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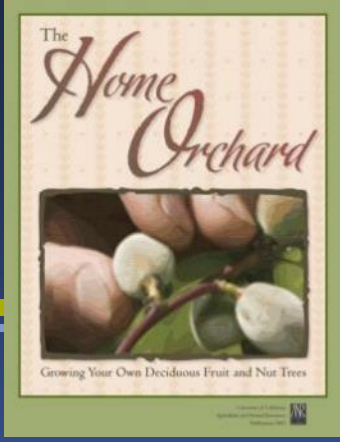

Growing Fruit Trees and Grapes in the Home Garden

Chuck Ingels

UC Cooperative Extension, Sacramento County

Master Gardener Training

Sacramento, Yolo, and Solano

Jan. 21, 2016

Topics to be Covered

- Fruit Tree Basics
- Planting
- Fruit Tree Growth
- Training and Pruning
- Irrigation and Fertilization
- Fruit Thinning
- Pest Management

Topics to be Covered

- **Fruit Tree Basics**
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- Fruit Tree Growth
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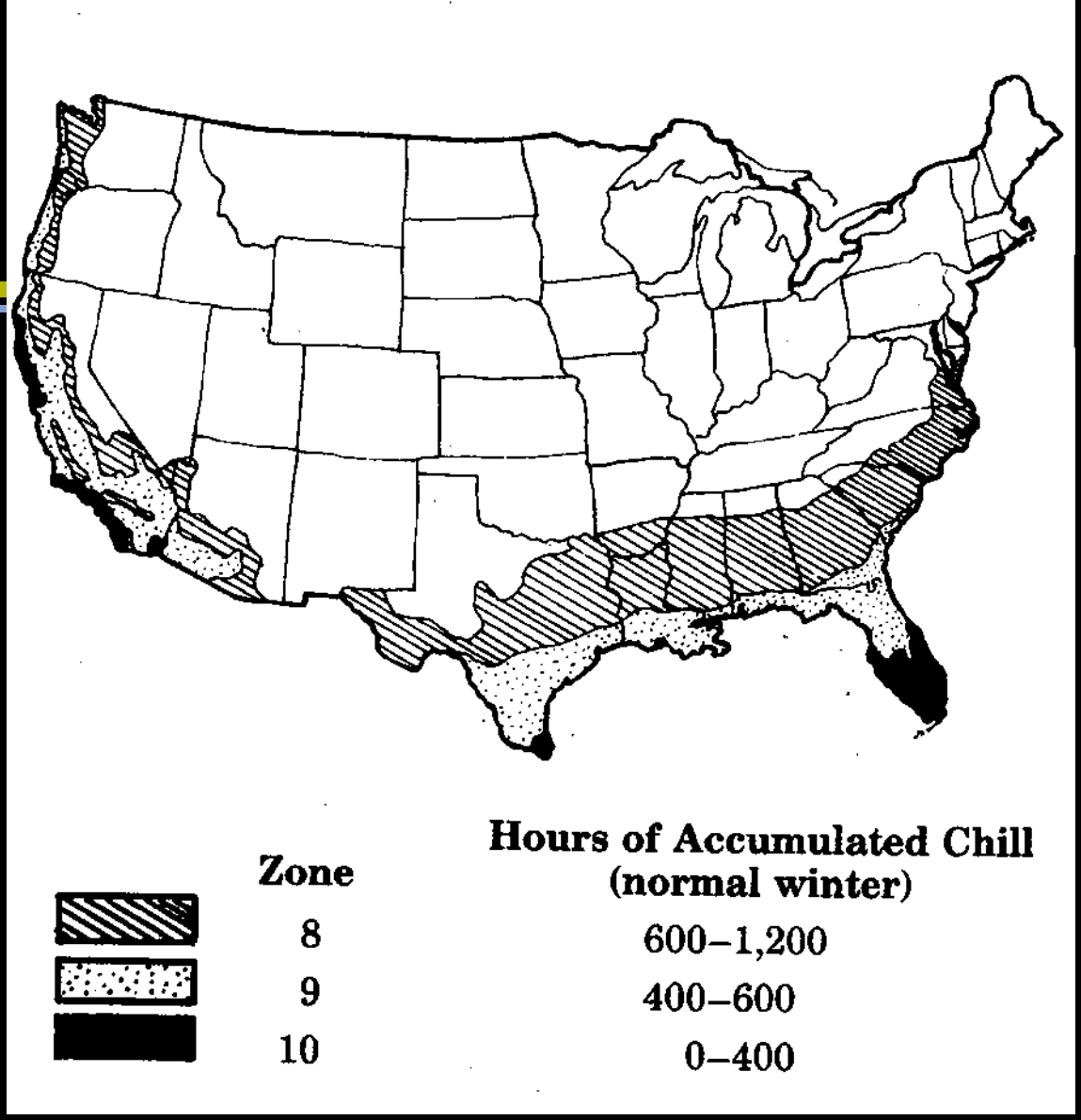
Chilling Requirement

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

Extended bloom increases time pathogens may enter flowers



Three zones with low-chill winters

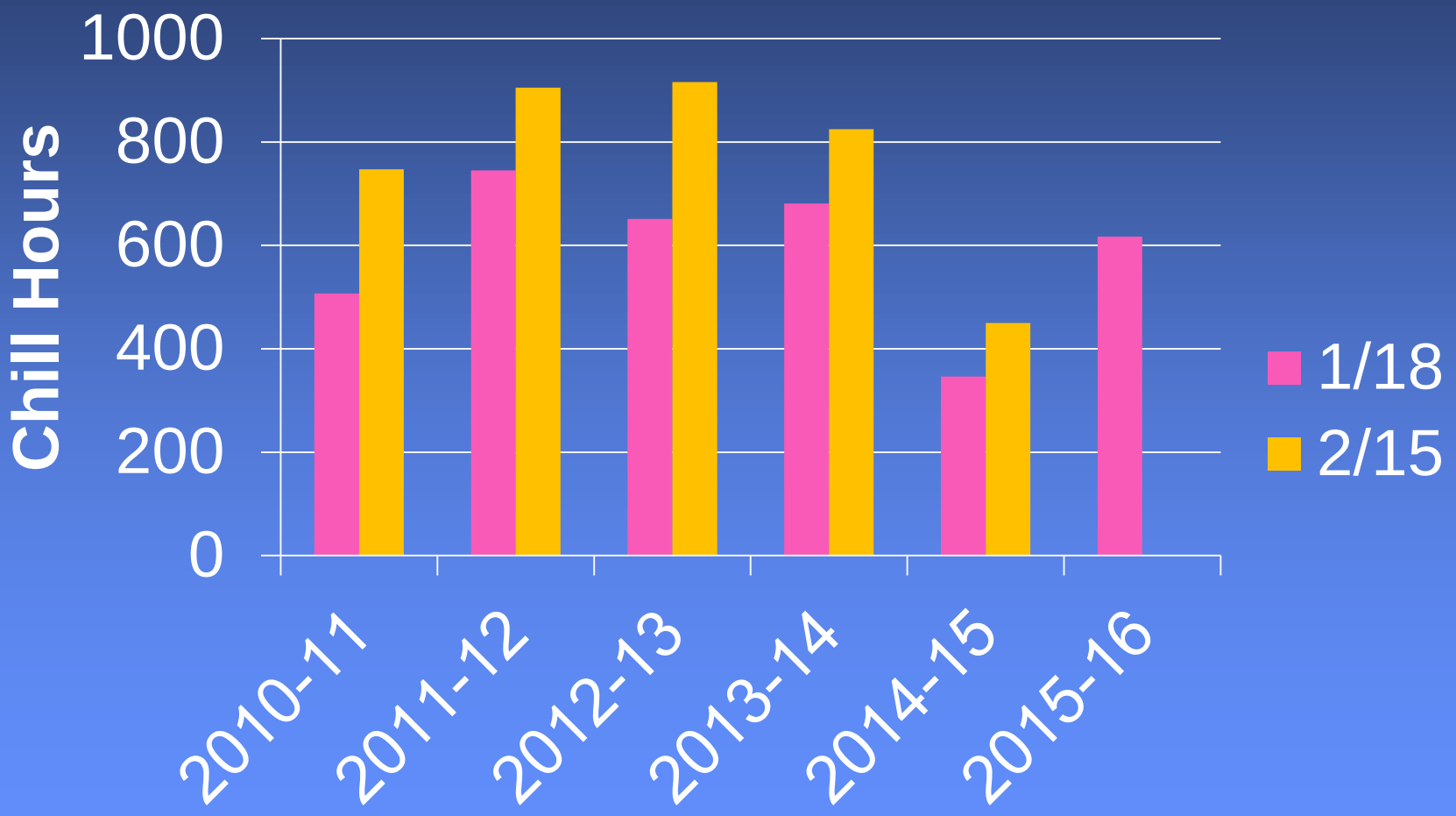
Chilling Hour Requirements
(Newer varieties may have lower requirements)

Almond	250-500
Apple*	500-1000
Apple (low chill)	400-600
Apricot*	300-800
Cherry, sweet	700-800
Fig	100
Peach/nectarine	500-800
Pear*	700-800

Pear (Asian)	350-450
Pecan	250
Persimmon	100-200
Pistachio	800
Plum, European	600-800
Plum, Japanese	700-800
Pomegranate	100-150
Walnut	500-700

Cumulative Chill Hours

CIMIS Station – Fair Oaks

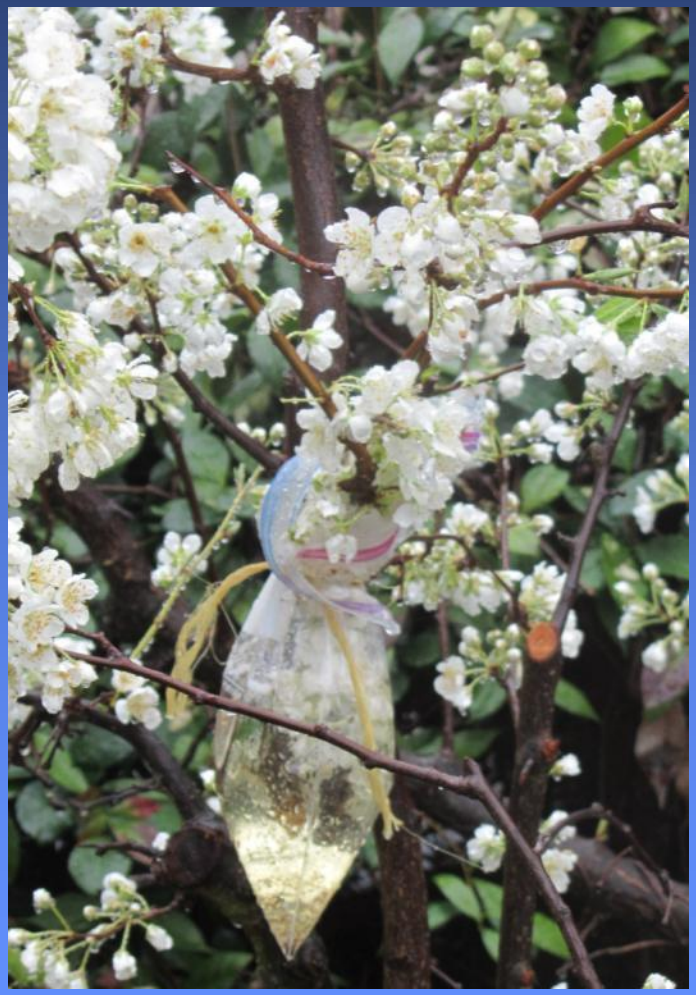


Pollination of Fruit Trees

- 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 Pollenizer Nearby? Plant, Graft, or:



Topics to be Covered

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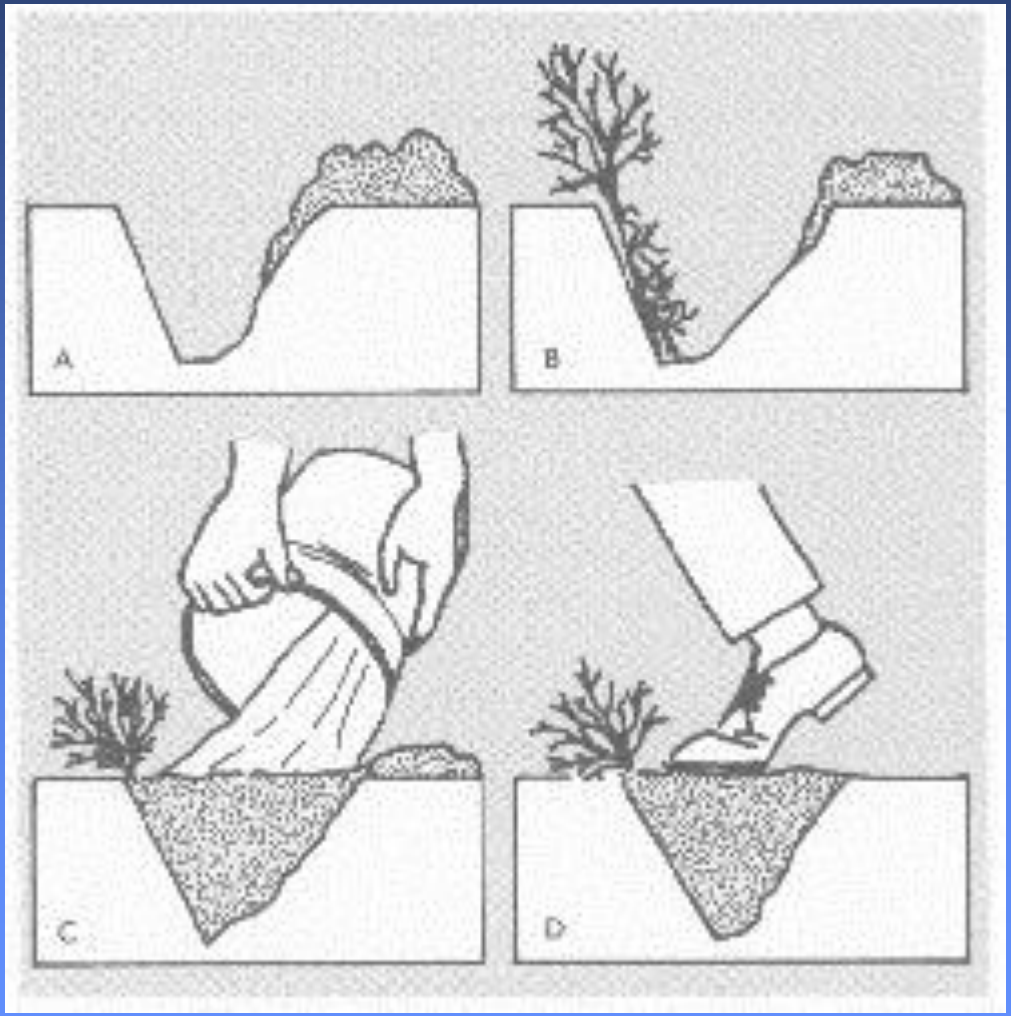
Soil Amendments

- Incorporate compost in planting area
- Uncomposted amendments incorporated months before planting
- No amendments in planting hole
- 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 1/2 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

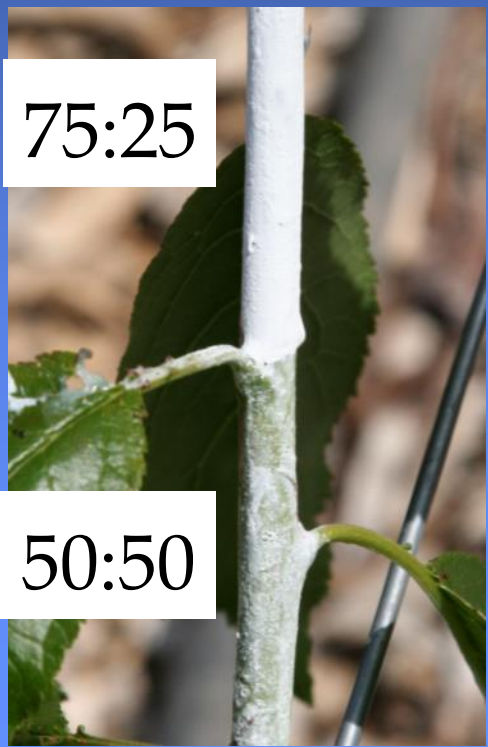
Water in

Don’t cover soil in pot

Pull out wound roots

Post-Planting Care

- Head tree at 18-24 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 (75:25)
  - Entire trunk to 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
- 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

Genetic Dwarf Peach/Nect.

INTERNODE LENGTH

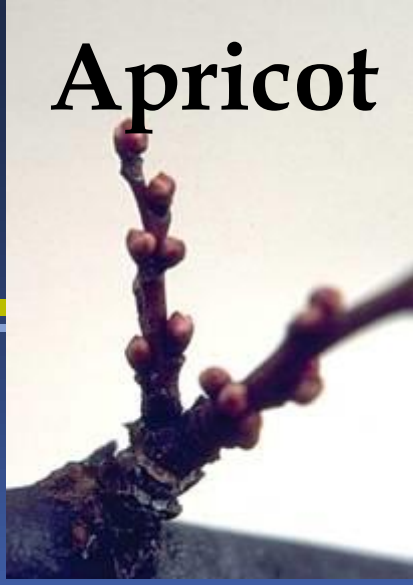
Standard Peach

Genetic Dwarf Peach

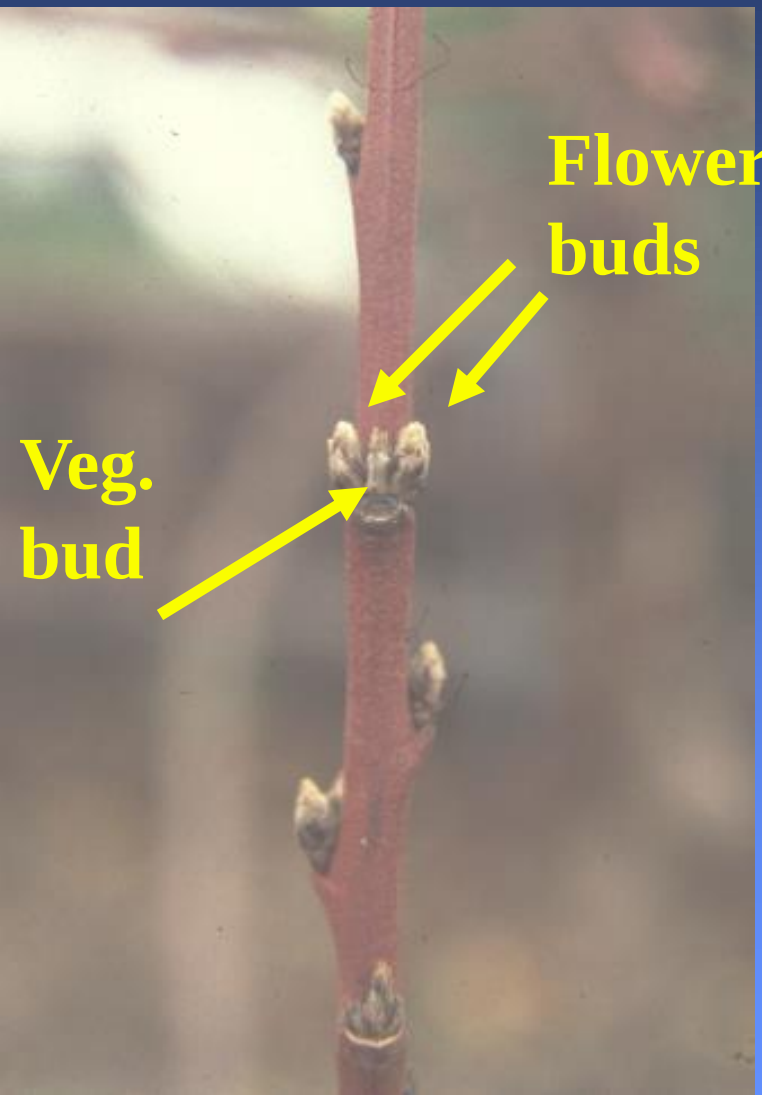
More Fruit Tree Terms

- 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

Spurs



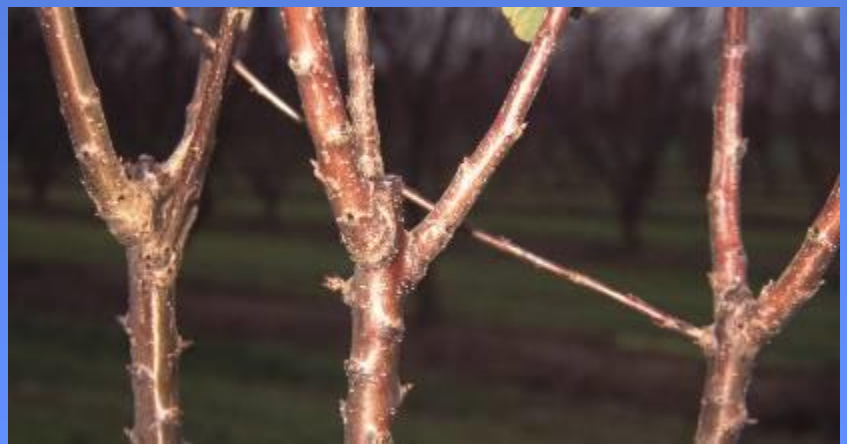
Peach Fruiting Branches



Pruning

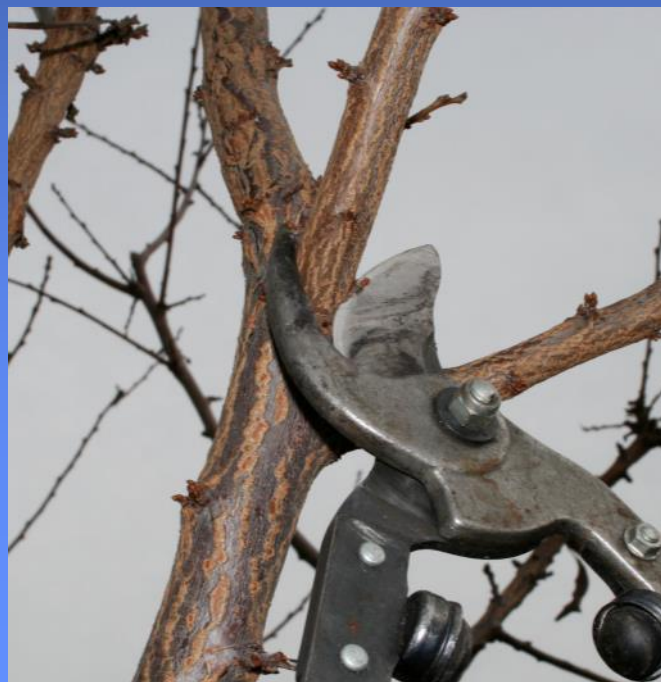
Heading Cut

- 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 Cut

- 1) Removal of entire branch
- 2) A cut to a branch that is >1/3 the thickness of the branch from which it arises
- Used to prevent crowding and improve sunlight penetration
- Defines main branches



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 (Eutypa, others)

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; can 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

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)

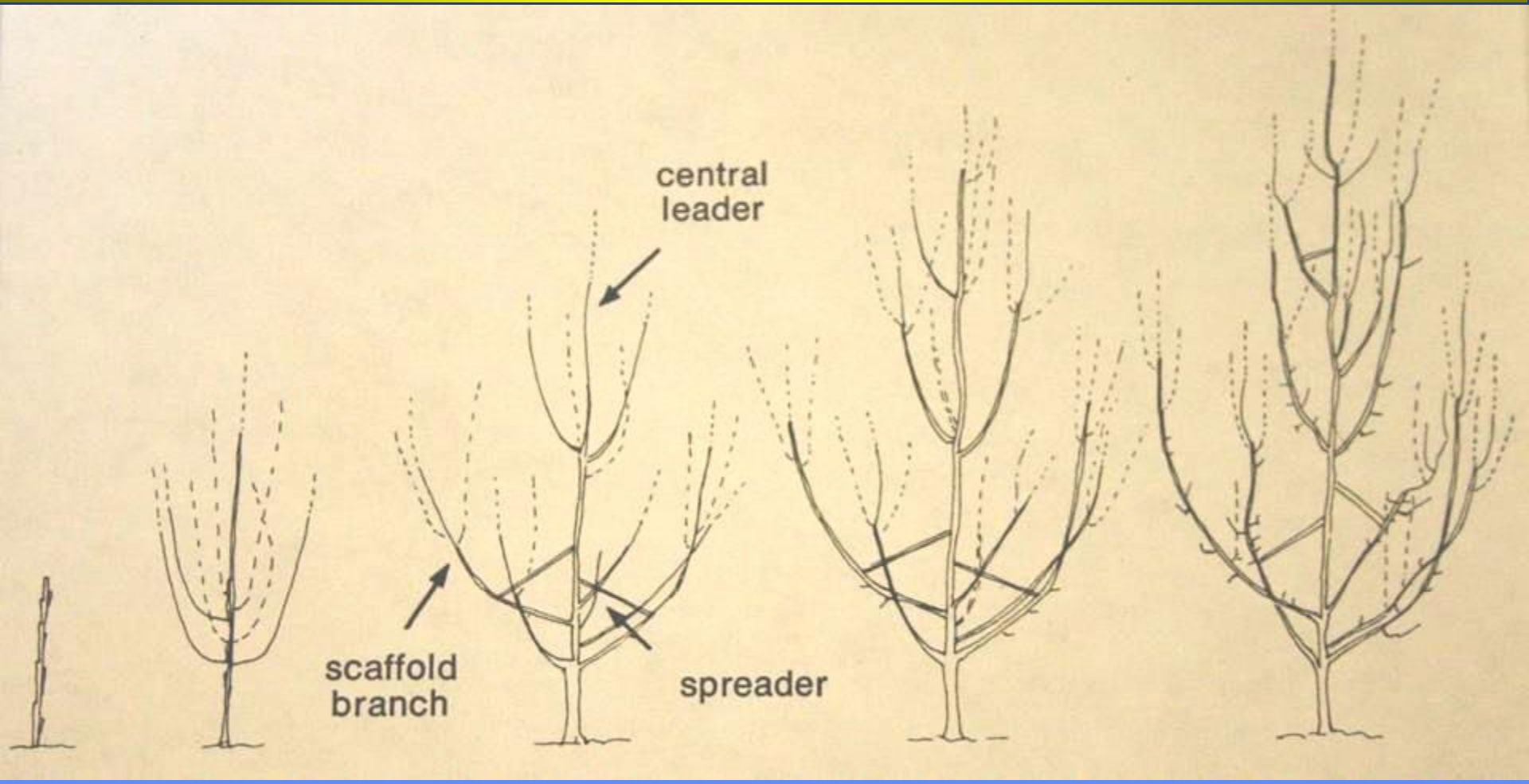
2004

2013

Central Leader Training

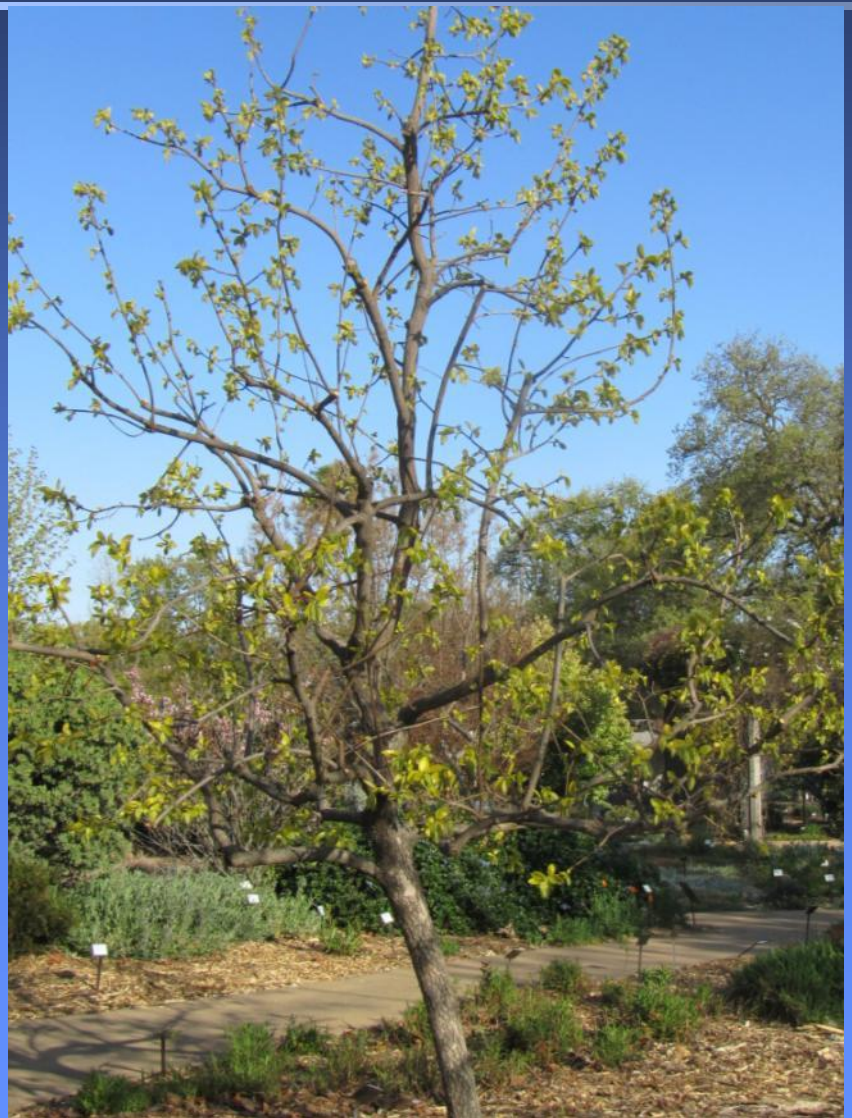
- Used for apples, pears, Asian pears
- Maintain leader, remove at certain height
- Tie or stake lateral branches outward
- Create 3-4 whorls of branches
- Branches offset from those below

Central Leader Training



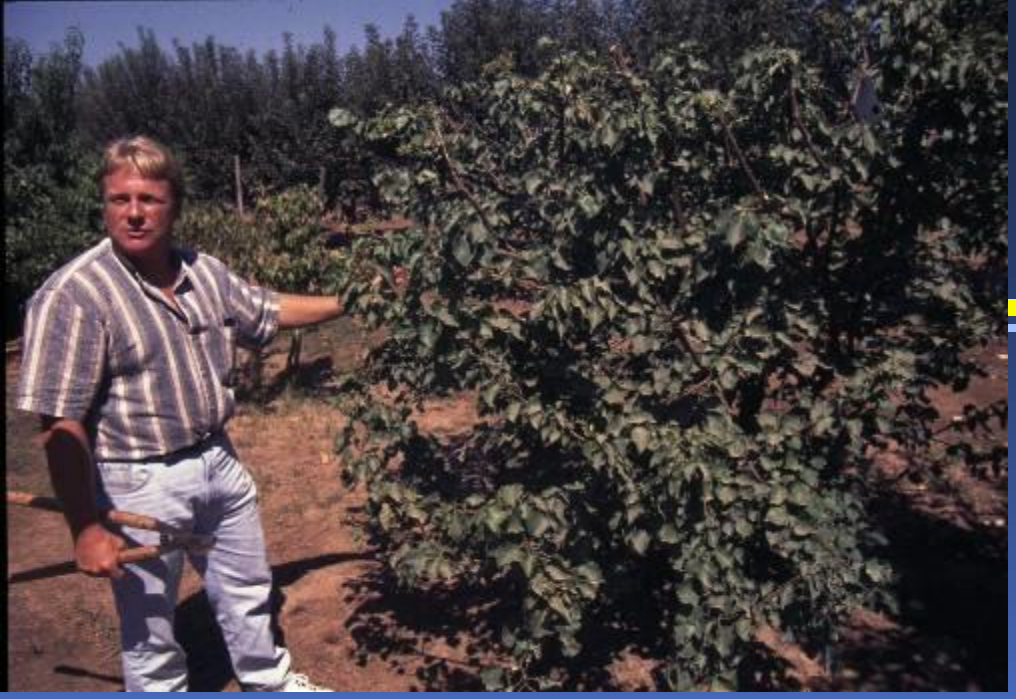
Persimmon (FOHC)

Central Leader



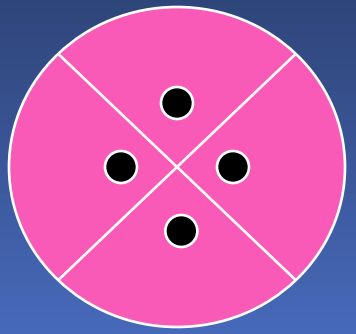
Specific Fruit & Nut Tree Training Methods

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



Fruit Bushes Kept at Desired Height

Fruit Bushes
Configuration & Spacing



- 1, 2, 3, or 4 trees per “hole”
  - 2 or 3 trees – 18” apart
  - 4 trees – 24” apart
- 1 tree planted 4-10 ft. apart (std. = 6-8 ft.)
- Group planted 10-12 ft. apart

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

Vigorous Growth – Extra Work

Fruit Bushes

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

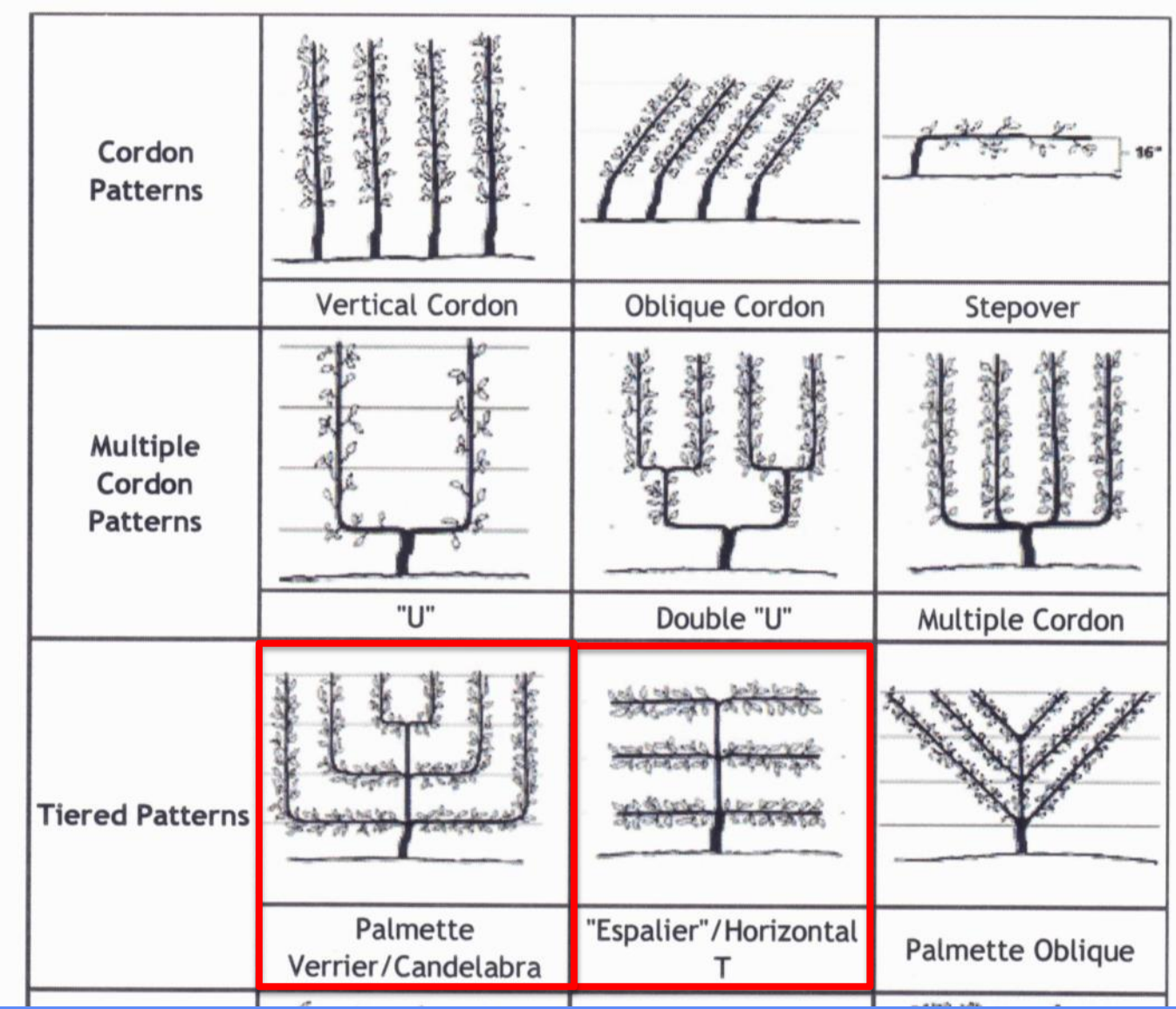
Key Summer Pruning Missed

Specific Fruit & Nut Tree Training Methods

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

Typical Espalier Patterns

Source: EspalierServices.com



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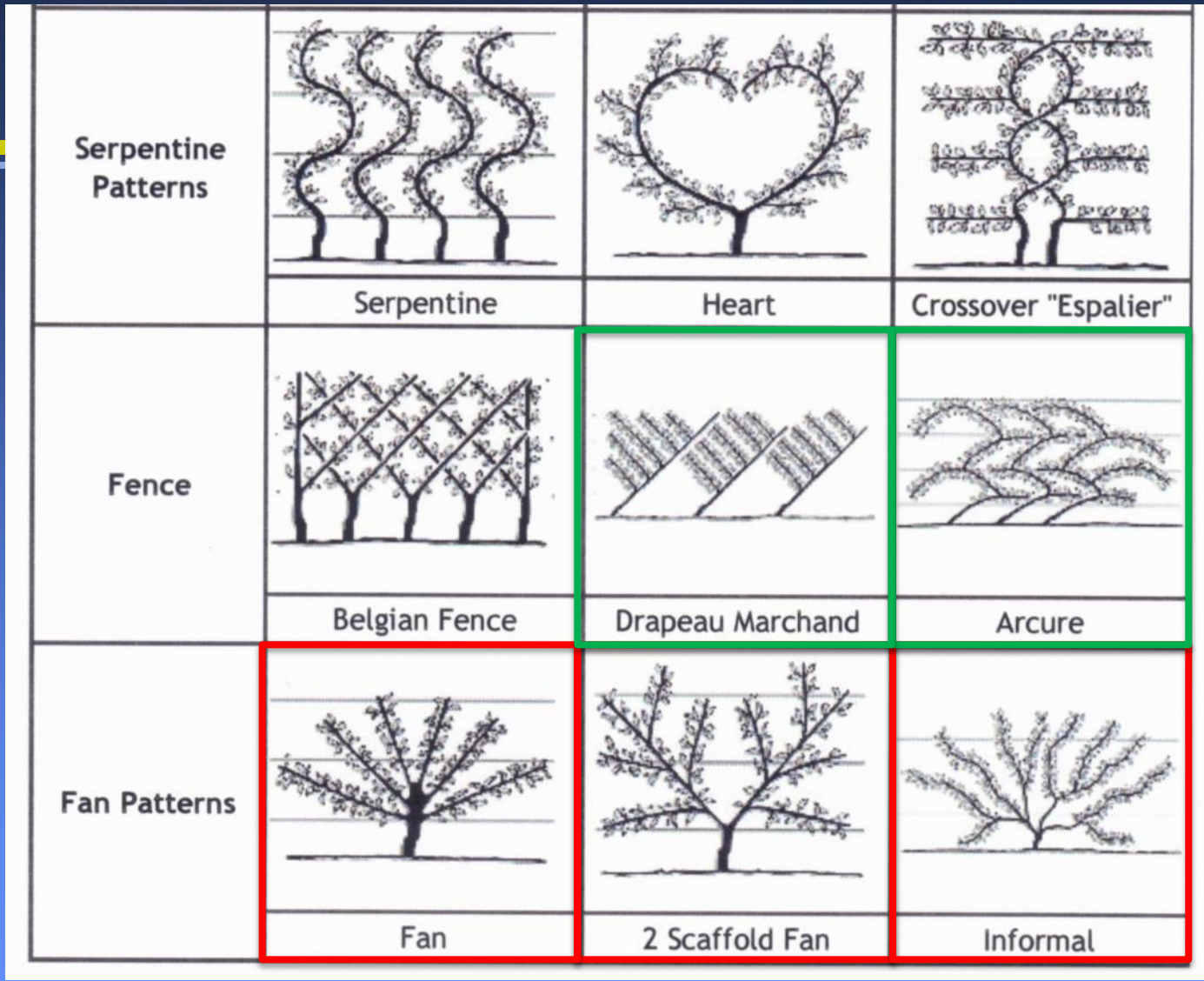
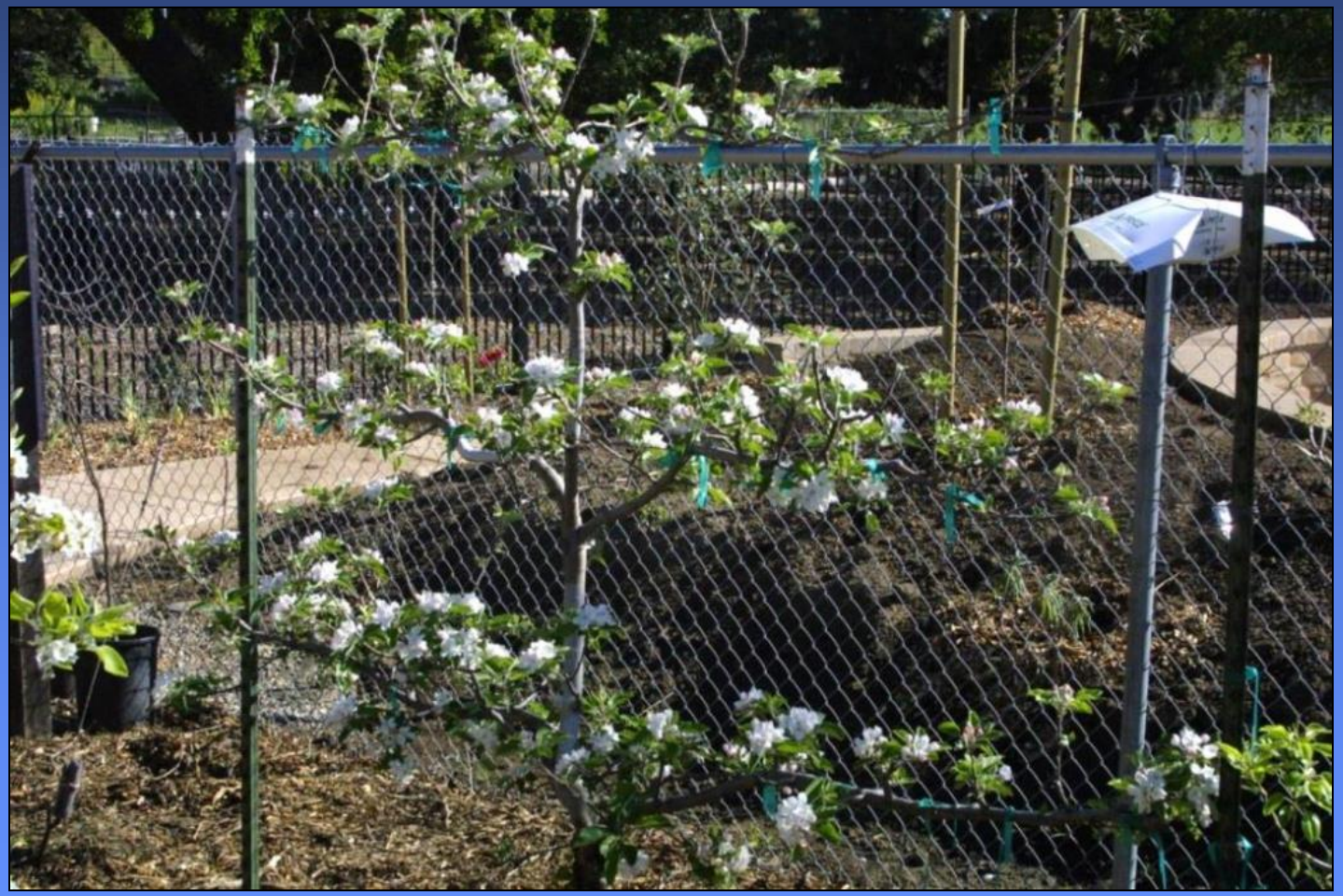


“Espalier” / Horizontal T

Promote Spurs



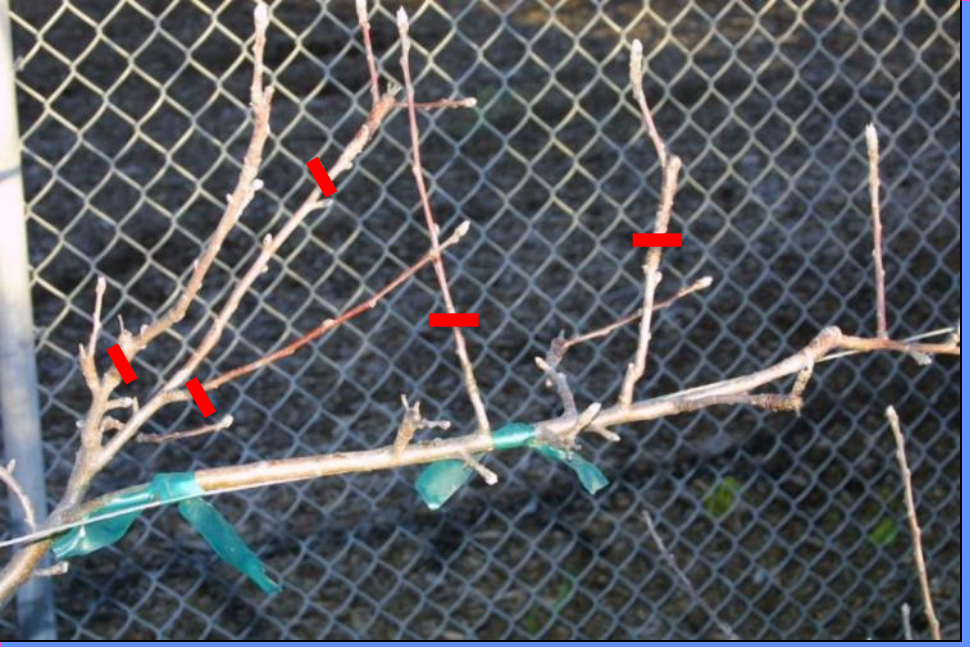
Espalier Pruning

Growing Season

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

Dormant Pruning

Young Espalier



Before

After

Palmette Verrier (Menorah)

Asian Pear: Planted Jan. 2001

Late April, 2002

Late May, 2002

Palmette Verrier (Menorah)

2004

Palmette Verrier (Menorah)

2014

2-Scaffold Fan Peach

Fair Oaks Hort. Center

2013

Peach Cherry

Cherry, Peach Espalier

FOHC, planted Feb. 2013

February

April

Peach Espalier
2013

April

June

July

Peach Espalier

Feb./March 2014

Row cover (Agribon)

Peach Espalier

(1) April 2, 2014

1

2

3

Peach Espalier

(5) July 12, 2014

Before

After

2nd Year: 20 fruits

Peach Espalier

March 2015

August 2015 (205 fruit)

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

1999

2012

2012

Topics to be Covered

- Fruit Tree Basics
- Planting
- Fruit Tree Growth
- Training and Pruning
- **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

- Low volume
- Output: 0.5-2 gph

Mulch pulled back

Second Drip Line Added (Inline emitter tubing)

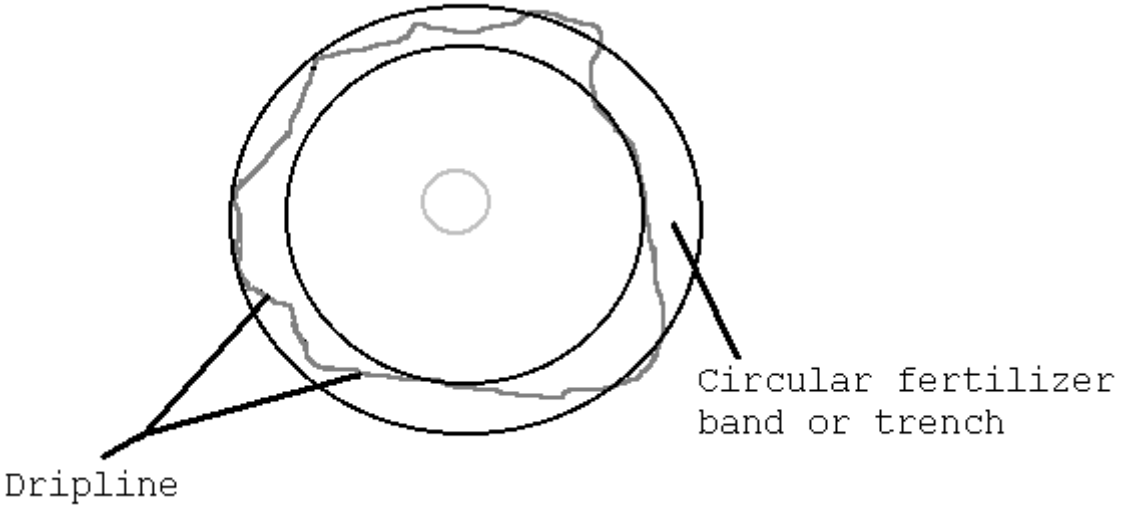
Microsprinkler

- Considered low volume
- Most are adjustable
- Output: ~4-15 gph
- Avoid water hitting trunks

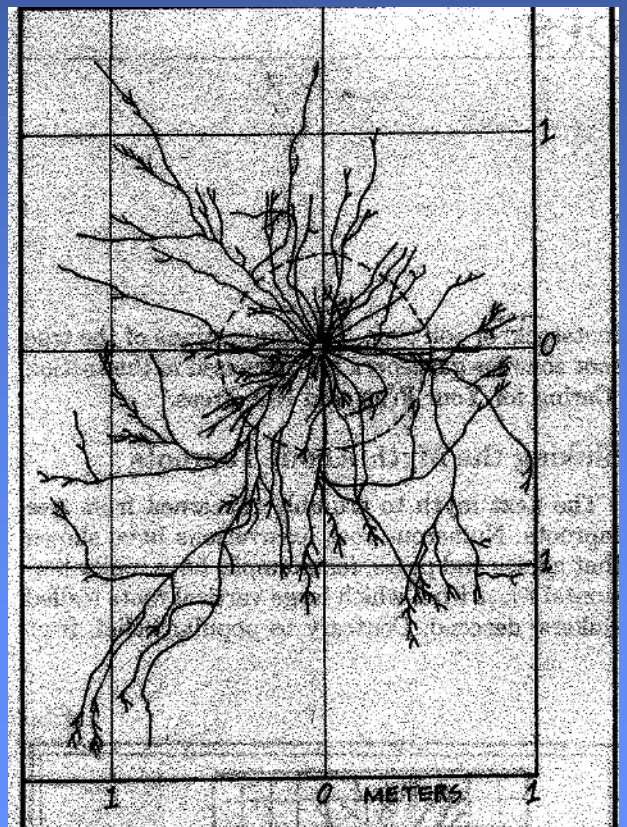
Fertilization

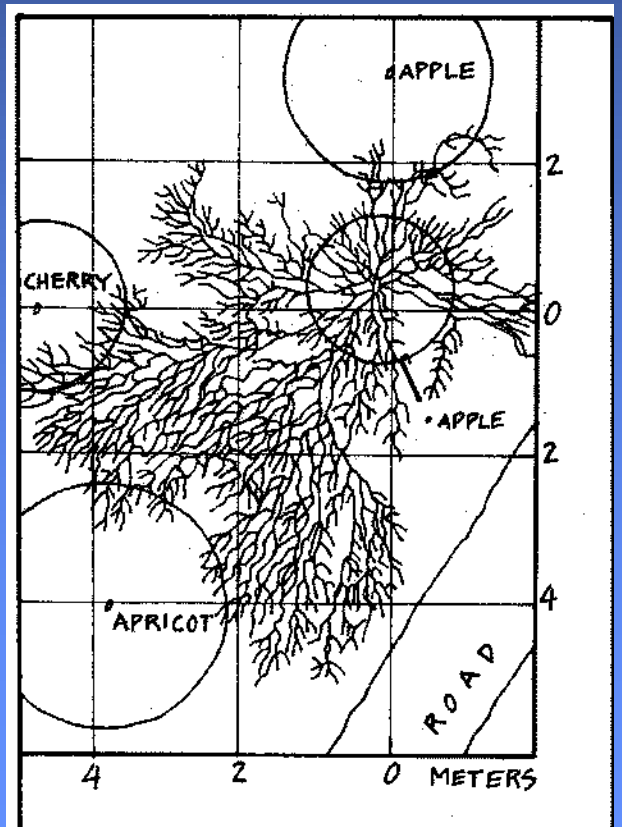
- Don’t overfertilize! Little N required.
- Use no more than 1 lb. actual N per year on mature trees
- Too much N → excessive growth, shading of lower wood
- Other nutrients usually sufficient
- Use organic amendments

Standard Location of Fertilizer Band



Many roots are in the drip line, but many grow beyond it also





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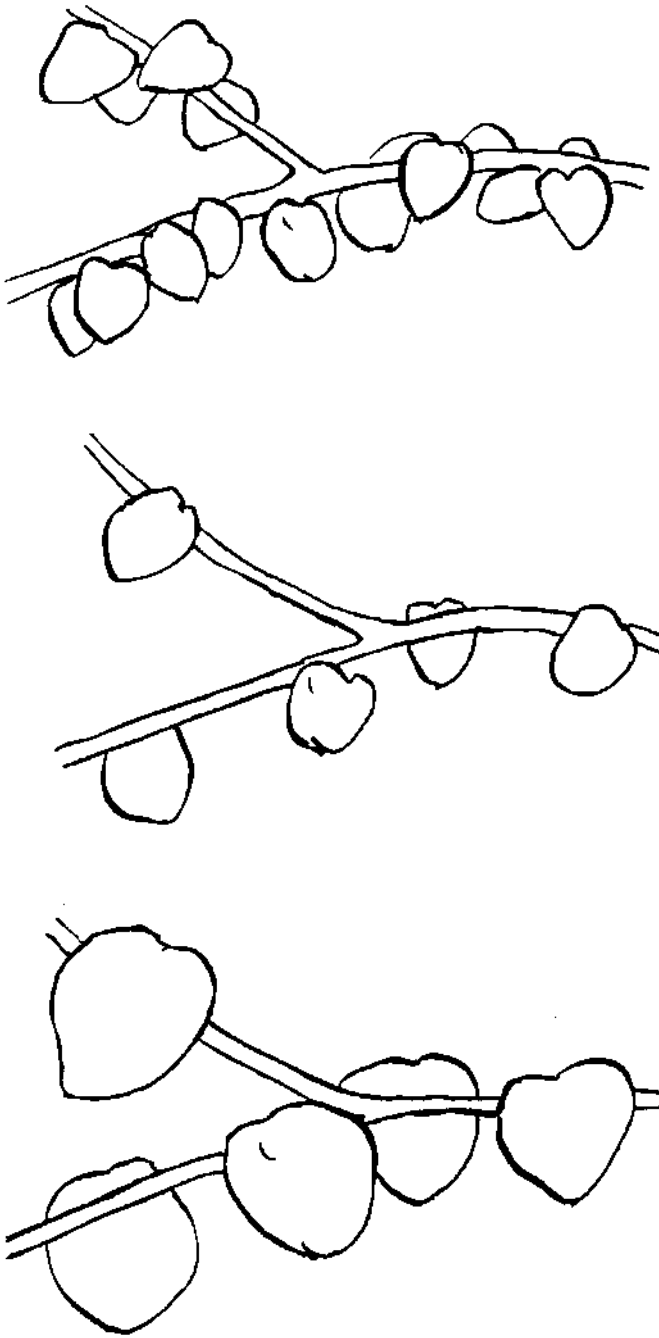
- **Fruit Thinning**
- Pest Management

Fruit Thinning
(Apricot)



Before

After

Harvest

Reasons for Fruit Thinning

- Increases fruit size
- 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: 6 in. Apricots: 5 in.
  - Apples: Thin to 1 fruit per cluster or 6 in.
  - Pears: Thin to 1 fruit/cluster (Bartlett – no thinning)

Topics to be Covered

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

Fire Blight

UC Statewide IPM Project
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Shoot dieback

Bark/ cambium damage

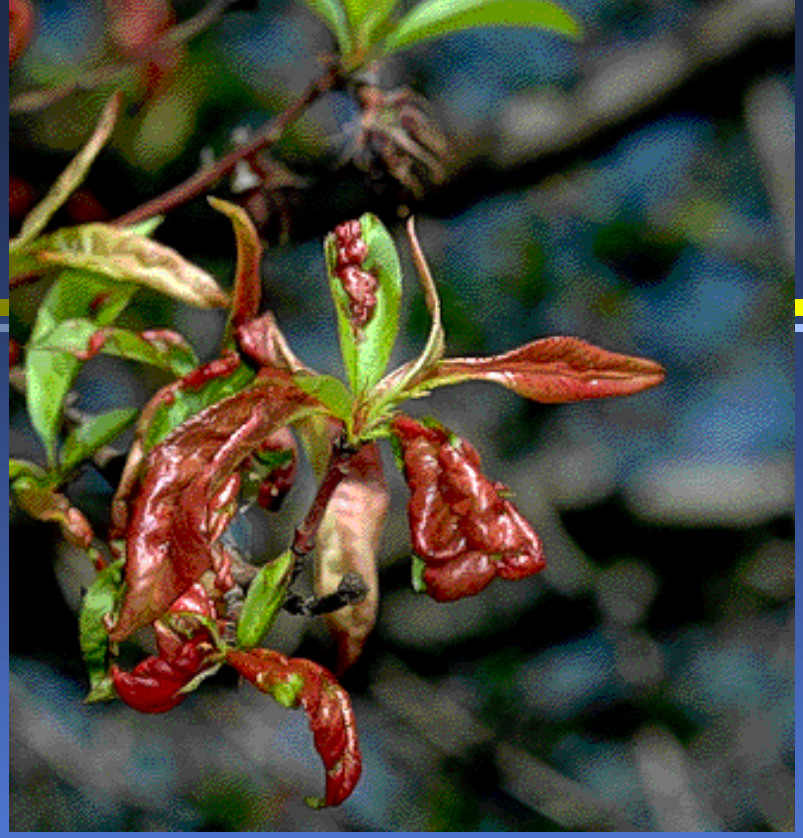
Fire Blight
Characteristics

- 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

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

Individual Branches Treated

Sprayed individual branches

Agribon on branch at home

Untreated

Lime sulfur – Microcop

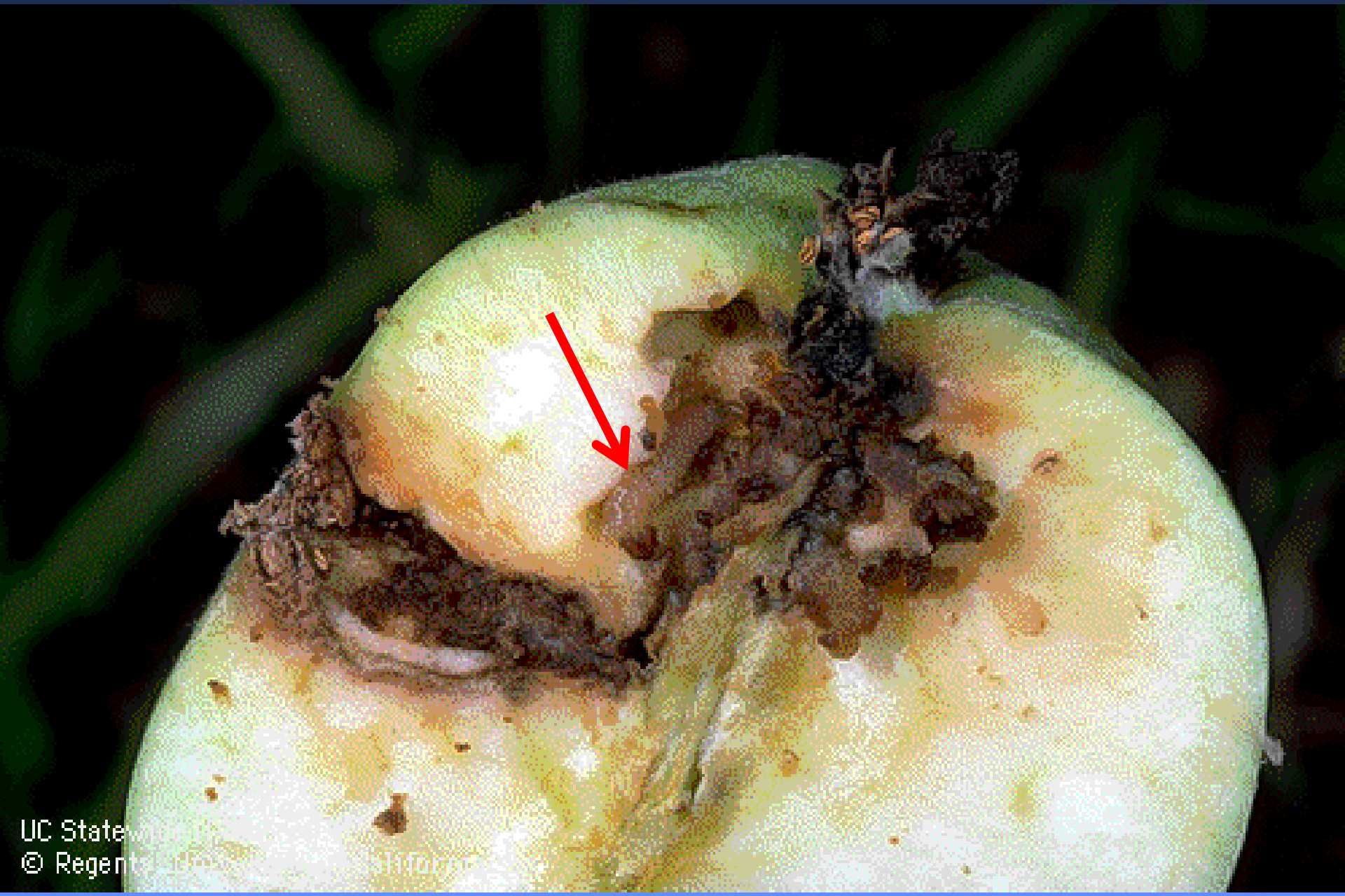
2012 Peach Leaf Curl Trial
Conclusions

- Very effective:
  - Lime sulfur / Microcop
  - Agribon + Liquicop
- Somewhat less effective:
  - Copper soap, Liquicop, and Agribon
  - But still provided 60-80% control
- No effect:
  - Maxicrop

Codling Moth

Eggs and newly hatched larva

Pupating larvae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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

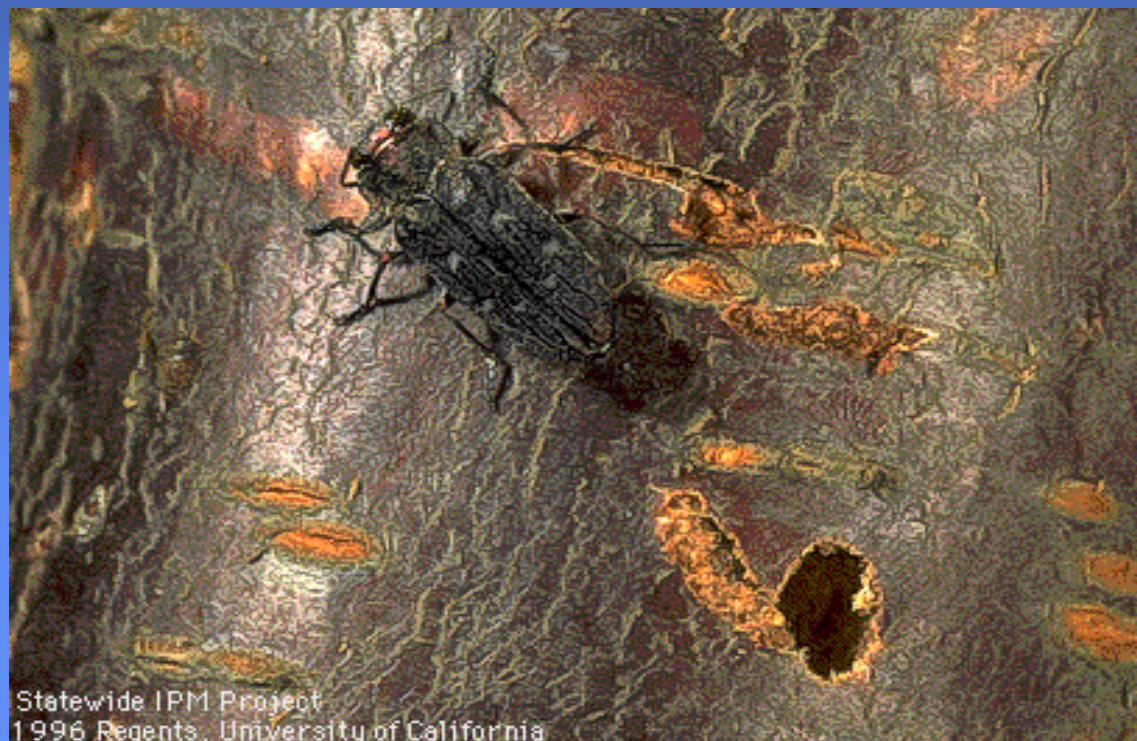
- Take what you get, cut damage out
- Remove/destroy infested fruit early
- Bag individual fruits
- Mass trapping of males
- Organic products: Hort. oil, granulosis virus (Cyd-X), spinosad, kaolin clay (Surround)
- Chemical: Sevin (kills beneficials!)
- Good coverage is essential

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

Frequent Tree Branch Problem

Sample brought in

Frequent Tree Branch Problem

Sample brought in

Photo sent in

Sapsucker Damage

On pear

On grapefruit

Spotted Wing Drosophila

Mostly cherries; also berries & other fruits

male

female

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

SWD Damage (Maggots)

Cherry

Unique Ovipositor

D. simulans/ melanogaster

D. suzukii

Photos by Martin Hauser, CDFA

Spotted Wing Drosophila
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

Questions?

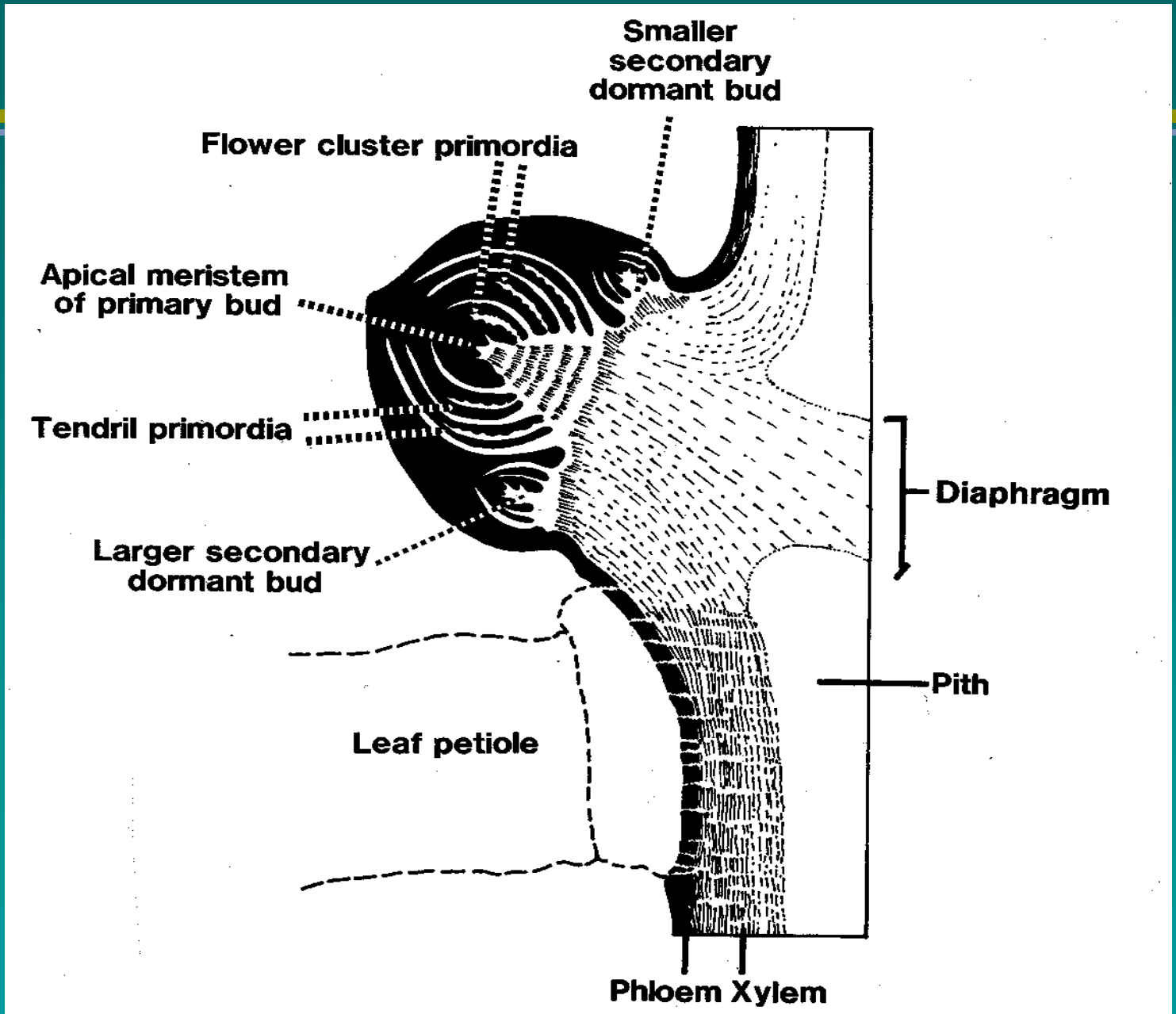
https://cesacramento.ucanr.edu

Growing Grapes in the Home Garden

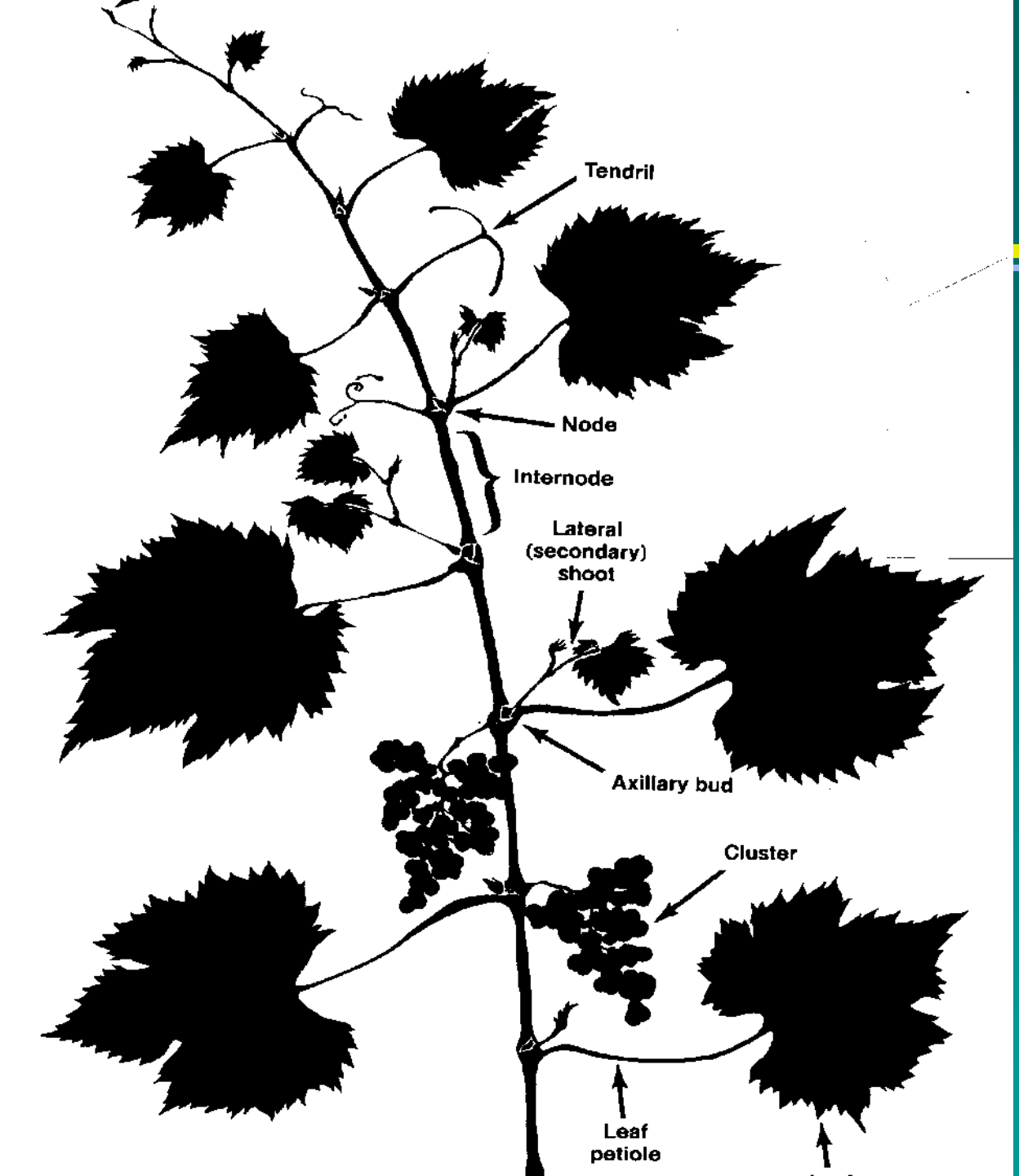
A Few Good Grape Varieties

- Table grape varieties
  - » Thompson Seedless, Flame Seedless, Black Monukka, Fantasy Seedless, Perlette, Diamond Muscat
- Red wine varieties
  - » Zinfandel, Cabernet Sauvignon, Merlot, Pinot Noir
- White wine varieties
  - » Chardonnay, Sauvignon Blanc, Pinot Gris

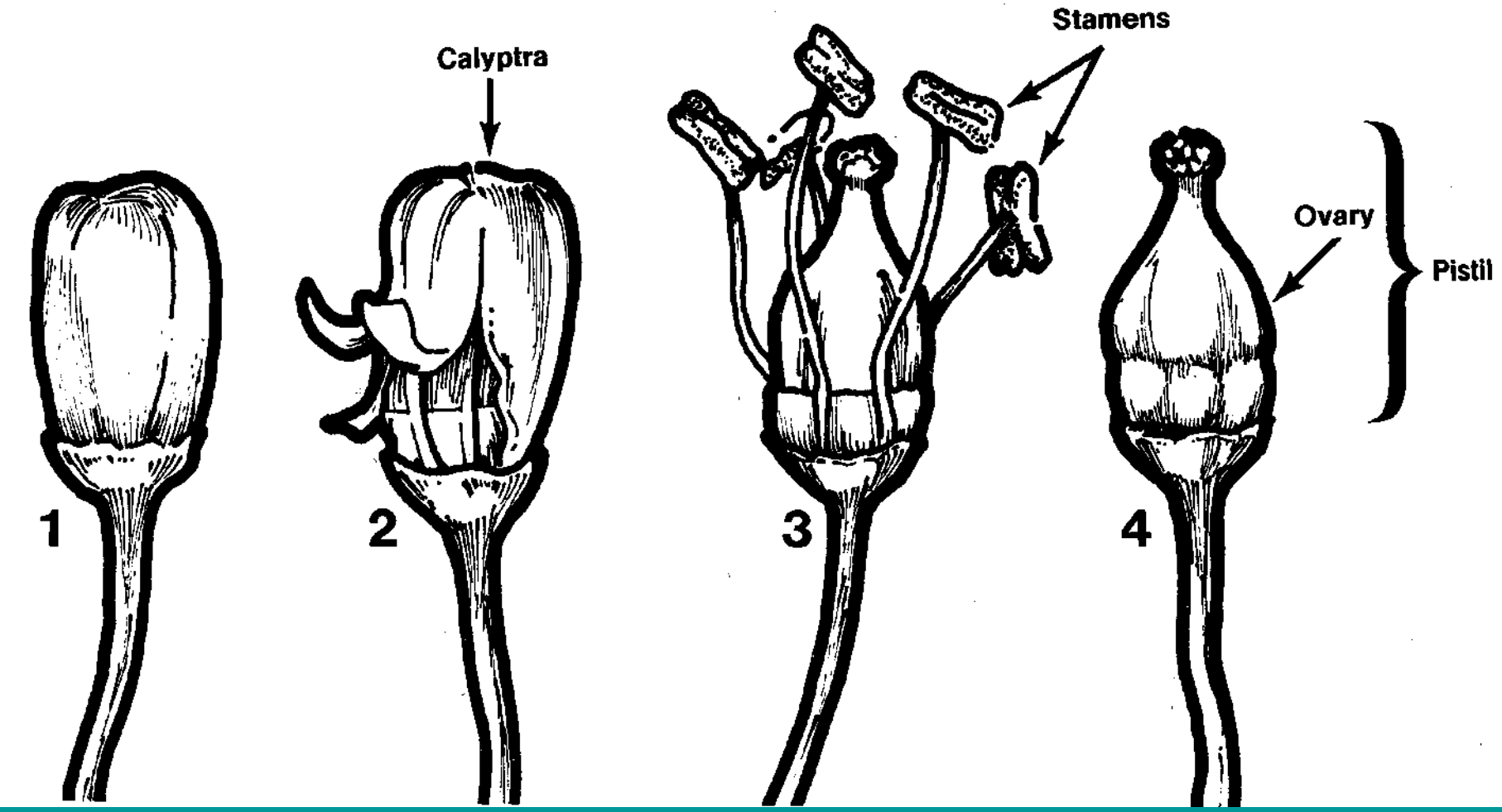
Grape Bud


Smaller secondary dormant bud
Flower cluster primordia
Apical meristem of primary bud
Tendril primordia
Larger secondary dormant bud
Diaphragm
Pith
Leaf petiole
Phloem
Xylem

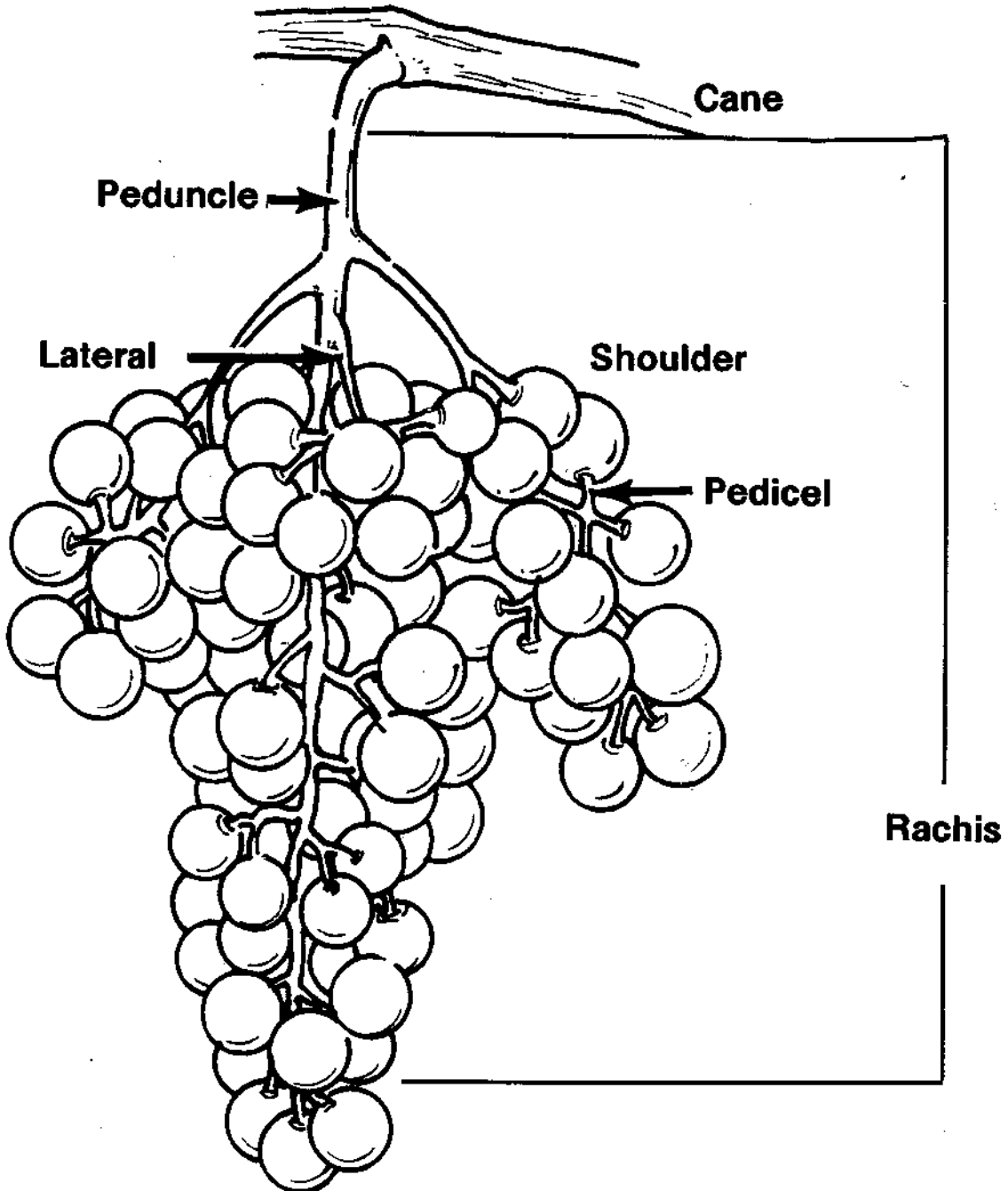
Grape Shoot


Tendril
Node
Internode
Lateral (secondary) shoot
Axillary bud
Cluster
Leaf petiole

Grape Flower



SHOULDERED CLUSTER



Growing Grapes from Cuttings

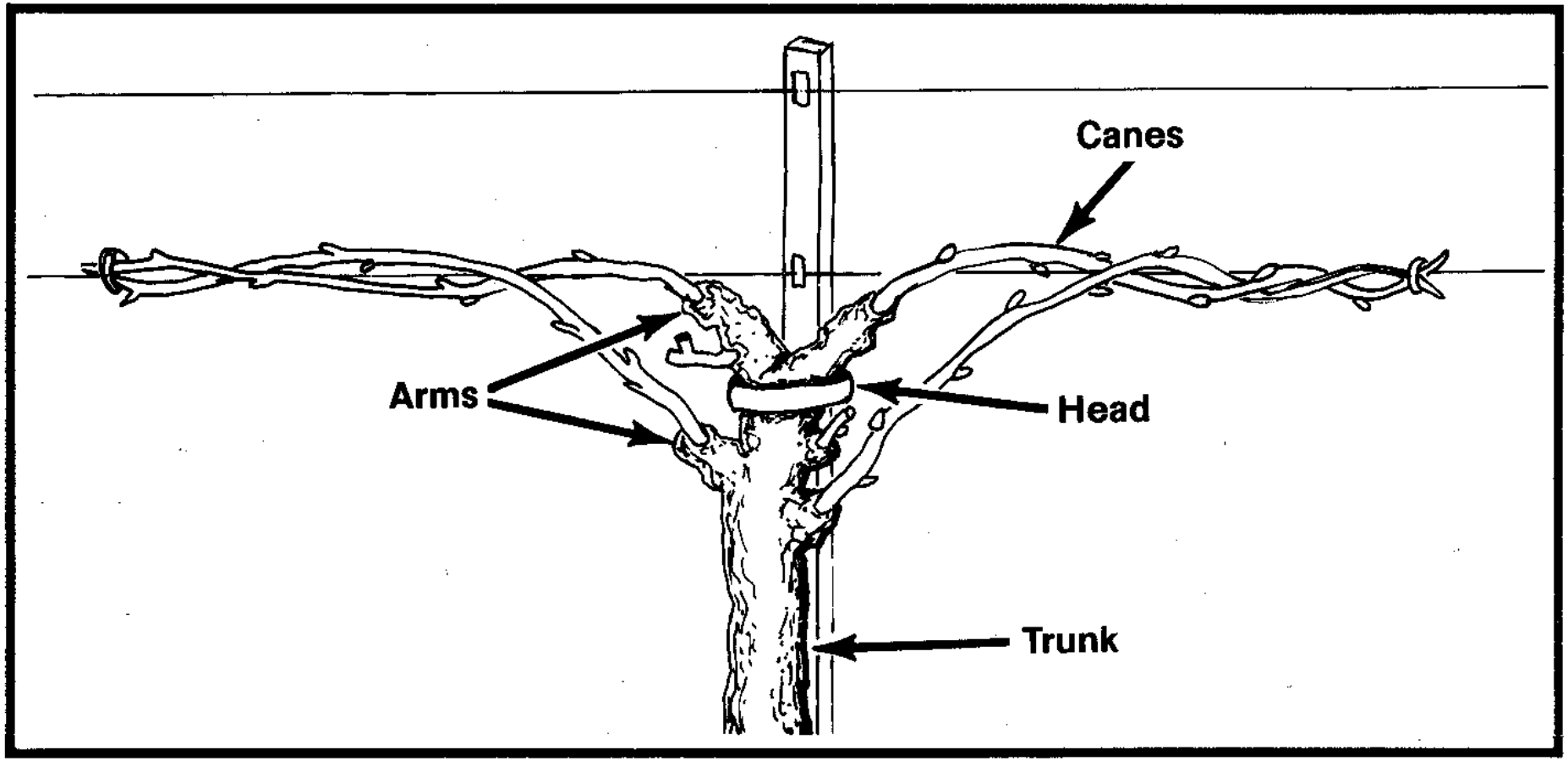
- Take cutting from dormant vine, ½ in. dia.
- Cut to 12-18 in. long
- Cut off all buds but the upper 2
- Stick in loose soil, upper 2 buds exposed

Grapevine Pruning

Grapevine Terms

- Head – upper portion of trunk
- Cordon – permanent branch on wire
- Shoot – current season's growth
- Cane – mature, woody shoot
- Spur – 2-bud section of cane for fruiting
- Arm – old growth of years of spurs
- Tendril – twining organ used for support

Head Training, Cane Pruning



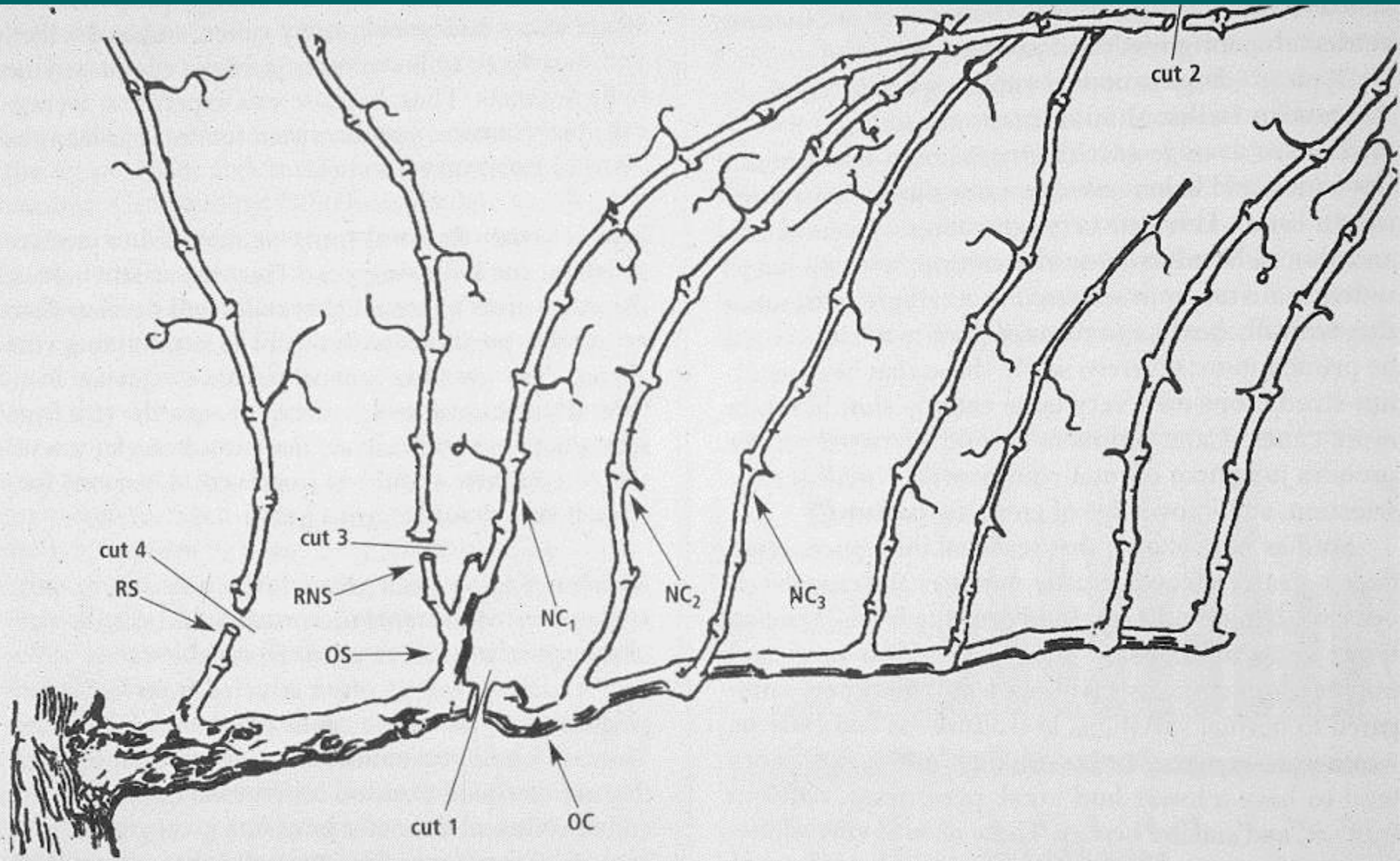
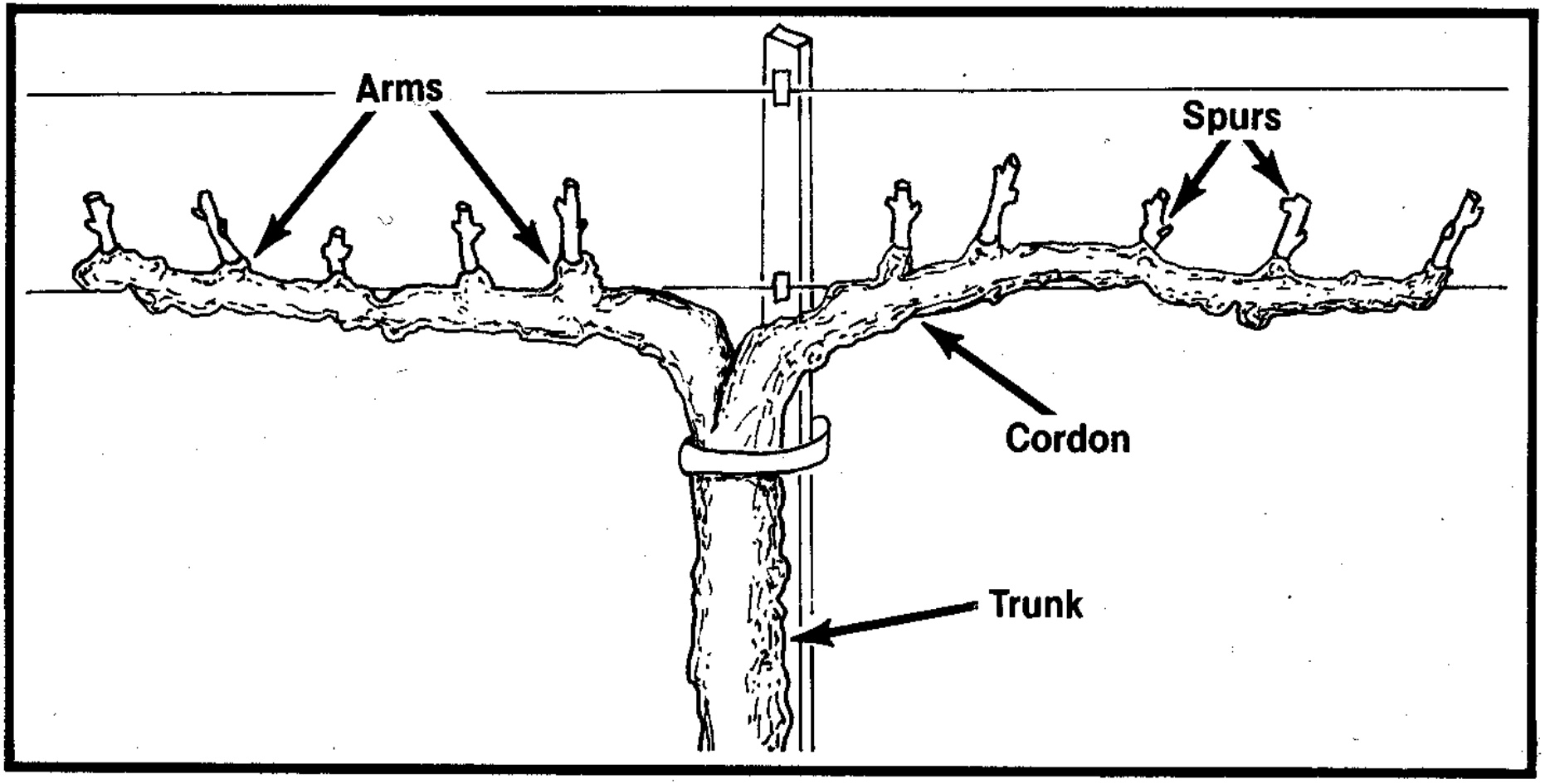


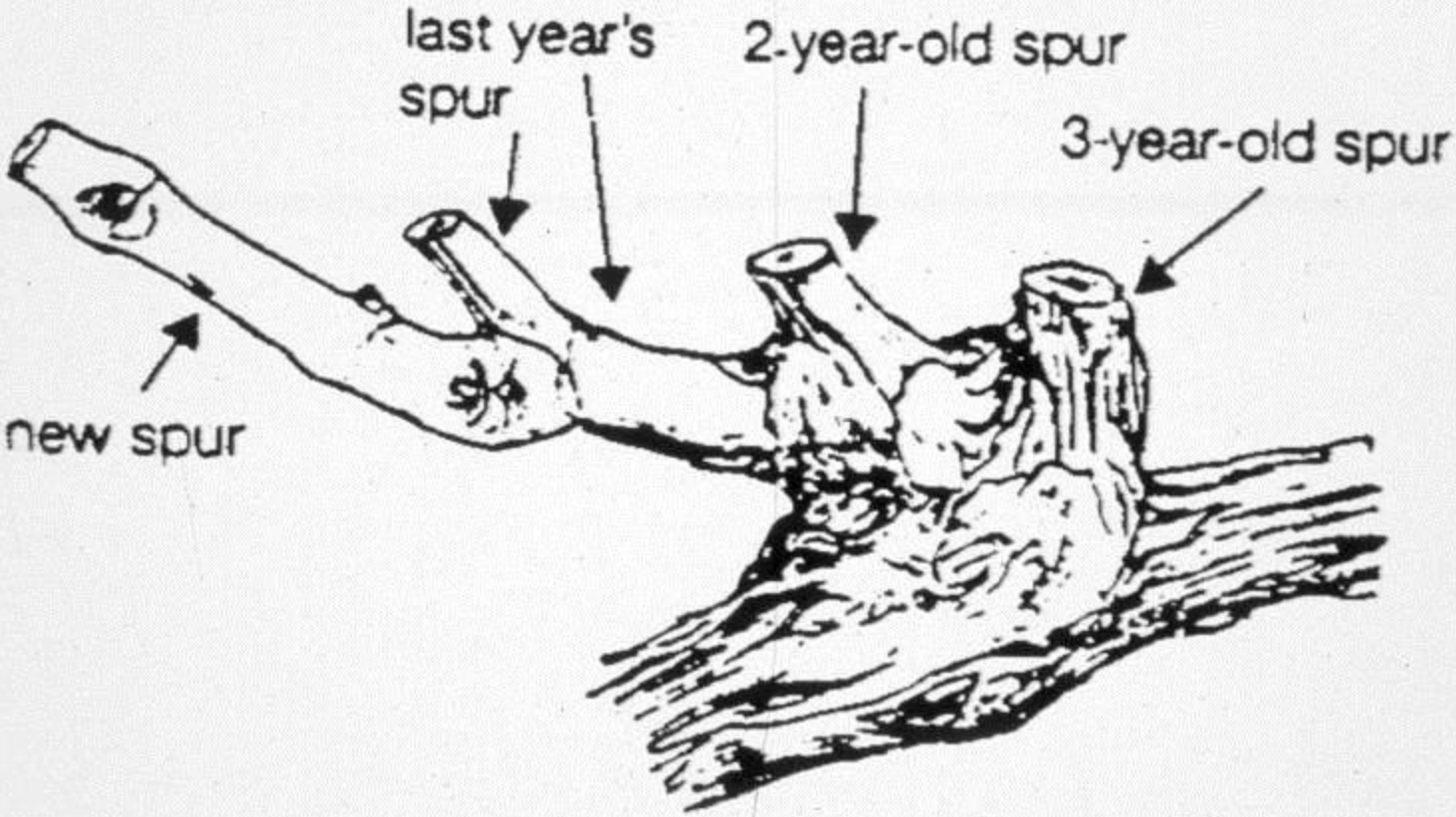
Figure 13.3 A 'Thompson Seedless' grapevine arm, showing pruning cuts for old cane removal and selection of new fruiting canes and spurs. OC = *older cane* retained the previous pruning season; NC = *new canes* from previous season's shoot growth for fruit cane selection; OS = *old spur* retained the previous year for renewal of fruit canes; RS = *replacement spur* retained for reserve of a new cane position; and RNS = *renewal spur* for the renewal or production of fruit canes for next year.

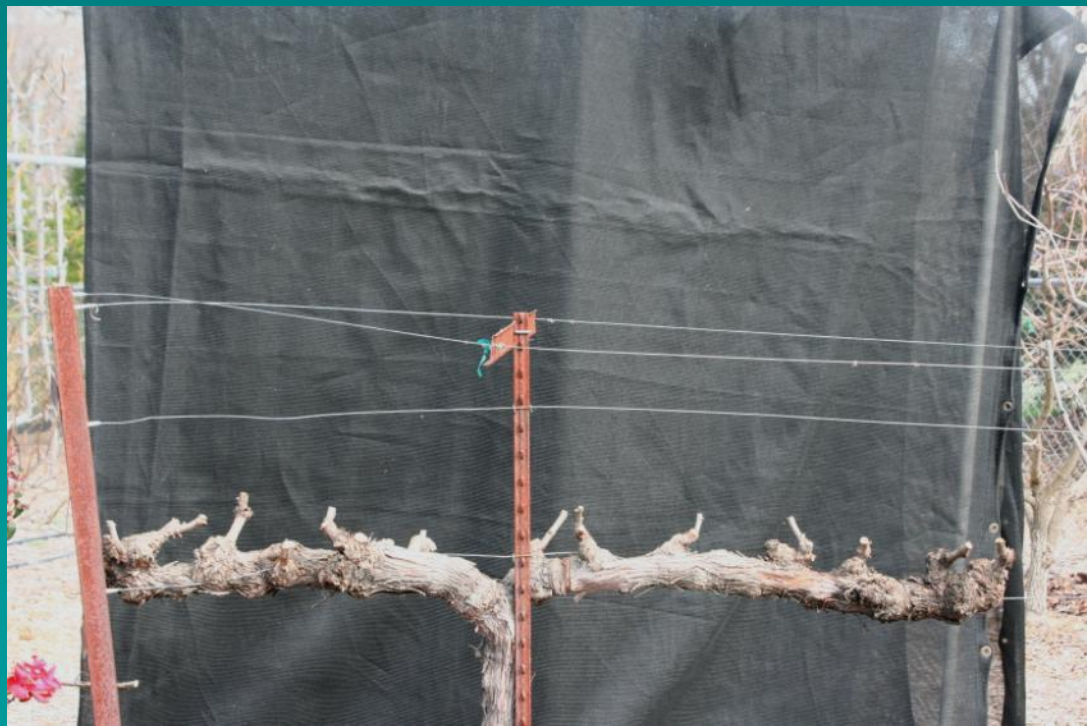
Head Training / Cane Pruning

- Used for varieties that produce no fruit from lower buds (e.g., Thomp. Seedless)
- 4-6 canes per vine, 10-14 buds long
- Wrap or tie canes along wire
- Leave ~1 spur per cane to produce replacement canes

Bilateral Cordon, Spur Pruning



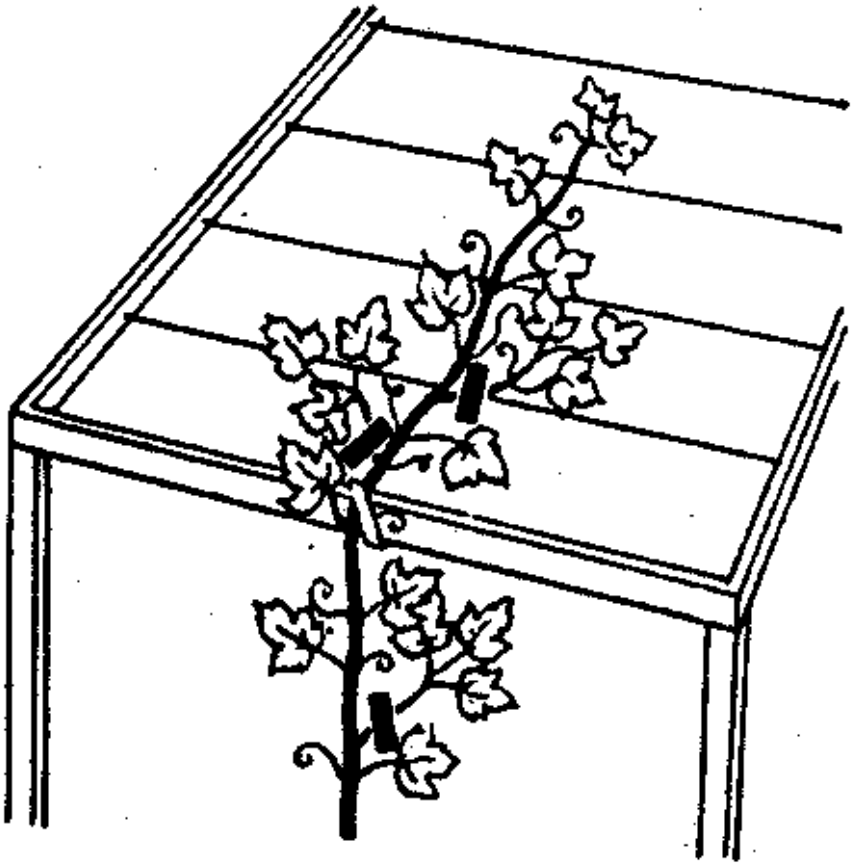

last year's
spur
2-year-old spur
3-year-old spur
new spur



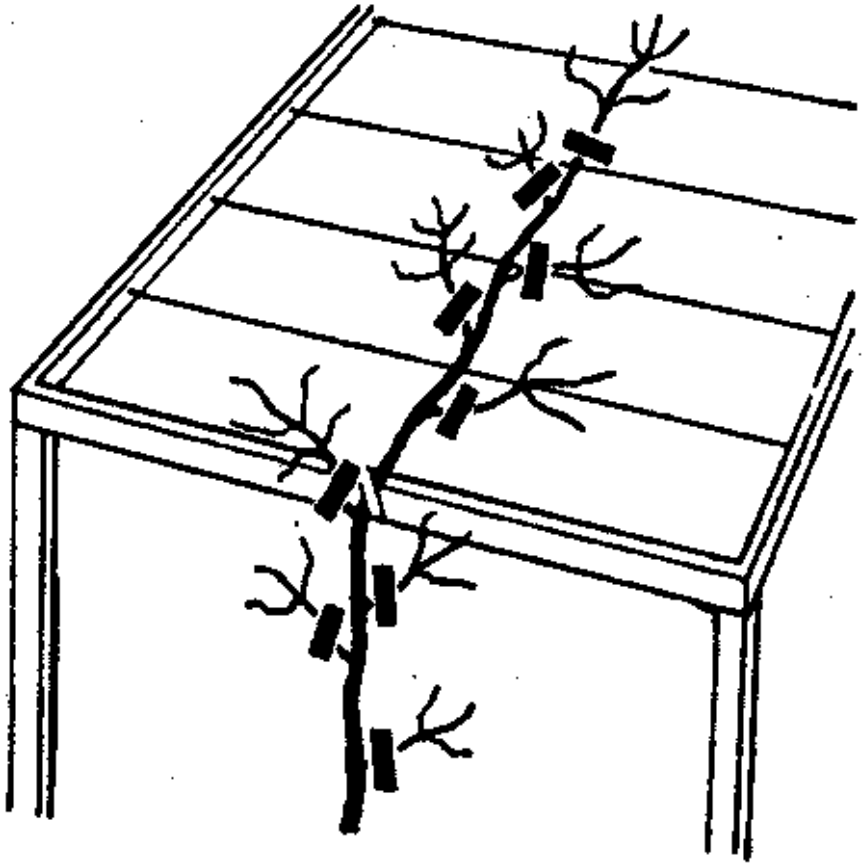
Cordon Training, Spur Pruning

- Majority of varieties
- Trunk divides into 2 or 4 cordons
- Create 5-8 spurs per side (~6 in. apart)
- Remove weak canes or make 1-bud spur
- Select lowest of the 2 canes for the spur

Arbor Pruning

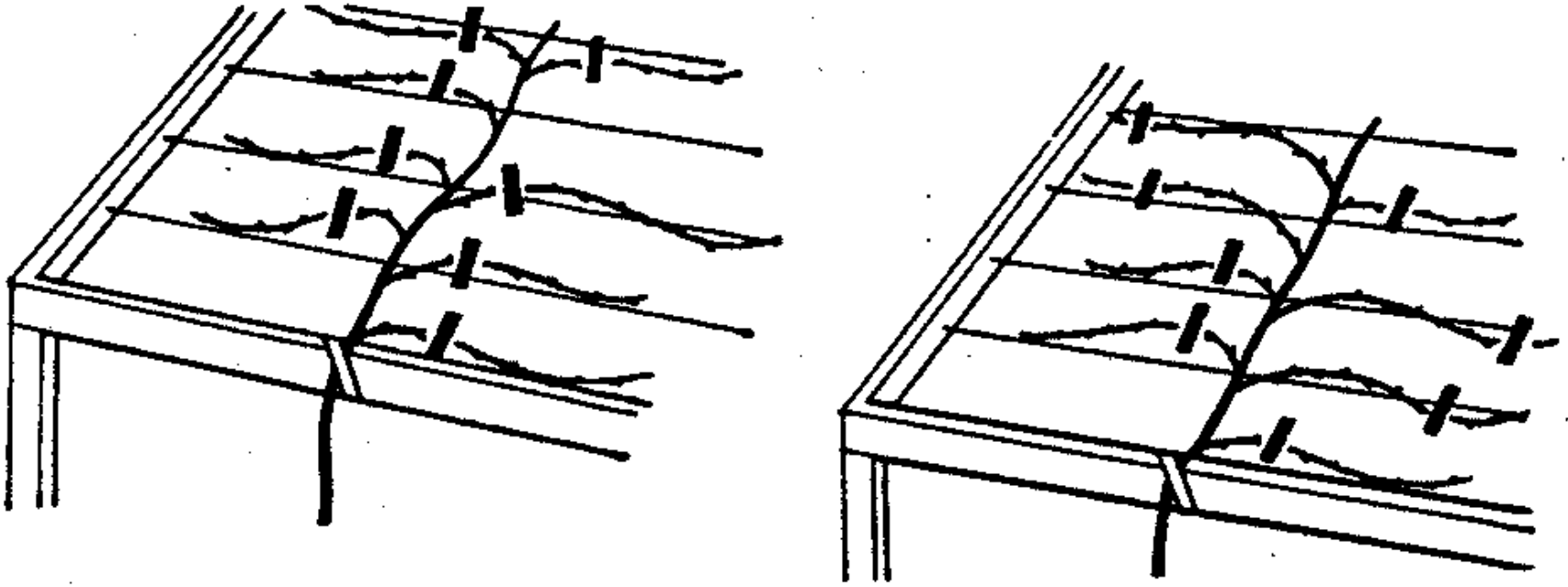


Second summer



Second winter . . .
and following spring

Arbor Pruning



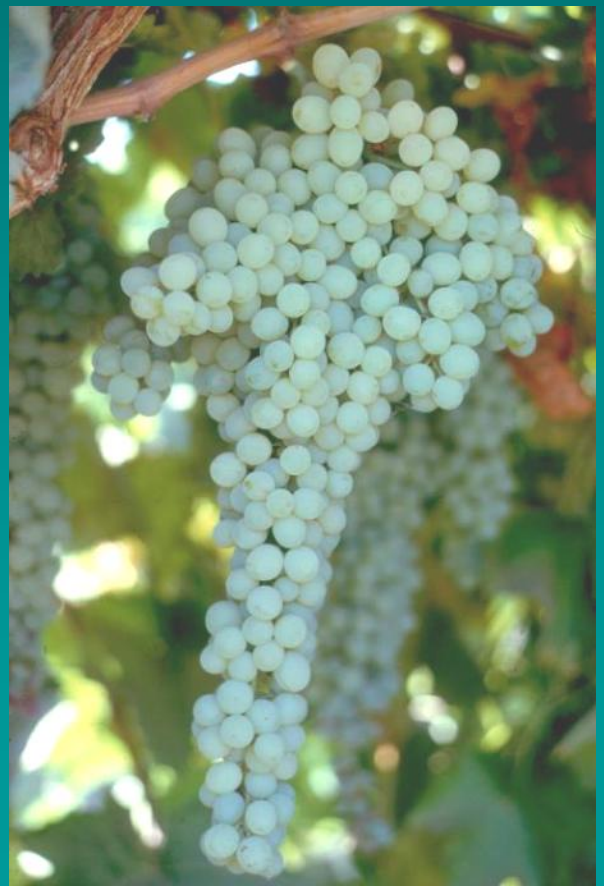
Third winter . . . and after

Grape Growing Terms
Increasing Fruit Size & Quality

- Cluster thinning – removal of clusters
- Berry thinning – removal of lower portion of clusters
- Girdling – removal of ring of bark
- Gibberellic acid – spray used to increase fruit size (commercial use only)
- Shoot thinning – removal of unwanted shoots to open canopy
- Leaf removal – around cluster, air circ.

Thompson Seedless

Raisin grape:
No berry thinning



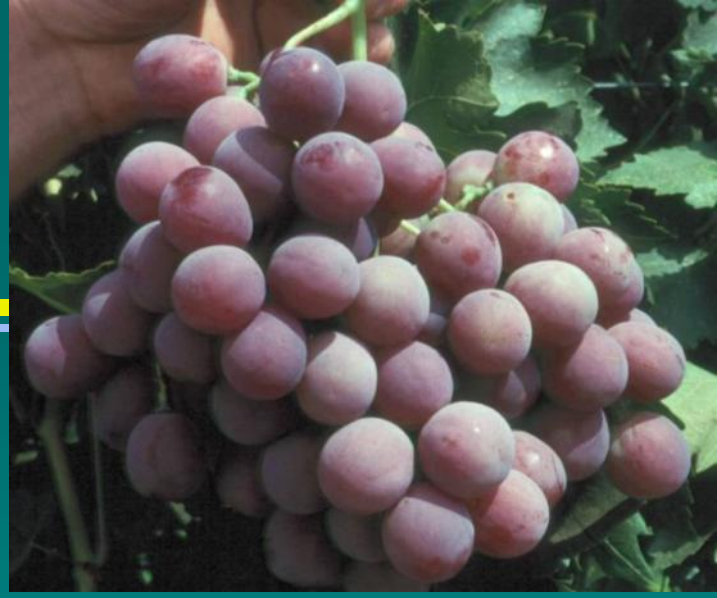


Table grape:
Berry thinned

Trunk Girdling to Increase Berry Size

- Disrupts downward movement of sugars
- Increase in weight about 50% (seedless)
- Increase in weight about 5-10% (seeded)
- Done at fruit set, 10-14 days after full bloom (about mid to late May)
- Remove strip of bark ~¼ in. wide
- Cut all the way around trunk or cordon

Trunk Girdling

Callused over
after 2 months

Grapevine Problems and Pest Management

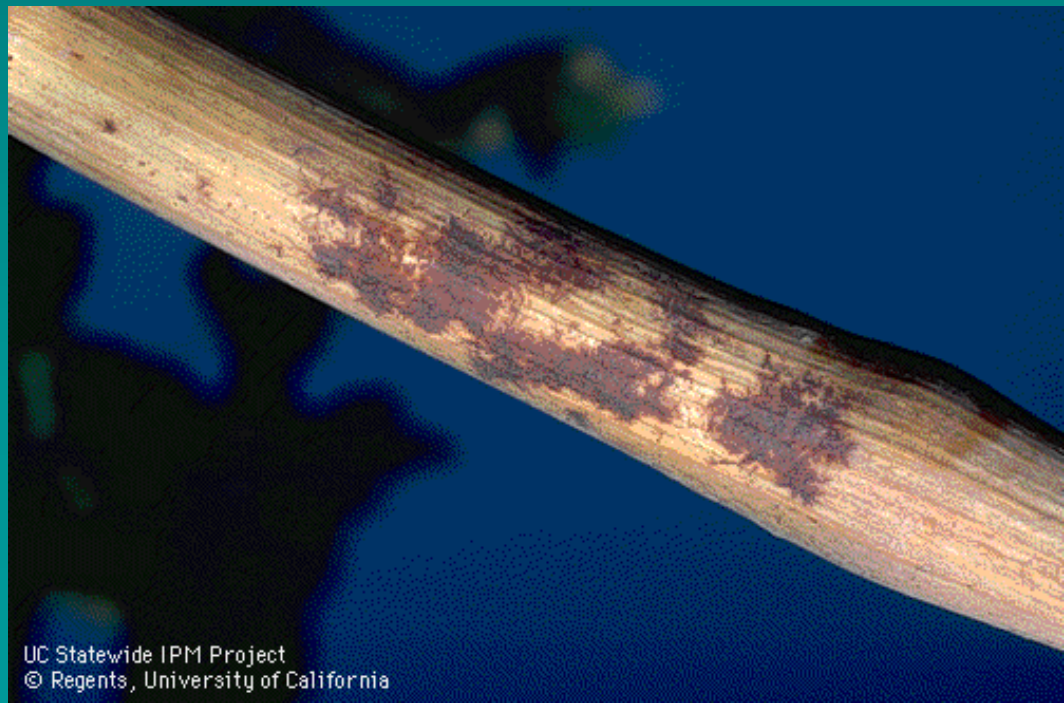
Powdery Mildew

Yellow blotches early on

Powdery Mildew

Strands of spores on berries

Brown blotches in fall/winter



Powdery Mildew
Characteristics

- Fungus – Does not require moisture
- Limiting factor in growing European grapes; American varieties resistant (Concord, etc.)
- Growth is minimal below 70 F and above 92 F
- Spring conditions required for growth:

  70 F for 6 hrs., 3 days in a row

Powdery Mildew
Symptoms

- Initial – Yellowish blotches on leaves
- Later – White powdery fungus on leaves, fruit
- Fruit – Small, don't ripen
- Canes – Brown blotches

Powdery Mildew
Control

- Plant in full sun
- Thin and trim shoots in late spring
- Thin clusters in May/early June
- Remove leaves around clusters
- Dust or spray with wettable sulfur
- Oil sprays (not with sulfur)
  - Horticultural oil, neem oil, etc., mixed in water

Powdery Mildew
Use of Sulfur or Oil

- Sulfur is preventive only, oil can kill a new infection
- Spray oil early season, sulfur late
  - Oil can damage fruits (table grapes
- 1st spray: Depends on temperatures!
  - Bud break to 2 inches of growth
- Then every 7-10 days through June
- Good coverage essential!

Erineum Mite
(Aesthetic problem only!)

Erineum Mite

- Large, puckered spots on leaves
- Felty white underneath early, brown later
- Aesthetic problem; not harmful to plant
- Sulfur or oil applications for powdery mildew control it
- Soap sprays in spring

Questions?