Growing Fruit Trees in the Home Garden

Chuck Ingels

UC Cooperative Extension, Sacramento County

Master Gardener Training – Riverside

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Topics to be Covered

- Fruit Tree Basics
- Species and Varieties
- Planting
- Fruit Tree Growth
- Training and Pruning
- Irrigation and Fertilization
- Fruit Thinning
- Pest Management
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Chilling Requirement

The number of hours below 45°F required by a fruit species or variety between November 1 and February 15

Lack of chilling causes:
Death of buds, extended bloom, and poor fruit set
Three zones with low-chill winters
# Chilling Hour Requirements
*(Newer varieties may have lower requirements)*

<table>
<thead>
<tr>
<th></th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Almond</td>
<td>250-500</td>
</tr>
<tr>
<td>Apple*</td>
<td>500-1000</td>
</tr>
<tr>
<td>Apple (low chill)</td>
<td>400-600</td>
</tr>
<tr>
<td>Apricot*</td>
<td>300-800</td>
</tr>
<tr>
<td>Cherry, sweet</td>
<td>700-800</td>
</tr>
<tr>
<td>Fig</td>
<td>100</td>
</tr>
<tr>
<td>Peach/nectarine</td>
<td>500-800</td>
</tr>
<tr>
<td>Pear*</td>
<td>700-800</td>
</tr>
<tr>
<td>Pear (Asian)</td>
<td>350-450</td>
</tr>
<tr>
<td>Pecan</td>
<td>250</td>
</tr>
<tr>
<td>Persimmon</td>
<td>100-200</td>
</tr>
<tr>
<td>Pistachio</td>
<td>800</td>
</tr>
<tr>
<td>Plum, European</td>
<td>600-800</td>
</tr>
<tr>
<td>Plum, Japanese</td>
<td>700-800</td>
</tr>
<tr>
<td>Pomegranate</td>
<td>100-150</td>
</tr>
<tr>
<td>Walnut</td>
<td>500-700</td>
</tr>
</tbody>
</table>
Site Selection

- 6-8+ hours of full sun
- Shelter from high winds
- Avoid planting where fruit falls on walks or driveway
- Soil should be at least 3 ft deep, but trees can be managed in shallower soil
Pollination of Fruit Trees

- **Pollenizer**: A tree of one variety used to provide pollen to a nearby tree of a different variety to produce fruit.

- **Pollinator**: An insect (usually a bee) that carries pollen from one tree or flower to another.
What if You Have No Pollinizer Nearby? Plant, Graft, or:
Topics to be Covered

- Fruit Tree Basics
- **Species and Varieties**
- Planting
- Fruit Tree Growth
- Training and Pruning
- Irrigation and Fertilization
- Fruit Thinning
- Pest Management
Peaches & Nectarines

- Same species (one-gene difference)
- Hundreds of varieties
  - Some ripen May (Royal Gold)
  - Some ripen in September (Fairtime)
- Yellow or white flesh
- Need long, hot summers
- Easy to grow, consistent bearers
  - Main problem: peach leaf curl
  - Curl-resistant varieties
Pluots

- Complex plum-apricot crosses (mostly plum)
- Bred by Floyd Zaiger (patented), licensed by Dave Wilson Nursery
- Rich flavor (taste test winners)
- Require pollenizer – Santa Rosa plum or other pluot
- Give them room to grow!
Cherries

- Most are large, upright trees (apical dominance)
- Most require pollinizers (Stella & Lapins are self-fruitful)
- Problems: spotted wing Drosophila, canker diseases, birds
- Varieties ripen late May to mid July
- Great late season fruit
- Problems with codling moth, blight, scab
- Varieties ripen early Sept. to early Nov.
- Self-fruitful and self-unfruitful varieties
Leading Varieties Sold in Marin

Sources of Information:

» Sunnyside Nursery, San Anselmo
» Sloat Garden Center, Novato
» Fruit, Berry and Nut Inventory (3rd ed.), 2001
» Cornucopia II; A Source Book of Edible Plants, 1998
» Dave Wilson Nursery: www.davewilson.com
» The Home Orchard (UC publication), 2007
Topics to be Covered

- Fruit Tree Basics
- Species and Varieties
- **Planting**
- Fruit Tree Growth
- Training and Pruning
- Irrigation and Fertilization
- Fruit Thinning
- Pest Management
Soil Amendments

- Rototill compost in planting area
- No amendments in planting hole
- Uncomposted amendments rototilled months before planting
- Avoid pockets of undecomposed organic matter in heavy soils
- Add mulch or compost to surface
Choosing and Handling Trees

- Bare root cheaper than potted
- Use ½ to 5/8 in. caliper trees
- Avoid drying of bare roots
- “Heel in” bare root trees if planting is delayed
Heeling in
Planting Fruit Trees

- Check roots, cut off dead or damaged
- Hole size: Wide, and deep if compacted
- Plant on mound to keep crown dry
- **Plant high!** – Reduces chances of crown & root rot
  - Graft union well above soil
  - Previous soil line at or above soil level
  - Allow for soil settling
Undercutting the Trees
Planting a Bare Root Tree

- Dig hole to fit roots
- Lightly tamp soil
- Emitters 1 ft. away
Planting a Containerized Tree

Pull out wound roots

Don’t cover soil in pot

Water in
Post-Planting Care

• Head tree at 18-36 in. (bare root only)
• Cut back well-placed laterals to 3-8 in., remove all others
• Paint trunk white
  - Interior latex paint & water, 50:50
  - Entire trunk & 2 in. below soil
  - Prevents sunburn & borers
Pruning a Bare-Root Tree

Branches thinner than 3/16
Branches thicker than 3/16
New Shoots on Branches of Newly Planted Tree
Paint Trunks White
(Hot Climates, Afternoon Sun on Trunk)

To prevent this
Topics to be Covered

- Fruit Tree Basics
- Species and Varieties
- Planting
- **Fruit Tree Growth**
- **Training and Pruning**
- Irrigation and Fertilization
- Fruit Thinning
- Pest Management
Fruit Tree Terms

• **Rootstock/Stock** – tree below graft union
• **Scion** – above union; bud or shoot grafted
• **Crown**: trunk below ground (also canopy)
Semi-Dwarf vs. Genetic Dwarf

- **Standard**: 20-25+ ft.
- **Semi-dwarf** (dwarfing rootstock): 12-20 ft.
  - Variable dwarfing
- **Genetic dwarf** (std. rootstock): 8-12 ft.
  - Available in apricot, apple, olive, peach, nectarine, pomegranate
  - Selection of varieties is limited
  - Not available in citrus, fig, pear, persimmon, plum/pluot
**Grandpa’s Typical Rootstock choices:**

<table>
<thead>
<tr>
<th>Rootstock Type</th>
<th>Percent of Standard-Seedling Tree</th>
<th>Approximate Tree Height: When Full Grown</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard or Seedling Root</td>
<td>100%</td>
<td>20-25 feet</td>
</tr>
<tr>
<td>Semi-Standard Root</td>
<td>60-85% range</td>
<td>12-15 feet</td>
</tr>
<tr>
<td>Semi-Dwarf root</td>
<td>50% range</td>
<td>10-12 feet</td>
</tr>
<tr>
<td>Dwarf roots</td>
<td>30-40% range</td>
<td>6-10 feet</td>
</tr>
</tbody>
</table>

### Apples Rootstocks:
- Seedling (not offered)
- B 118, M 111 & M 106
- M 7, Geneva™ 30
- M 26
- M 9 & B 9

### Pear Rootstocks:
- Seedling
- OHxF 97 & OHxF 87
- Pyro-Dwarf®

### Cherry Rootstocks:
- Mazzard
- Mahaleb, MxM® 60, Gisela® 6
- Gisela® 5
Genetic Dwarf Peach/Nect.
More Fruit Tree Terms

- **Scaffold branch**: main structural limb
- **Spur**: short fruiting twig
- **Shoot**: current season elongated growth
- **Water sprout**: vigorous shoot from branch
  - **Sucker**: shoot from rootstock or roots
Peach Fruiting Branches

Veg. bud

Flower buds
Summer Pruning of Young Trees

- **Purpose**: promote scaffold branches
- Head unwanted shoots to 4-6 in.
- Pinch 2 ft. long shoots to promote side branching if necessary
- Reduces training time, shortens time to first fruit production
Summer Pruning for Training
(Open Center)

Before

After
Summer Pruning of Mature Trees

- Purpose: To increase sunlight & productivity of lower fruiting wood
- Remove unwanted vigorous, upright shoots 1-2 times during season
- Bring down tree height
- Large branches may sunburn if pruning is excessive
Summer Pruning
(Plum)

Before

After
Prune Apricots and Cherries in August to Avoid Branch Diseases
Specific Fruit & Nut Tree Training Methods

- Open center
- Central leader
- Modified central leader
- Perpendicular “V”
- Fruit bush
- Espalier
Open Center

- Most common method
- Stone fruits and almonds; also use for apples, pears, figs
- Select scaffolds during first 2 growing seasons, touch up in dormant season
- Keep center open during summer from the start
Pruning a One-Year-Old Peach
Pruning a Two-Year-Old Peach
Pruning a Mature Peach
Tying Open Center Peach Tree
Specific Fruit & Nut Tree Training Methods

- Open center
- **Central leader**
- Modified central leader
- Perpendicular “V”
- Fruit bush
- Espalier
Central Leader Apple
(Genetic Dwarf, planted 2000)

2004

2013
Central Leader Training

- Used for apples, pears, Asian pears
- Maintain leader, remove at certain height
- Tie or stake lateral branches outward
- Create 3-4 whorls of branches
- Branches offset from those below
Central Leader Training
Spread branches, keep leader dominant
Persimmon (FOHC) Central Leader
Specific Fruit & Nut Tree Training Methods

- Open center
- Central leader
- Modified central leader
- Perpendicular "V"
- Fruit bush
- Espalier
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
Vigorous Growth – Extra Work
Apricot, Plum/Pluot Fruit Bushes
Vigorous Growth
Fruit Bushes

- **Advantages**
  - Tree maintenance without ladder
  - Trees for small spaces
  - Sequential ripening

- **Disadvantages**
  - Less fruit
  - No shade
  - Timing of pruning critical
Key Summer Pruning Missed
Specific Fruit & Nut Tree Training Methods

- Open center
- Central leader
- Modified central leader
- Perpendicular “V”
- Fruit bush
- Espalier
Espalier Pruning
Growing Season

Source: Pruning and Training (Amer. Hort. Soc.)
Dormant Pruning

Before

After
Espalier
Menorah Shape
Dwarf Citrus Espalier (Mandarin)
Espalier Peach
Pruning Overgrown Trees
Methods of Reducing Height of Large Trees

1. Cut to desired height in thirds over 3 years
   - Thin upright shoots in summer to provide light for lower fruiting wood
Pruning Overgrown Apple

What else can be done?
Methods of Reducing Height of Large Trees

1. Cut to desired height in thirds over 3 years
   - Thin upright shoots in summer to provide light for lower fruiting wood

2. Bring down height in one year
   - Saw off limbs well below desired height
   - Leave one “nurse” limb to feed roots
   - Thin new shoots, train tree as desired
   - Paint exposed limbs white
Pruning Overgrown Apple – One Year

1999
Topics to be Covered

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- Irrigation and Fertilization
- Fruit Thinning
- Pest Management
Irrigation

- Best = drip and microsprinkler irrigation
- Also, furrow, doughnut ring, sprinkler
- Worst = in a lawn
- Water should reach at least 2 ft. deep
- A 2-year-old tree can use about 2 gal./day
- A mature tree can use >50 gal./day
Drip Irrigation

Mulch pulled back
Second Drip Line Added
(Inline emitter tubing)
Microsprinkler
Fertilization

• Don’t overfertilize! Little N required.
• Use no more than 1 lb. actual N per year on mature trees
• Too much N → excessive growth, shading of lower wood
• Other nutrients usually sufficient
• Use organic amendments
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- Fruit Tree Basics
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- Fruit Thinning
- Pest Management
Fruit Thinning

Before

After

Harvest
Reasons for Fruit Thinning

- Increases fruit size
- Improves fruit color
- Reduces diseases (esp. brown rot)
- Reduces alternate bearing
- Reduces limb breakage
Methods of Fruit Thinning

• Hand thinning
  ➢ Most thorough but time consuming
  ➢ Selectively eliminate small, damaged fruit

• Pole thinning
  ➢ Short hose piece on mop handle
  ➢ Quick, but not selective
  ➢ May damage fruit
Fruit Thinning
Timing and Spacing

- **Timing:** ¾ to 1 in. dia. (late April-early May)
- **Spacing**
  - Depends on tree vigor
  - Fruit should not touch at harvest
  - **Peaches:** 5-6 in.  
    **Apricots:** 4-5 in.
  - **Apples:** Thin to 1 fruit per cluster or 6 in.
  - **Pears:** Thin to 1 fruit/cluster (Bartlett – no thinning)
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- Fruit Thinning
- Pest Management
Codling Moth
Eggs and newly hatched larva

Pupating larvae
Codling Moth
Characteristics

- Pest of apple, pear, quince, walnut
- Overwinter as larva in cocoon
- Mating begins during or just after flowering (temp. dependent)
- 2-4 generations per year
- Extremely difficult to control
Codling Moth
Control Methods

- Take what you get, cut damage out
- Remove/destroy infested fruit early
- Bag individual fruits
- Mass trapping of males
- Organic products: Hort. oil, granulosis virus (Cyd-X), spinosad, kaolin clay (Surround)
- Chemical: Sevin (kills beneficials!)
- Good coverage is essential
Pheromone Trap
Pacific Flatheaded Borer

Larva

Adult
Shothole Borer
Borers

Control methods:

» Keep trees healthy

» Prevent sunburn!
  – Paint new trees and exposed branches white
  – Proper dormant & summer pruning
SWD Damage (Maggots) Cherry
Spotted Wing Drosophila
Mostly cherries; also berries & other fruits

- Native to Asia
- Found in Calif. in 2009
- Now endemic
- Infest mature and rotting fruit
- Overwinter as adults
- Active throughout the year
D. simulans/melanogaster

Photos by Martin Hauser, CDFA
Insecticides

- Gardeners have only Malathion and spinosad
- Begin spraying at fruit color change (straw/pink in cherries)
  - No need to spray green fruit
  - Spray before fruit softening
Exclusion
Fair Oaks Horticulture Center
Fire Blight
Shoot dieback

Bark/cambium damage
Fire Blight
Characteristics

• Bacteria – enters through flowers under warm, moist conditions

• Affects apple, pear (esp. Bartlett), Asian pear, flowering pear, quince, loquat, pyracantha, hawthorne
Fire Blight
Control Methods

• Cut shoot or branch 12 in. below infection zone
  » Sterilize shears between cuts (20% solution of bleach)
• Spray copper product twice during bloom
Peach Leaf Curl
Peach Leaf Curl

- Affects peaches, nectarines
- Fungal diseases spread by rain, wind
- Spores overwinter in buds and twigs
Control of Peach Leaf Curl

- Lime sulfur, Microcop no longer available
- Copper sprays
  - Tribasic or basic copper sulfate (hard to find)
  - Copper ammonium complex (e.g., Liqui-Cop)
  - Copper soap (e.g., Concern)
  1. Early Dec.
  2. In Feb. as flower buds swell
- Consider covering trees
## 2012 Peach Leaf Curl Trial
### Treatments and Timings

<table>
<thead>
<tr>
<th>Product</th>
<th>Rate/Gal.</th>
<th>Timing(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lime sulfur - Microcop</td>
<td>1 cup</td>
<td>Dec. 4, Feb. 11</td>
</tr>
<tr>
<td></td>
<td>2 1/3 Tbsp.</td>
<td></td>
</tr>
<tr>
<td>Copper soap</td>
<td>2 fl. oz. (+ oil)</td>
<td>Dec. 4, Feb. 11</td>
</tr>
<tr>
<td>Liquicop</td>
<td>1 fl. oz. (+ oil)</td>
<td>Dec. 4, Feb. 11</td>
</tr>
<tr>
<td>Agribon (fabric)</td>
<td>AG-30, doubled</td>
<td>Before rains</td>
</tr>
<tr>
<td>Agribon + Liquicop</td>
<td>Same as above</td>
<td>Dec. 4, Feb. 11</td>
</tr>
<tr>
<td>Maxicrop (kelp extract)</td>
<td>1.7 oz.</td>
<td>Feb. 20 Mar. 2, 8, 12, 15, 26, 28</td>
</tr>
</tbody>
</table>
Individual Branches Treated

Sprayed individual branches
Agribon on branch at home

Untreated
Lime sulfur – Microcop
2012 Peach Leaf Curl Trial
Conclusions

- Lime sulfur (late fall) and Microcop (late winter) was very effective in reducing severity.
- Agribon + Liquicop was at least as effective as lime sulfur - Microcop.
- Copper soap, Liquicop, and Agribon were somewhat less effective than lime sulfur/ Microcop, but still provided 60-80% control compared to untreated branches.
- Maxicrop vs. untreated (not shown): Nearly equal incidence in all 4 varieties tested, and Maxicrop increased severity in 3 of the 4 varieties.
Brown Marmorated Stink Bug
(Halyomorpha halys)

Photos: Baldo Villegas
Brown Marmorated Stink Bug
(*Halyomorpha halys*)

- Native to East Asia (China, Japan, Korea, Taiwan)
- A crop pest in its native range and here
- Household nuisance pest in fall, winter
- Host list currently 170 spp., likely to rise
Current distribution in USA

Source - http://www.stopbmsb.org
T. Leskey, USDA-ARS May, 2012
BMSB Finds in California

Also:
Butte
Monterey
Yolo
San Luis Obispo
Siskiyou
Sutter

Source - CDFA Plant Health and Pest Prevention Services Database, 2010
BMSB Finds in Sacramento County

Oct. 15, 2013

Jan. 1, 2014

cesacramento.ucanr.edu
Actual adult size 1/2 to 5/8 inch

Two white bands on antennae

Banded legs

Rust color with broad brown markings

Smooth “shoulder” edges

Banded abdominal edge extending beyond wings

Mature nymph (5th instar)

Photo: UC IPM
Eggs (20-30) & nymphs

Nymph (3rd of 5)

Adult
Some Other True Bugs

- Rough stink bug
- Red shouldered stink bugs
- BMSB
- Consperse stink bug

Photos: UC IPM
Host Plants

Crops

- Stone fruits (esp. peach), pome fruits, citrus, persimmon, fig
- Berries
- Grapes (not a major host)
- Eggplant, tomato, okra, pepper, corn, beans (esp. soy), cucurbits, sunflower
Host Plants
Selected Ornamentals

- Catalpa
- Chinese pistache
- Elm
- Maple
- Holly
- Mulberry
- Princess tree (*Paulownia*)
- Pyracantha
- Redbud
- Rose
- Southern magnolia
- Tree-of-heaven
BMSB Damage
Adult Aggregation

- Late summer/fall – adults seek overwinter sites in houses, under eaves, in leaf litter
- Annoys residents, odor when disturbed
BMSB
An Arboreal Species
Aggregation Season, Pennsylvania

Photos: Tracy Leskey
Aggregation Behavior

Photos: Tracy Leskey
Questions?
https://cesacramento.ucanr.edu