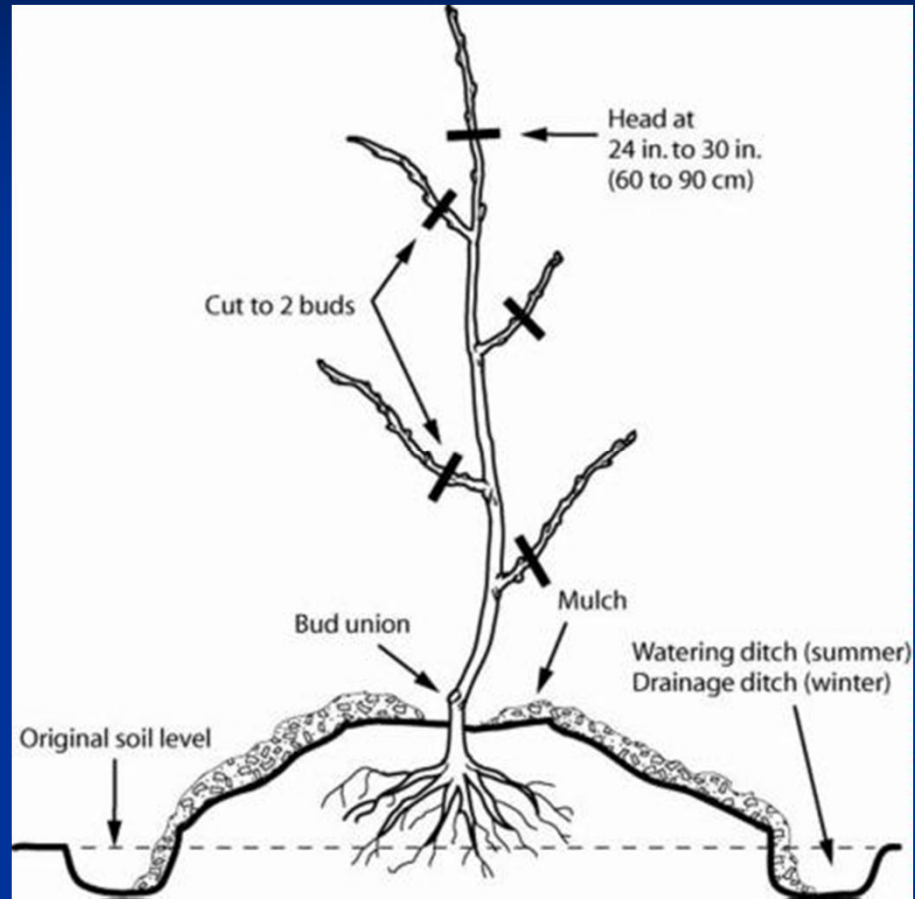


- Cone shape
- Orientation of bud union
- Planting depth

Preparing The Planting Site

- Dig 2x as wide and as deep as the root ball.
- If heavy soil, plant high
- What about organic amendments?





Sunburn protection



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

■ Irrigation

Begin water watering after the trees have grown about 6 inches

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

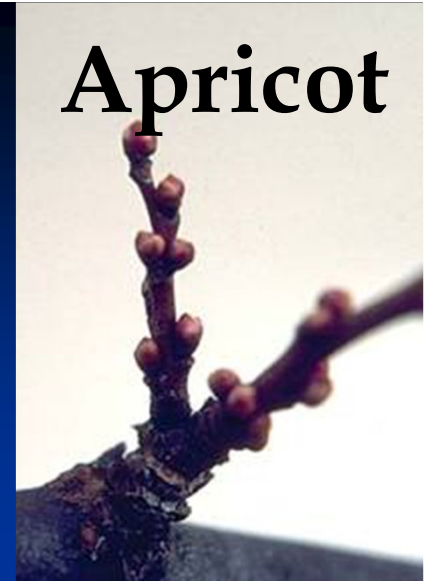
- Dormant Vs. Summer
 - Dormant = invigoration
 - Used to promote growth and shape tree
 - Summer = devigoration
 - Used control tree size and promote light infiltration into the canopy



Cherry

Spurs

What it's
all about



Apricot

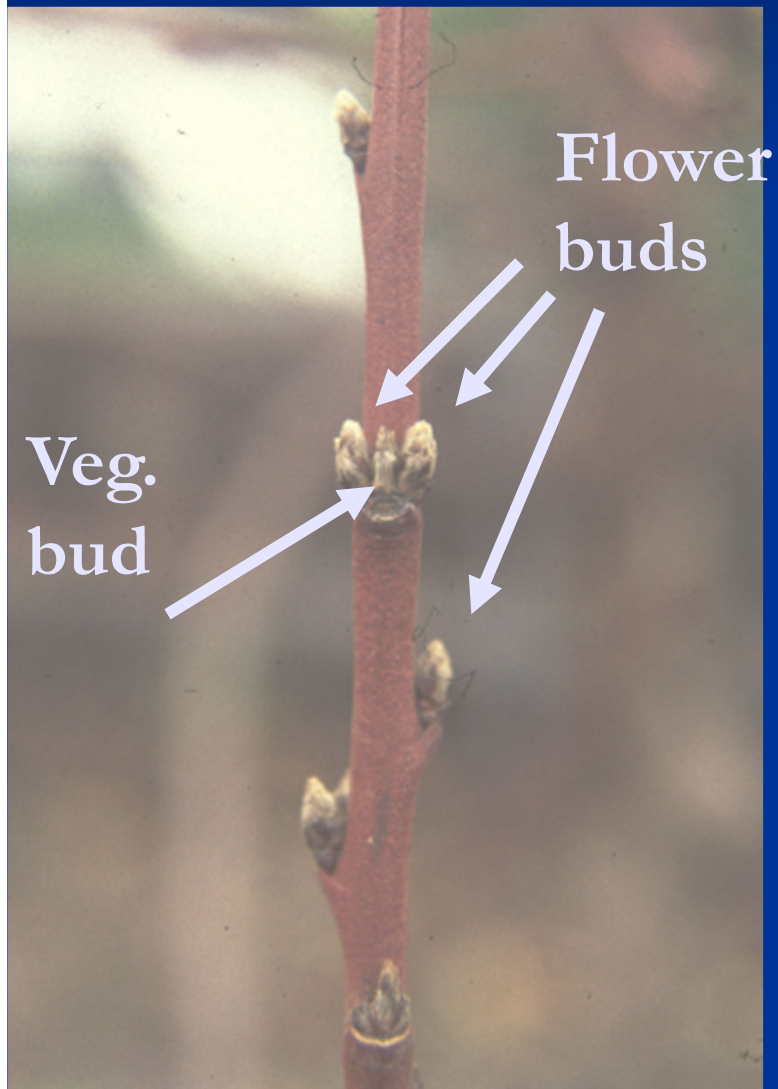


A. pear



Eur. pear

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



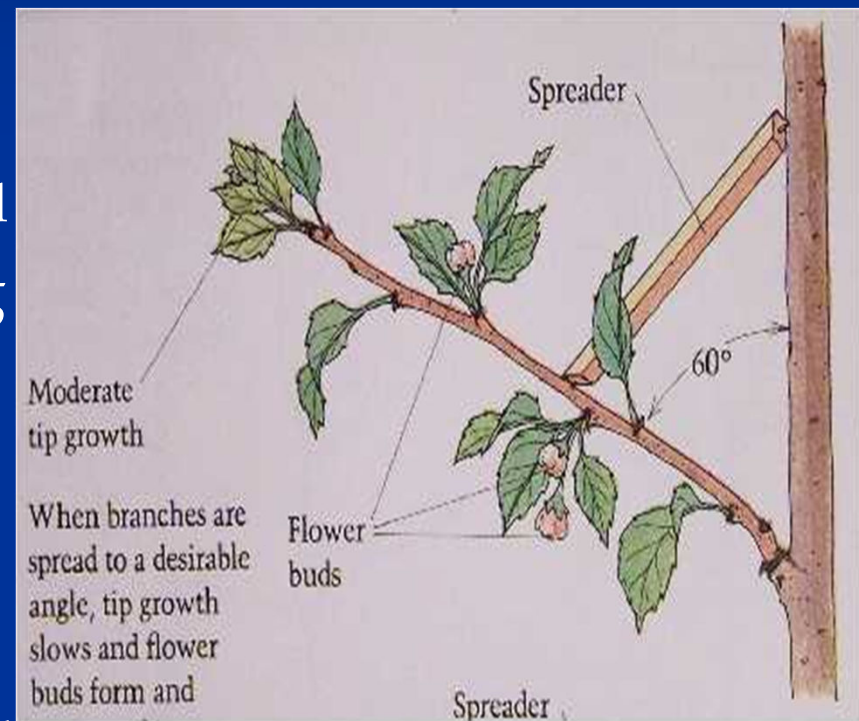
2. Heading cut

- Remove top of a branch
- Encourages branching
- For training or hedging



Limb Selection

- Scaffold limbs
 - 45-60° branch angle
 - Strongest attachment
 - Balances vegetative vigor and
 - Distributed around & along
- 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



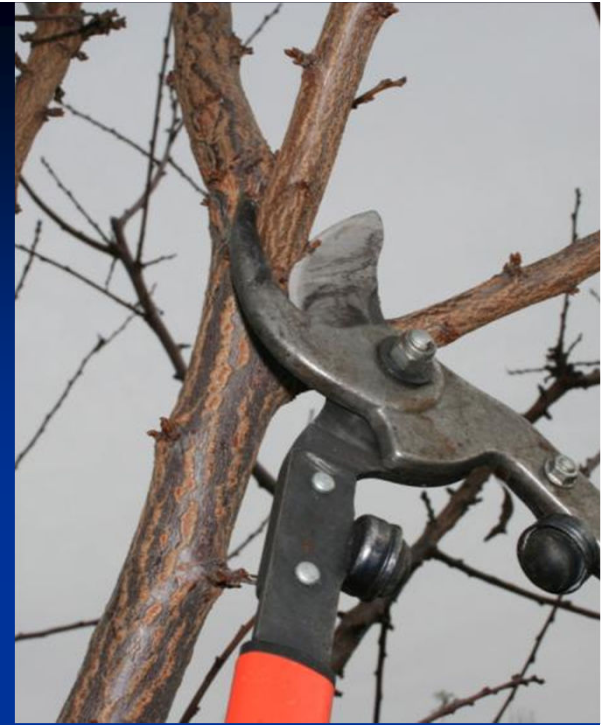


Thinning & Heading Cuts on Plum Tree



Proper Pruning Technique

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



Pruning Systems

Open Vase

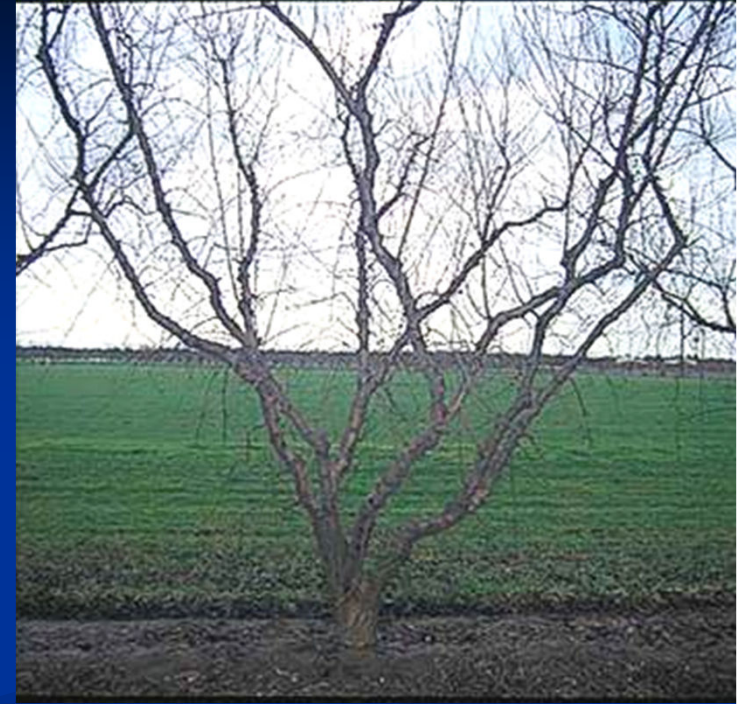


Central Leader



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
- Keep center open during summer from the start



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

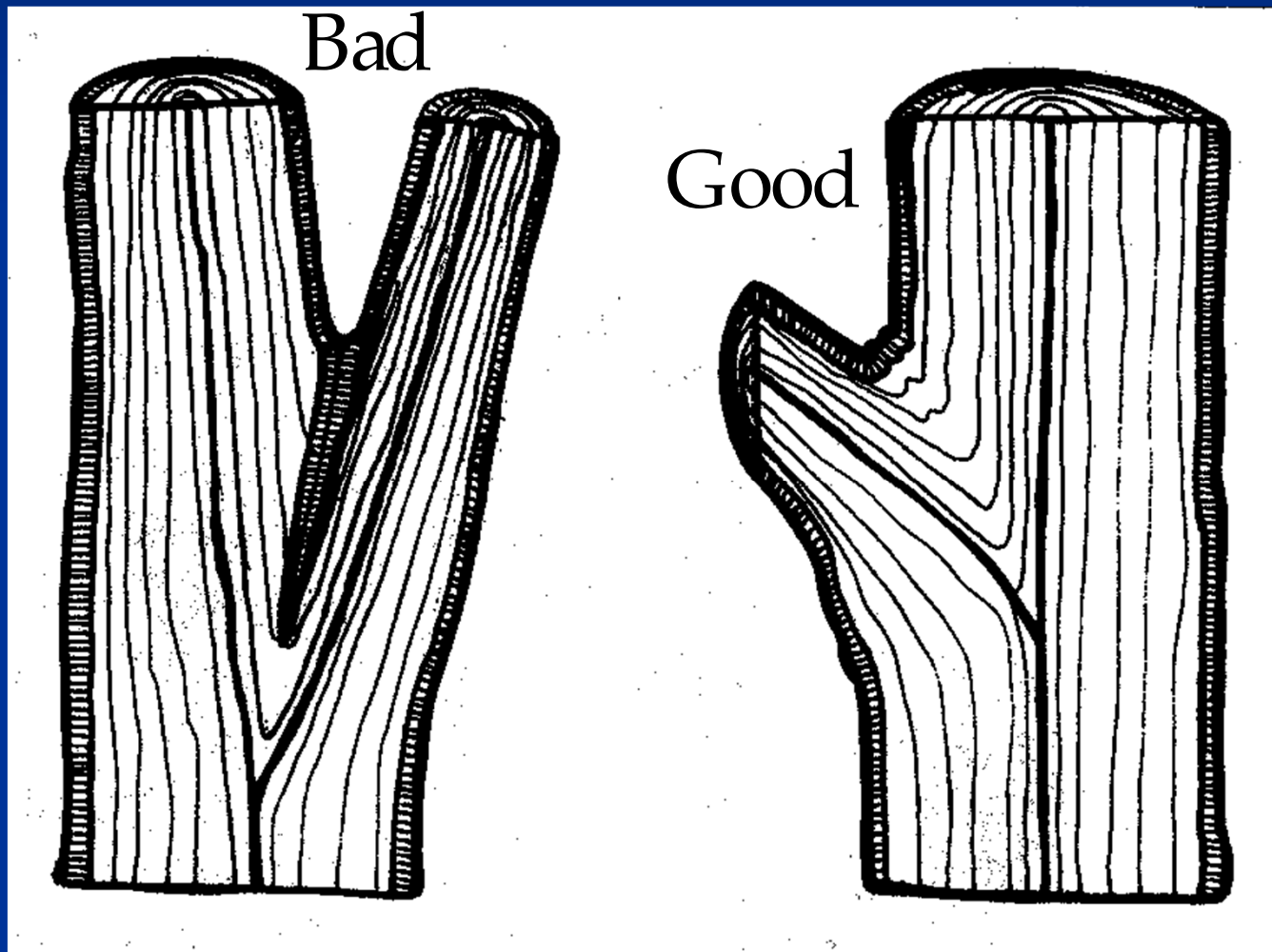


Visible Bark
Ridge



Included
Bark

Narrow vs. Wide Branch Angles



Pruning Systems

Open Vase



Pruning a One-Year-Old Peach



Pruning a Two-Year-Old Peach



1st dormant pruning

Before



After





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*

**Unpruned 2nd
Dormant**



Long Pruned



**Lightly
Tipped**



Short



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

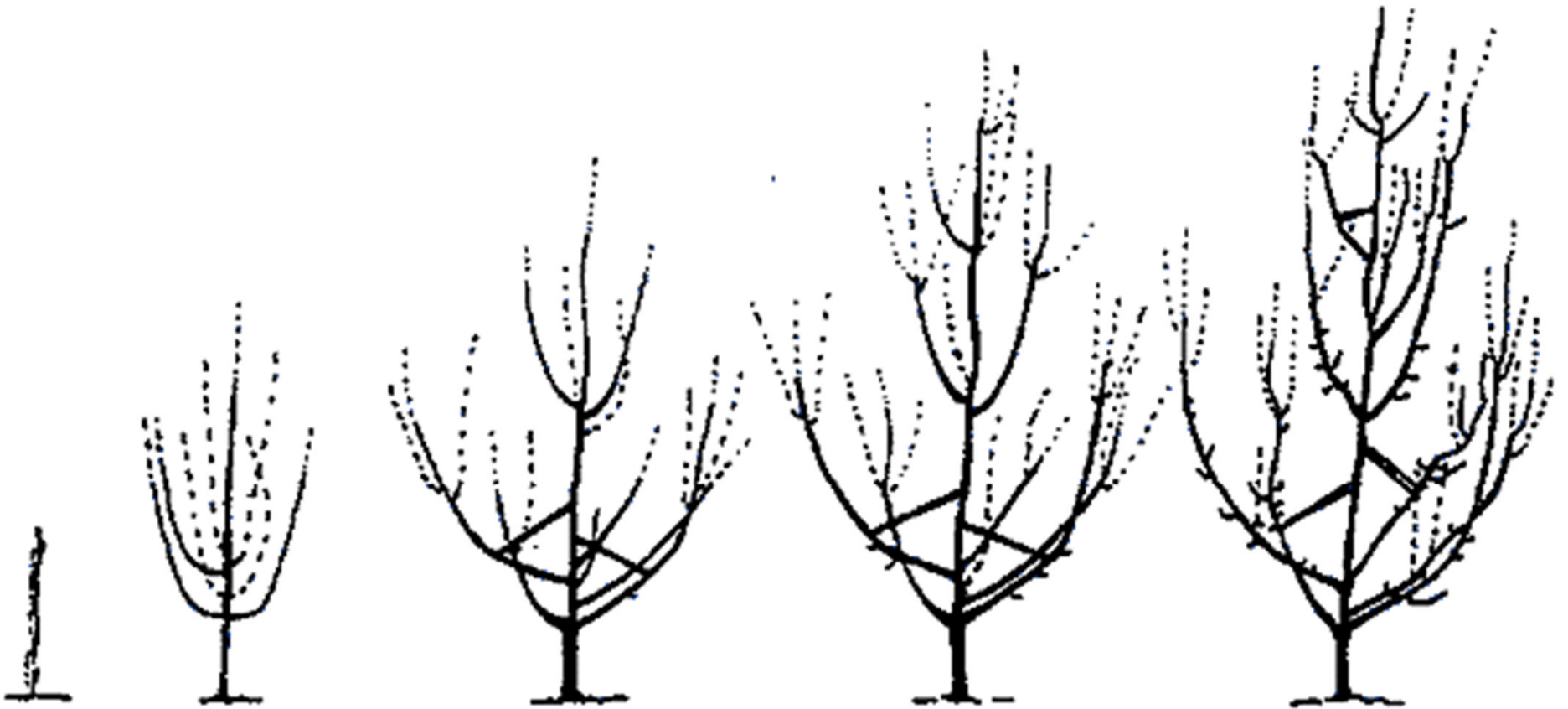


Central Leader

- Appropriate for apples, pears, pecans, persimmons
- 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

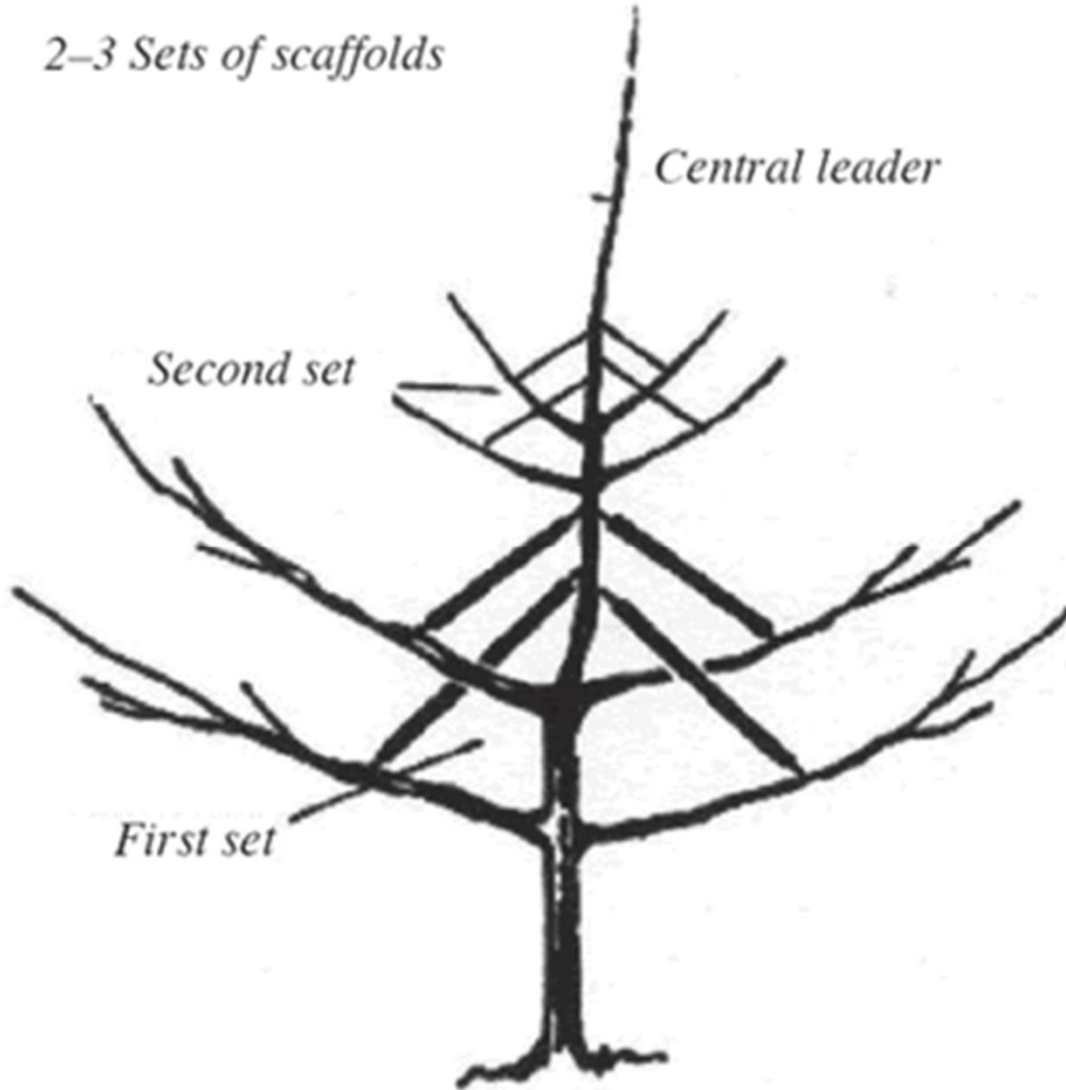


2-3 Sets of scaffolds

Central leader

Second set

First set



Modified Central Leader

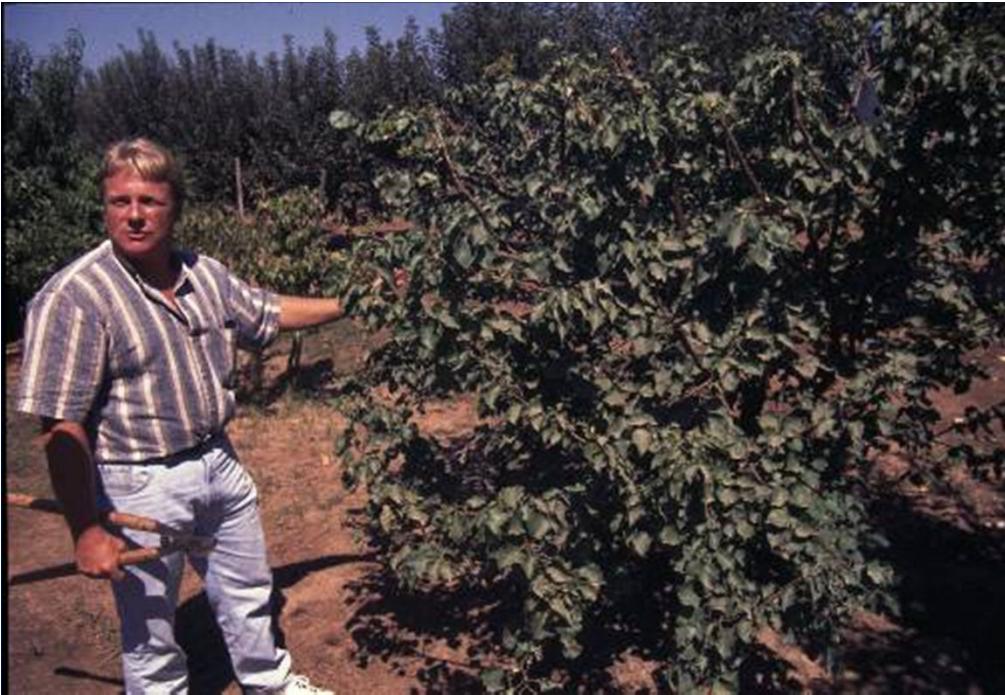
- Appropriate for pistachios, walnuts, almonds, apples, pears, persimmons
- At planting
 - If no leader, select upright growing shoot to force into central leader position
 - Head back when leader reaches desired height
 - During the first or second season, select primary scaffolds as we did with vase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

Before



After





Cherry,
Pome Fruits
Ideal for Fruit Bush

Apricot, Plum/Pluot Fruit Bushes Excessive Growth



Apricot, Plum/Pluot Fruit Bushes Excessive Growth

Before



After



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
- Heading cuts to promote growth and increase vigor

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 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>

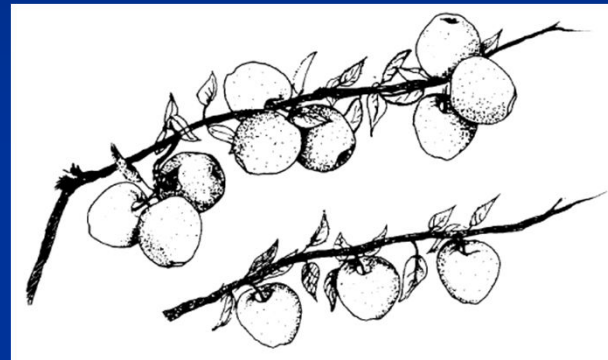
- Training and Pruning Deciduous Trees
- Pruning Overgrown Deciduous Trees

■ 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
- Increase fruit size
 - after natural drop (May)
 - 4-6" between fruits,
 - 1 fruit per spur
 - earlier thinning = bigger fruit
- 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



How to manage pests

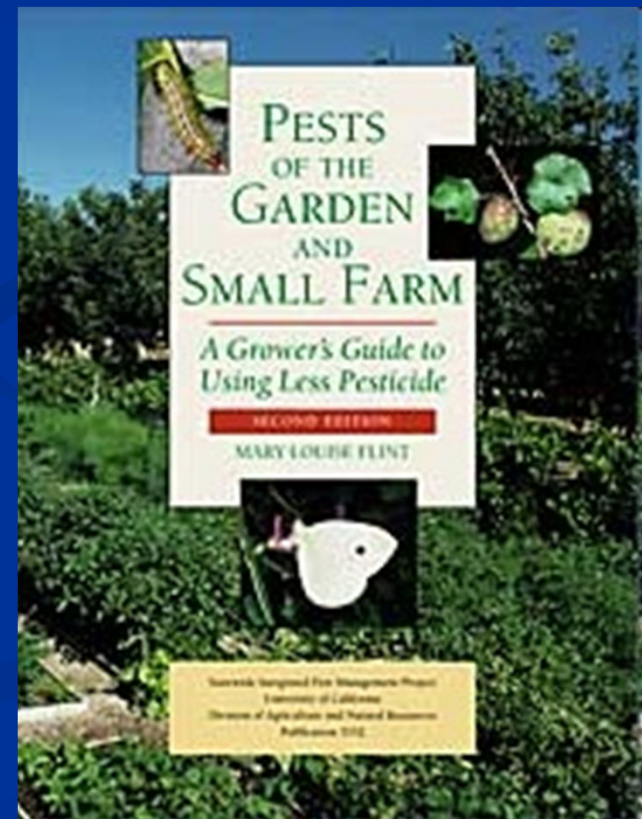
Manage and identify insects, mites, diseases, nematodes, weeds, and vertebrates

- [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

UC Statewide IPM Project
© 2000 Regents, University of California



UC Statewide IPM Project
© 2000 Regents, University of California



UC Statewide IPM Project
© 2000 Regents, University of California

COMMON PESTS:

Brown Rot

- Apricots, peaches/nectarines, cherries, plums
- Infects bloom during wet weather
- 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)
- Leaf pull at bloom
- Spray sulfur



UC IPM Powdery Mildew Pest Note:

<http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn7494.html>

COMMON PESTS

Codling Moth



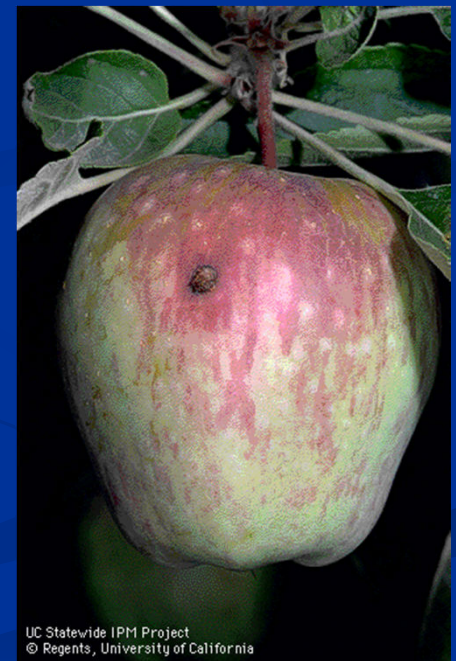
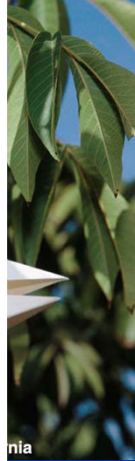
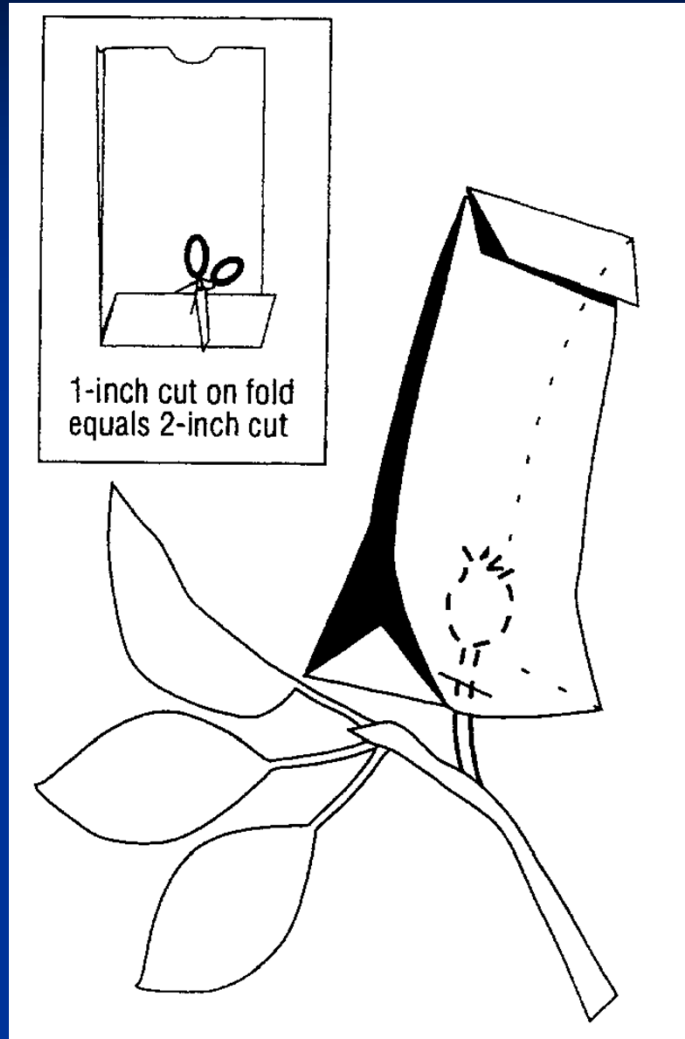
- Apples, pears, quince
- Worse in hot climates
 - Hot: 50-80% damage
 - Mild: 15-25% damage
- Control Options
 - Sprays
 - Carbaryl (Sevin)
 - Spinosad
 - Summer oil
 - Traps & Sanitation
 - Bagging



COMMON PESTS

Codling Moth

- Traps & Sanitation
- Bagging
- Choose early Varieties



See UC IPM Codling Moth Pest Note:

<http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn7412.html>

More information

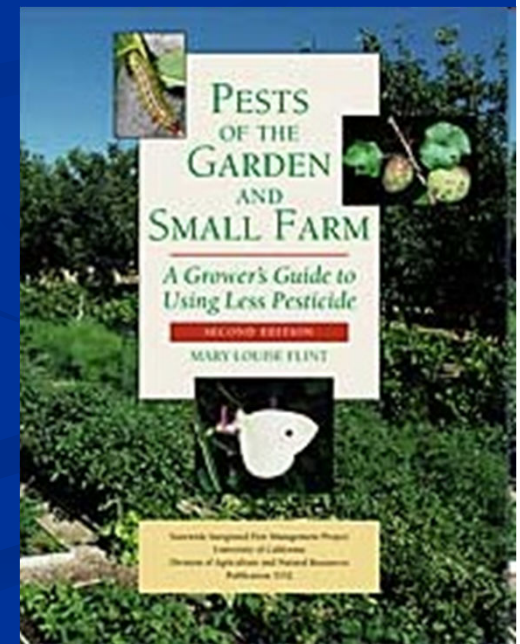
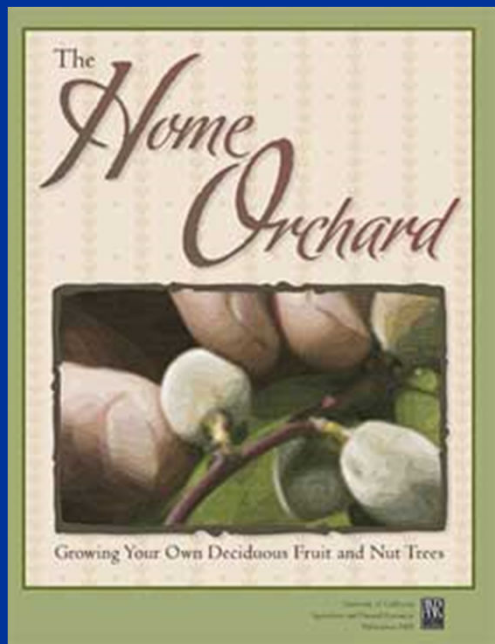
Websites:

- 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
 - Trifoliolate-more cold tolerant
 - Troyer Citrange – more vigorous
- Problems
 - Dry root rot – Frost Nucellar Navel on Trifoliolate
 - Use Old line Navel on Roubidoux Trifoliolate

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, Marisol, 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, Murcott, Kinnow, Dancy, Daisy, Seedless Kishu, Sunburst, Fallglo, Fairchild, Kara, Fremont, Fortune, Robinson, Lee, Nova, Encore

"Seedless" mandarins in Both Isolated and Mixed Variety Blocks

- All Satsuma selections: Owari, Okitsu Wase, Kuno wase
- Seedless Kishu
- Pixie
- Gold Nugget
- Shasta Gold™ mandarin hybrid
- Tahoe Gold™ mandarin hybrid
- Yosemite Gold™ mandarin hybrid

"Seedless" ONLY if isolated from other types that could cross pollinate them

- Clementine selections
- W. Murcott Afourer
- Page
- Minneola
- Orlando
- Nova