

Espalier Training for Fruit Trees

A Home Orchard Workshop

Fair Oaks Horticulture Center

May 19, 2018

University of California Cooperative Extension
UCCE Master Gardeners of Sacramento County



Espalier Training for Fruit Trees

A Home Orchard Workshop

Presenters:

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UC Statewide IPM Program

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Topics to be Covered

- **Espalier intro & basics**
- Breakout Group 1
 - Managing growth of espaliered fruit trees
 - Espalier training & pruning methods
- Breakout Group 2
 - Using espaliers for pest management
 - Structures for espalier training

Introduction to Espalier Training

- French term. From Italian *spalliera* – Something to rest the shoulder (*spalla*) against
- Pronounced “es-PAL-yer” or “es-pal-YAY”
- Technique of growing trees into a two dimensional flat plane by training and pruning
- Began with Romans; refined in 1500s in Europe

Advantages of Espalier Training

- Narrow canopy; greater sunlight penetration
- Good use of narrow spaces
- Ease of managing & harvesting trees
- Efficient crop production
- Heat capture from walls in winter (citrus)
- More effective frost protection (citrus) and pest management

Disadvantages of Espalier Training



- Narrow canopy – sunburn & borers
- Learning curve, can be challenging initially
- Increased management, spring to mid-summer
- Some species or varieties overly vigorous
- Some fruit species less compatible
 - Peach (1-yr. branches), fig/persimmon (new shoots)



Ease of Espalier by Fruit Species

Easiest

- Apple, Eur. pear, Asian pear
- Citrus
- Genetic dwarf trees

Fairly easy

- Apricot, cherry, plum, pluot, pomegranate

More challenging

- Peach/nectarine
- Fig, persimmon
 - Bear fruit on long branches or new shoots

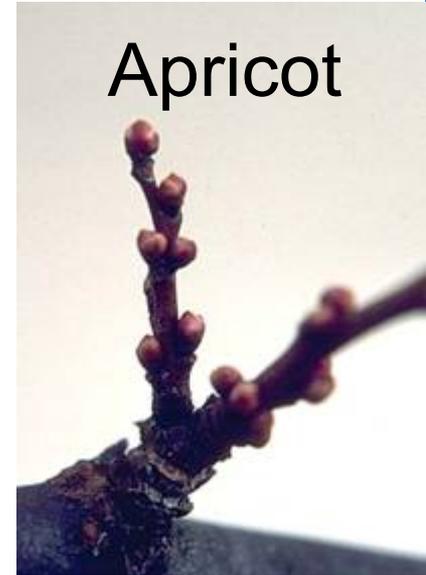
Most challenging

- Trees with extreme vigor or insufficient space

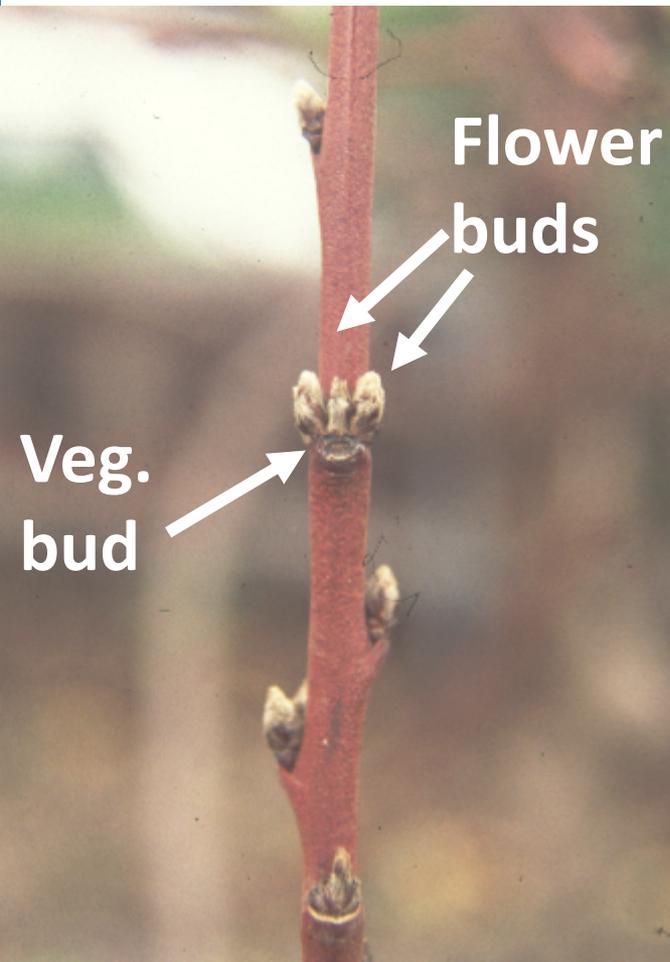
Spurs

Short branches
specialized for flower
and fruit production

Trees with many spurs
tend to be easier to
espalier



Species with Flowers on Long Fruiting Branches (Peach/Nectarine) Challenging



Fruitful Shoots at Ends of 1-Year-Old Branches Challenging

Persimmon



Fig



Choose Trees with Low Branches

- Or cut off bare-root tree at planting



Trees in nursery:
Lowest branches
may be too high



Provide Adequate Space



- Pluot espalier (FOHC, 1998)
- Year 1 – Filled trellis, not enough space!

- Predict space based on expected size & vigor
- Choose appropriate rootstock & scion
- Vigor management



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Ways to Affect Tree Growth

Reduce Tree Vigor:

Use late-maturing varieties

Plant trees farther apart

Less fruit thinning

More frequent summer pruning

Increase Tree Vigor:

Use early maturing varieties

Plant trees closer together

More fruit thinning

Less frequent summer pruning

Training Shoots

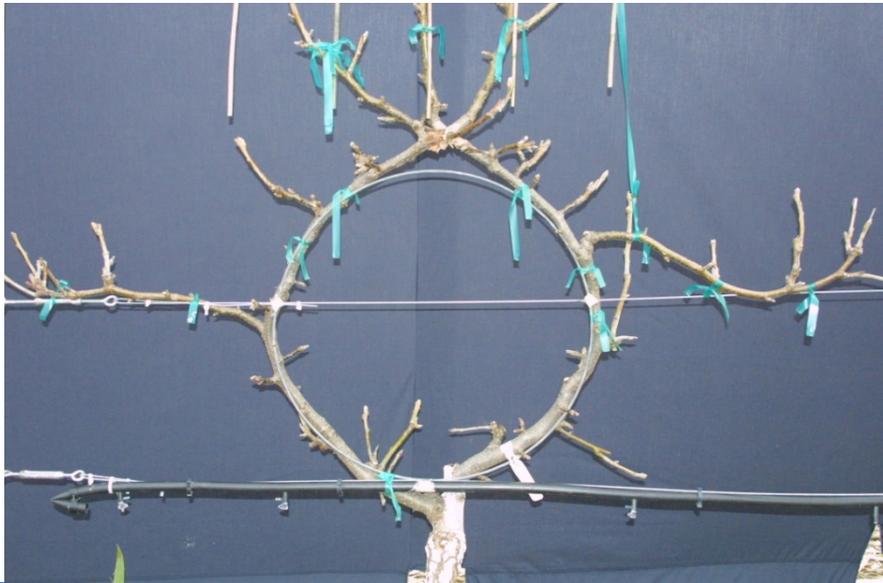
- Direct shoots along wires or tie to wires
- Use flexible ties, avoid girdling branches
- Upright shoots tend to grow faster than shoots that are flat or growing at angle



Simes Tie Bands
2" band (2nd from left) shown below



Shoots Grow Where You Want Them





Excessive Top Growth Leads to Shaded Lower Branches



Keep trees narrow on top

Summer Pruning

(Pruning in spring and summer)

- For espalier trees, can use summer pruning only
 - Can include late winter touch-up pruning
 - Reduces branch dieback (cankers)
- Remove vigorous upright shoots, cut back to weak laterals, and/or head shoots as needed
- Prune 2-4 times per year
- Keep upper canopy narrow but prevent sunburn

Aug. 9



Vigorous Apple

(Horizontal T)

No Summer Pruning



- Don't let this happen!
- New shoots 6+ ft. long
- Fruiting wood shaded

Looking up
(Tall poles)



Vigorous Apple No Summer Pruning (Photo taken in August)

- Vigorous shoots
- Almost no spurs





Vigorous Apple

Summer Pruning – August



- Vigorous shoots removed
- Spurs, short shoots allowed to remain
- Pruning should have been done twice - spring & early summer

Persimmon

Tipping/Pinching

Causes branching, slows growth



4/25/2015



5/25/2015



Tipping promotes branching, puts the brakes on strong upright growth

Branch Sunburn

- Tradeoff in hot climate:
 - Canopy is kept narrow to let sun in
 - Excess sun burns branches
- Exposed fruits can also burn



Avoiding Branch Sunburn

- Plant on east side of building
- Place shade cloth on west side
- Paint branches white
 - Interior white latex & water 50:50
 - Before they sunburn
 - South & west facing branches
 - Especially after summer pruning

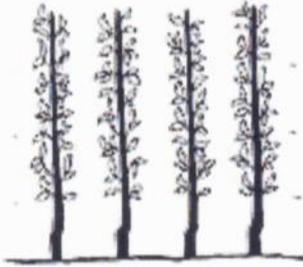
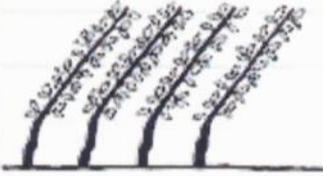
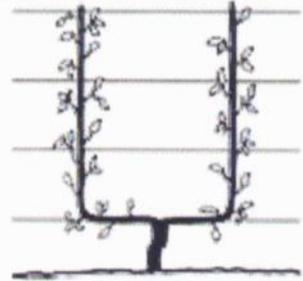
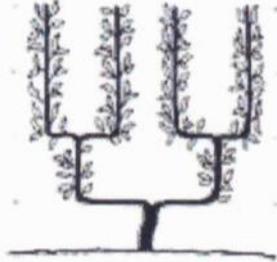
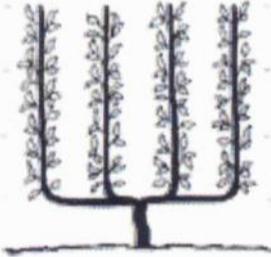
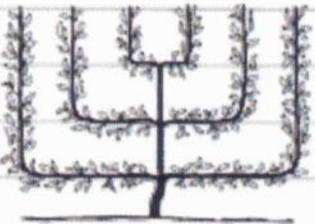
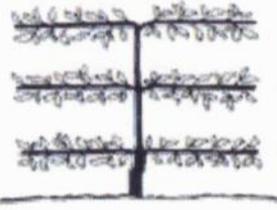
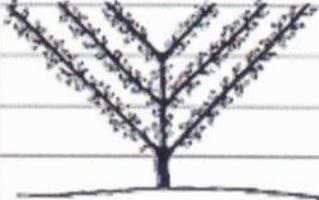


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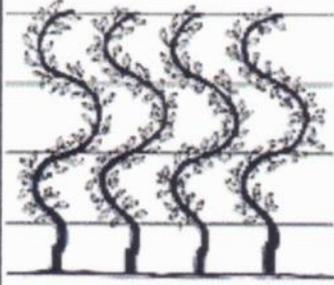
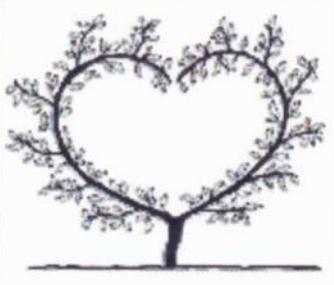
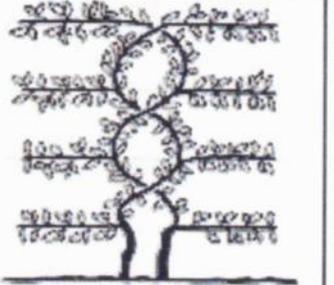
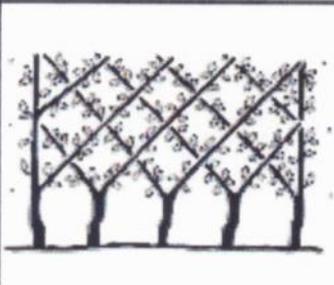
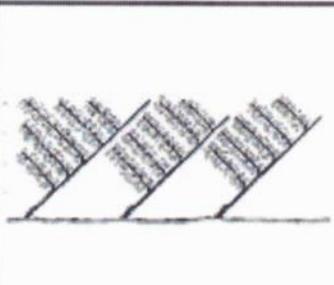
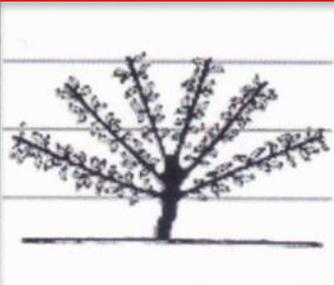
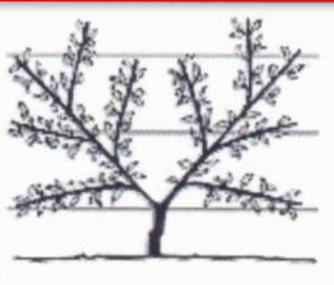
Typical Espalier Patterns

Source:
EspalierServices.com

Cordon Patterns			
	Vertical Cordon	Oblique Cordon	Stepover
Multiple Cordon Patterns			
	"U"	Double "U"	Multiple Cordon
Tiered Patterns			
	Palmette Verrier/Candelabra	"Espalier" / Horizontal T	Palmette Oblique

Typical Espalier Patterns

Source:
EspalierServices.com

Serpentine Patterns			
	Serpentine	Heart	Crossover "Espalier"
	Fence		
Belgian Fence		Drapeau Marchand	Arcure
Fan Patterns			
	Fan	2 Scaffold Fan	Informal

Crossing Limbs Look Nice, But They Cause Shading



Common “Informal” Pattern

Dwarf Pomegranate



Citrus Espalier

Dwarf Mandarin
("Informal" Pattern)

July
2012



Aug. 2012



Aug. 2013



Citrus Espalier (Mandarin)

Dec. 2015



Cherry Fan (Stella)

Fair Oaks Hort. Center

Planted April 2013



Spread



July 2013

Cherry Fan

First annual pruning
(5/7/2015)



Before



After



Before

Cherry Fan

Annual pruning
(5/29/2017)



After

Cherry Fan

3/30/2018



“Espalier”/Horizontal T

Promote Spurs



Palmette Verrier (Candelabra)



Source: pepinieresdenghien.be

Palmette Verrier (Asian Pear)

Planted Jan. 2001



Late April, 2002



Late May, 2002

Palmette Verrier (Asian Pear)

2004



Palmette Verrier (Asian Pear)

2014



Palmette Verrier (Asian Pear)

2014



Before summer pruning

After summer pruning

Palmette Verrier (Asian Pear)

Cut back 5/15/17, Photos 7/9/2017



July 2017



April 2018

2-Scaffold Fan (Peach)

Fair Oaks Hort. Center
(planted Jan. 2013)



July 2013



Dec. 2013

2-Scaffold Fan (Peach)

(1) April 2, 2014



2-Scaffold Fan (Peach)

(3) May 17, 2014



Lateral shoots



Before



2-Scaffold Fan (Peach)

2nd pruning – 5/10/2015

New shoots made singular
and directed upward to
prevent crowding

After



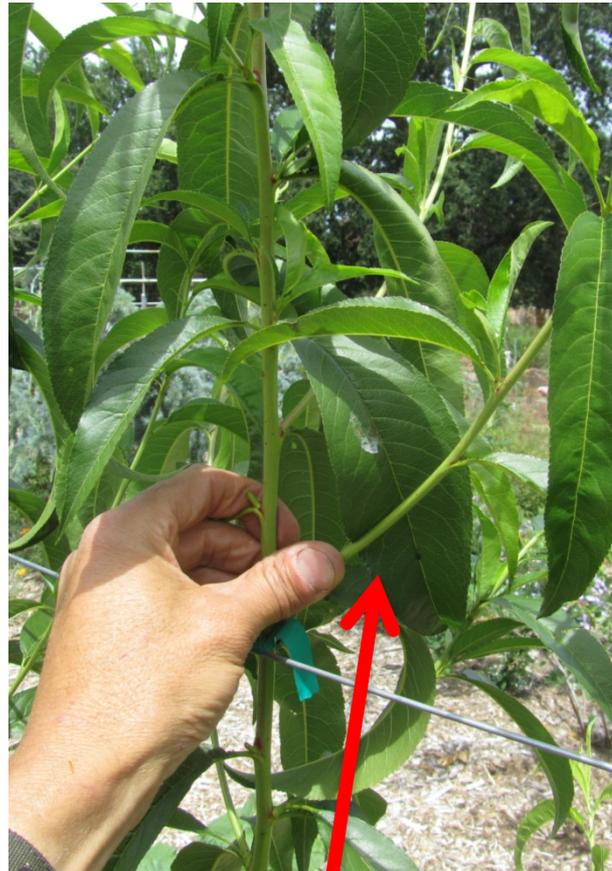


Flowering and Fruiting

360 fruits
2016 (year 4)



Dealing with Side Shoots



Cut to lowest lateral shoot

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Potential Pest Management Benefits

Espalier Training with Tree Covers

- Can reduce damage from several pest types
- Fruit damage is easier to find and remove
- Better spray coverage is possible
- Fruit may be easier to protect and keep dry

What Pests Could Be Managed Better with Espalier Training?

- Vertebrate pests
 - Deer
 - Birds
 - Squirrels
 - Rats
 - Raccoons & opossums
- Netting may need to be stiffer for larger animals than for birds



Photo: Maria de Bruyn

What Pests Could Be Managed Better with Espalier Training?

- Insects

1. Stink bugs & other true bugs
2. Codling moth
3. Spotted wing drosophila
4. Asian citrus psyllid/HLB

1



2



3



4



What Pests Could Be Managed Better with Espalier Training?

- Diseases

1. Peach leaf curl
2. Bacterial canker
 - Also brown rot, branch canker diseases, wood rots

- Requires keeping trees dry at critical times
 - May be impractical except for short periods

1



2



Controlling Insects with Tree Covers

Challenges

- Excludes bees, so not used during bloom
- Must seal edges
- Protection must be in place before pests arrive
- Mainly for pests that require cover for a short period only
 - E.g., SWD cherry maggot (1 month)
 - Longer cover duration unattractive, interferes with summer pruning
 - Other insects may build up with no natural enemies

Excluding Pests with Espalier Training

Fair Oaks Horticulture Center



8' x 8' cherry tree (large!)



Fruit Shield

8' tall peach tree

Covering Trees

Protection from Rain



Nectarine fruit bush



Peach espalier

Covering Trees

Protection from Birds, Squirrels, and
Other Vertebrate Pests



Covering Trees for Protection

- Budbreak through April
 - Peach leaf curl, brown rot (tarp before heavy rain)
- Beginning 1 month before harvest
 - Birds, squirrels, rodents, etc. – bird netting
 - Spotted wing drosophila (cherry maggot) – row cover
 - True bugs (leaffooted, lygus, stink bugs) – row cover
- As needed
 - Codling moth, Asian citrus psyllid (row cover)
 - Long duration makes this method impractical

Covering Trees for Protection

Methods and Challenges

- For rain protection (early spring):
 - Waterproof tarp that can withstand high winds
 - Attach before rain, remove afterward
 - Not practical for long wet periods
- For insect exclusion (before ripening):
 - Examples: Fruit Shield[®], Agribon, mosquito netting
 - Can be expensive but some last several years
 - Must seal edges
 - Also excludes bees; may increase whiteflies or aphids

Covering Trees for Protection

Methods and Challenges

- For vertebrate pests (pre-harvest)
 - Examples: Avigard, other bird netting, Fruit Shield®
 - Must wrap edges & seal bottom
 - Animals can get caught in netting
 - Netting can get caught on branches, mulch, & buttons
 - Also it can rip, shoots grow through it (but easily removed if not left on too long), some feeding on edges
 - Do summer pruning before putting it on

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Locating the Trellis

- Avoid north-facing wall
- South-facing wall increases heat in winter, spring
 - But light is minimal in mid-summer
- Can be grown on or near wall
 - Keep 6-12+ in. from wood walls
- Avoid hot western exposure for sensitive species
 - Pome fruits, persimmons, cherries
- Avoid planting by large trees
 - Invasive tree roots

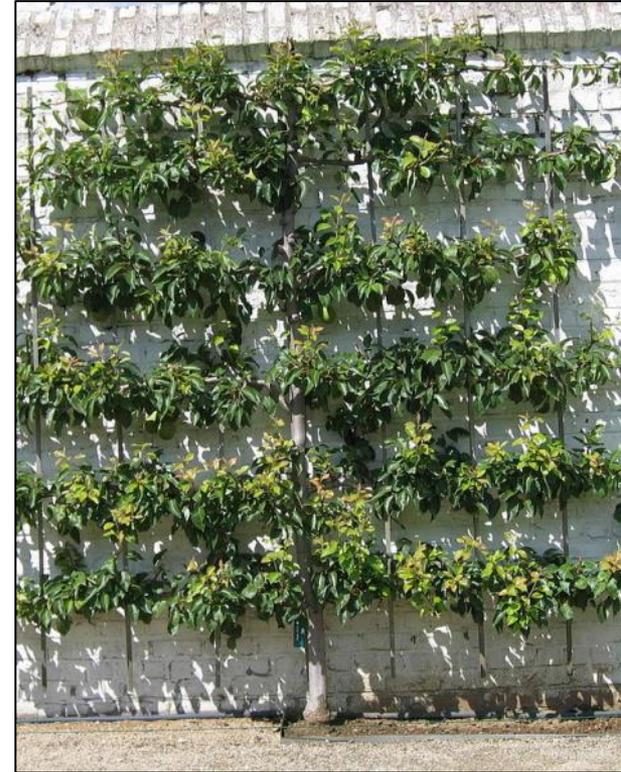


Photo: KVDP

Avoid Fencing with Holes!

- Causes girdling, like tying a rope around a branch



Locating the Trellis



Photo: Pam Plemmons

Espalier

Ensure Adequate Sunlight

House



↑
Large
tree
above

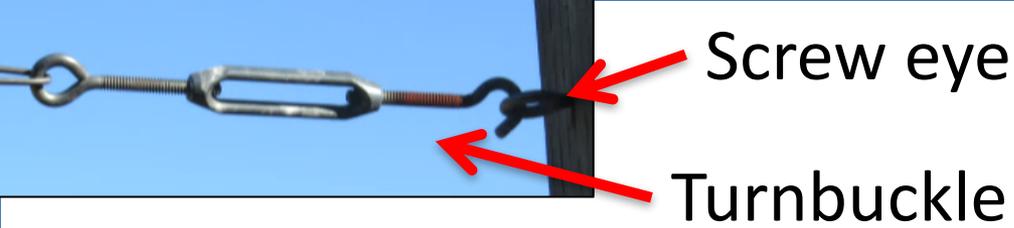


Fence

Trellis Construction Tips

- Use rot-resistant wood (cypress, cedar, redwood, pressure-treated)
- Sink posts in concrete that extends above ground and mulch
- Use heavy gauge wire (12 or 14 gauge)
- Support end posts to prevent wire sag

Wood Posts with Support Bar



Crossarm for drip tubing (if used)



Post in raised concrete



T-Posts with Angled Support Wire

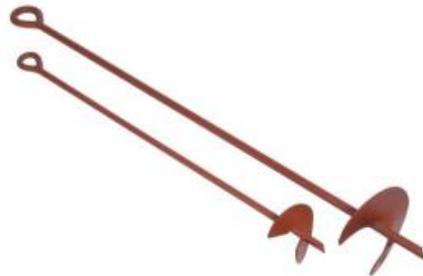


T stake

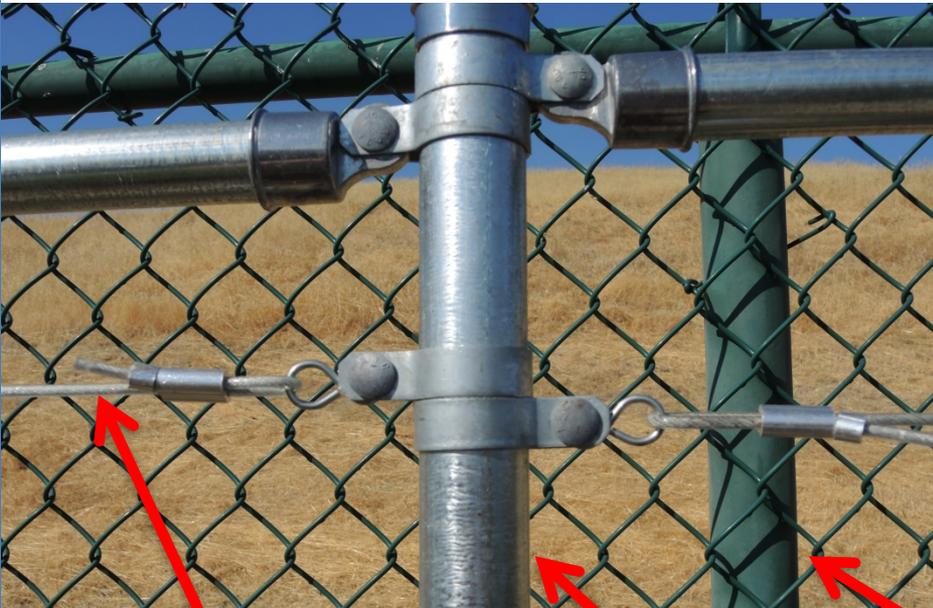
Wire

Helical anchor
(earth anchor)

Angled trellis
end post
(vineyard)



Chain Link Posts & Top Rails



Vinyl coated
cable

Center
post



Turnbuckle

Tension band

Chain link fence
(in back)

Chain Link Posts & Top Rails



Post spacing = 10 in.
Wire spacing = 12 in.



4 in. "H-Curl" to hold
tubing to wire

Photos by Ed Laivo

UC Master Gardeners of Sacramento County Fair Oaks Horticulture Center (FOHC)

Thank you for attending today's event.

Presentations: http://sacmg.ucanr.edu/Event_publications/

Pest management:

<http://ipm.ucanr.edu/PMG/menu.homegarden.html>

Please join us in thanking all the Master Gardener Volunteers who over the past 20 years have worked diligently to create and maintain FOHC, an amazing educational facility.

Advice to Grow by... Ask Us!

Harvest Day 2018

Saturday, August 4, 8:00 a.m. – 2 p.m.

The UCCE Master Gardeners present
Sacramento's Premier Gardening Event
at the
Fair Oaks Horticulture Center

Join us for
talks, demonstrations, grape tasting
30+ non-profits & agencies
plant & food vendors
plus much, much more ...

details & videos @ sacmg.ucanr.edu
916-876-5338

