

Developing an Orchard Site Selection, Orchard Renewal Plan & preparation, Rootstock Selection and Planting

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Topics to be covered

- Site Selection
- Site Planning and Preparation
 - Renewal
- Rootstocks and Variety Selection
- Orchard Systems and Design
 - Spacing
 - Trellis Support
- Planting and Establishment

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Elevation/Topography Important

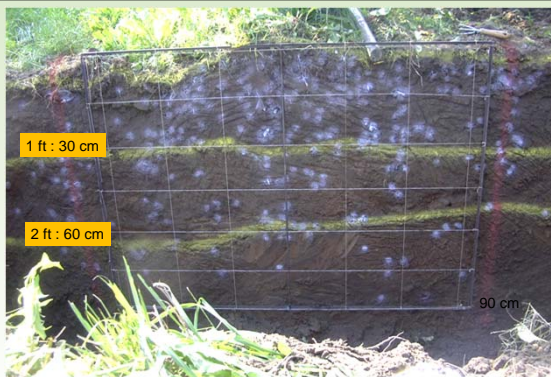
- With respect to surrounding area
- **Cold air drainage**
- Aspect; important for heat units and sugar accumulation in fruit
- Soil should be at least 3 feet deep and be friable with good “tilth”.

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Soils for Orchards

- If subsoil is dense, need to plant on “raised beds” if stone fruit.
- If planting apples and pears, not as much a limitation.
- Know the soil series and where changes in delineations for the site change (called Polygons- soil series/mapped for site).
 - 1. <http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx> by NCRS
- Rootstock selection and orchard layout may be affected.
 - Important for stone fruit; Cherry; Mazzard or MXM clones, vs Mahaleb;
 - Apples; if dense profile avoid M.26 and MM.106
 - If course; avoid weak rootstocks/depends on system

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Basically, most roots are found in the top 1.5 to 2 ft of the soil surface.

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Tree health and performance affected by soil depth and maladies

7 yr-old Tart Cherry / Mahaleb



Shallow soil profile = stress in this Orchard with large crop loads & Mid season when fruit is a major sink



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Shallow rooting and Phytophthora root and crown rot



Peach roots limited by clay layer

Phytophthora on Mahaleb Cherry root system

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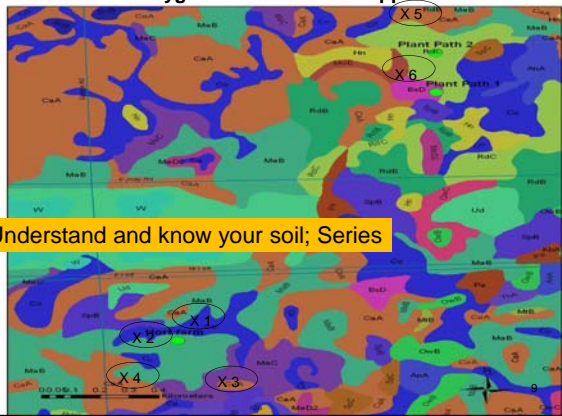
Experiment at Clarksville Hort Station; 1981-1990



- Peach and Sour Cherry trees had improved productivity and survival after 10 yrs on medium size, wide bed (30 cm high, 2 m wide).
- Apples on MM 106, not affected by bed treatments

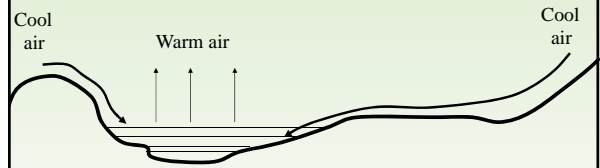
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Polygons = Soil Series mapped

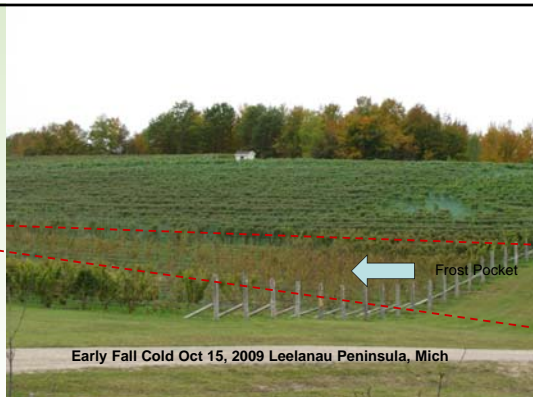


Understand and know your soil; Series

Elevation – Slope – Frost Pockets



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Early Fall Cold Oct 15, 2009 Leelanau Peninsula, Mich

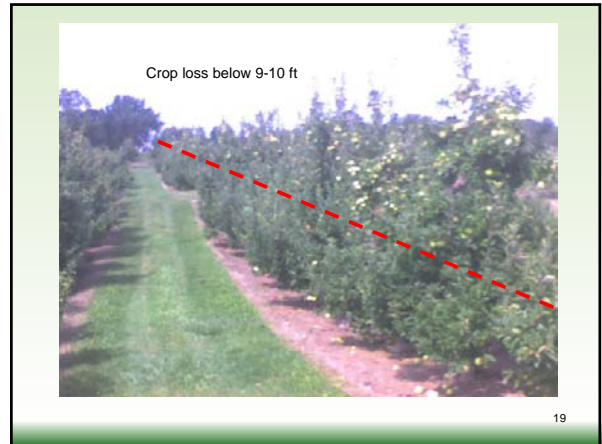
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Slope: Aspect (compass direction)
Grade (steepness)





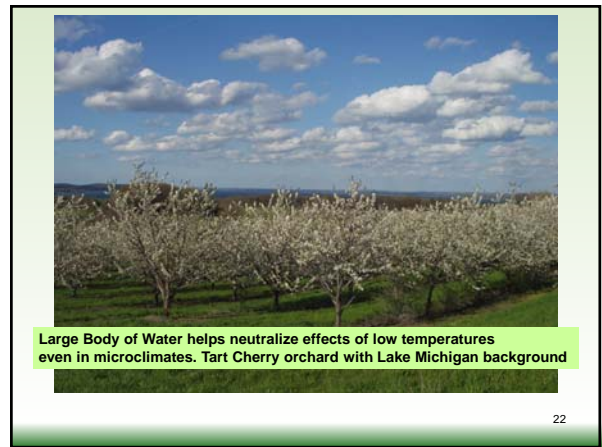
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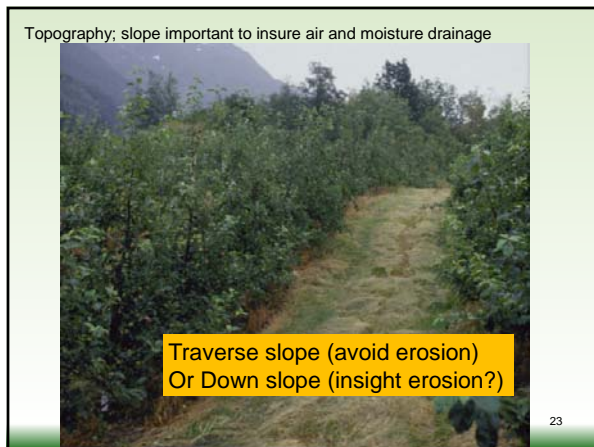
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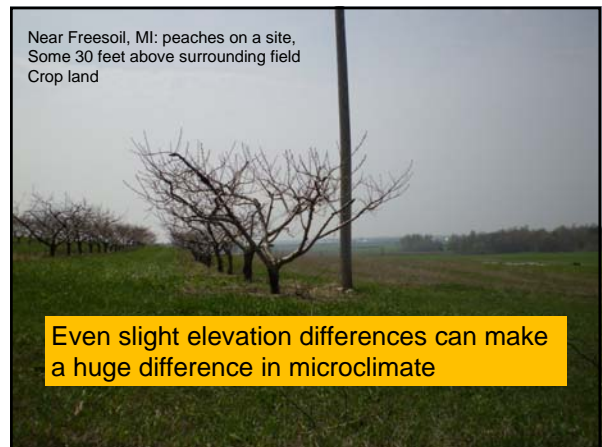
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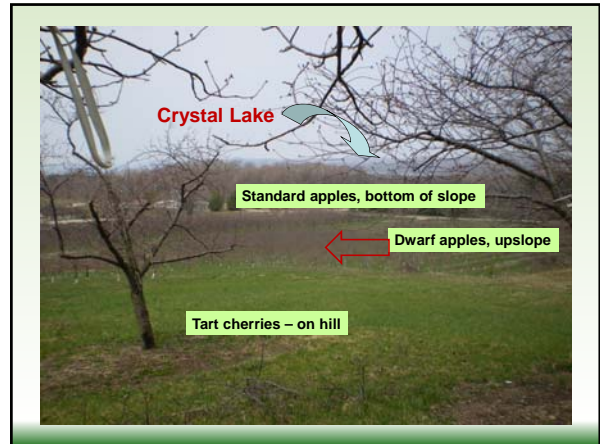
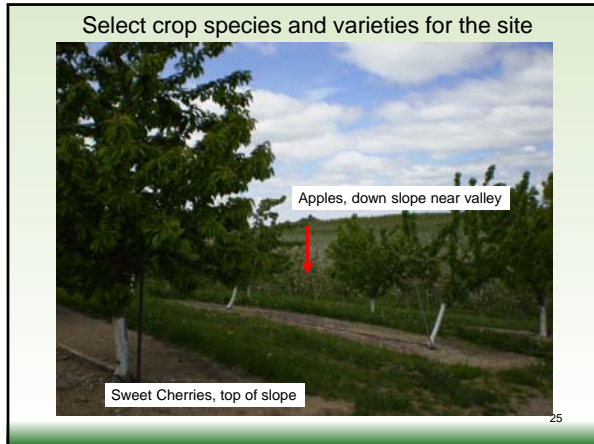


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Orchard Renewal/Replant

1. Remove old trees.
 1. Remove as much old root debris as possible.
 2. Root fragments that are infected with pathogens, nematodes or viruses serve as reservoirs and carry disease over into the new planting
- Do not replant for at least two years with several crop rotations (primarily an Eastern recommendation where replant disease more prevalent)
- Most growers re-establish after 1 year of cover/green manure crop.
- Cover or green manure crops can help suppress plant-parasitic nematodes and soil-borne fungi.
 - Sudan grass, Rye grass, Brassicas (mustard), Marigold, etc. will suppress pests and effects of Apple Replant Disease (Merwin, et. al. 2002).
- Cover Crops incorporate Organic Matter, provides opportunity to add fertilizer, lime, suppress weeds.
- Do not leave a site fallow because of the weed, nematode and virus pressure that can develop.

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Sourcing Trees

- Custom bud orders
 - Can order the scion and rootstocks wanted
 - Usually lower price
 - Sources
 - Local VS Distance
 - North VS South
 - General VS Specialized
 - Reputation – ask questions
 - “Certified”, Heat treated, Virus free, Virus tested, Bud-wood source, rootstock source, patented

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Design and Layout of Orchard Block

- Spacing and Row directions
 - based on slope and orientation
 - In north latitudes; **prefer N/S**
 - Multiply 1.3 X tree height = Alleyway width
 - More alleyway width given for E/W orientation
 - Multiply 1.5 X tree height = Alleyway width
- **Irrelevant re:**
 - **Tall Spindle system which calls for 3-4' X 11-12' spacing: basically 1.0 X tree height**
 - **Super Slender Spindle systems which calls for 1.5' X 8-9'**

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Design and Layout of Orchard Block

- Drain Schemes
- Raised beds
- Irrigation systems
- Contouring where necessary
- Headlands
 - Set aside about 30 ft for headlands

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Planting

- Planting with Mechanical Planters, union at a minimum of 4 - 6 inches above ground line
- Augered holes, a minimum 6-8 inches high (apple). More settling following planting is experienced with augered holes.
- **Do not fertilize until mid summer.**
- Roots can and should be pruned back to fit hole / furrow



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Trees settle after planting in augered or large holes



- Expect trees to settle in soil planted the previous spring.
- Reduce settling with packing soil around roots and watering immediately after planting.
- Minimize hole size to reduce potential for settling.

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Keep Root Systems Moist and Back Fill With Soil to Remove Air Pockets



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Apples on Dwarfing Clonal Rootstocks



- Use a 2"X6" on edge (2-4 ft long) piece of wood to help as a reference.



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Impact of scion rooting in apples



Union



Golden Del / M.26

Problematic if roots become strong and dominant after 5-7 years; no solution to correct.

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Plant apples so that the Union is 4-6 inches above soil level.



Plant stone fruit (peach, cherry, plum, apricot) so that the Union is 1 inch above soil level!



Montmorency Cherry

Union 1" above soil; Growers report problems with "Lesser peach tree borer" if rootstock (Mahaleb) shank is exposed

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Mounding apple trees following planting to avoid Dogwood Borer in the Midwest and Eastern US

- Primarily a problem on dwarfing clonal rootstocks such as M.9, B.9, M.26, etc.
- Follow planting recommendation to place union at 4-6 inches above soil line.
- Mound (individual trees) or form berms (using "Green Hoe").
 - Soil should reach 2-3 inches above union on recently planted tree trunks (within 1 month following planting).
- Berm or mound encourages root primordia to initiate and extend into soil. Root primordia no longer present to provide haven for larvae and carbon source.
- Allow mound or berm to stay in the first 3 years. Much of berms erode or deflate after 3 years. If not, manually pull berm down below union to avoid scion rooting at the end of 3 years.

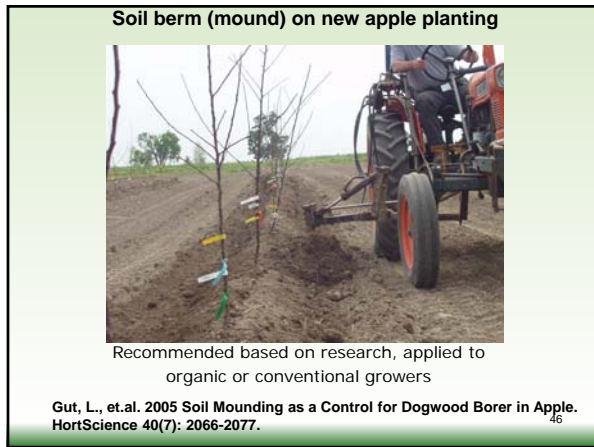
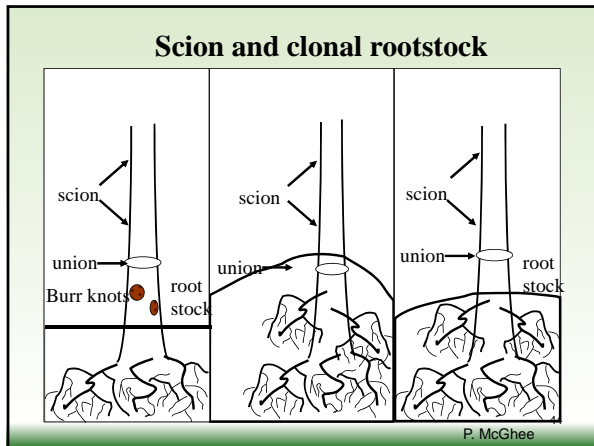
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Union of Apple with burr knot



BK common in dwarfing rootstocks

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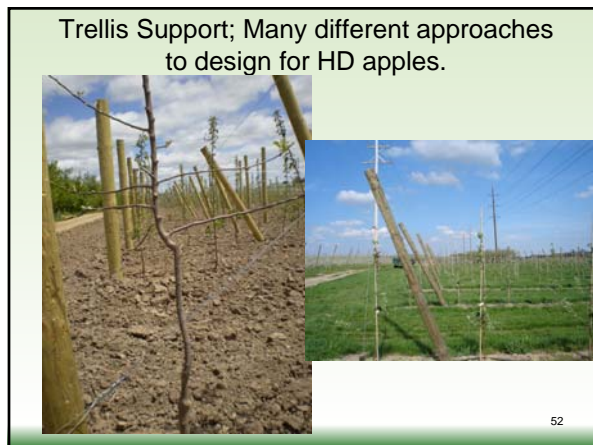
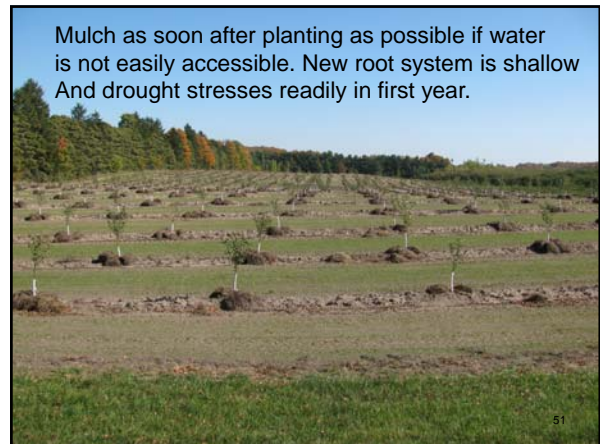
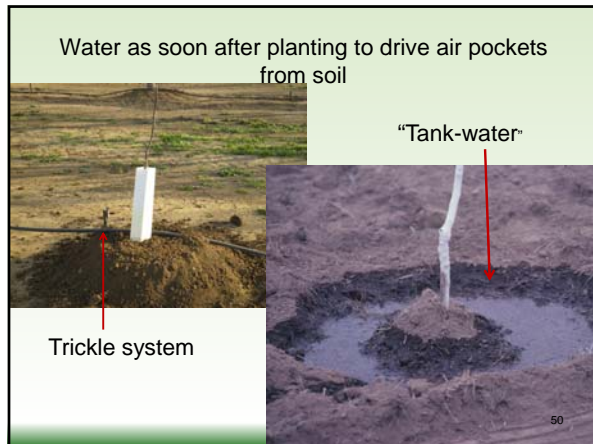


Keys to Mounding – Scion Rooting

- Initially, ok to mound above union.
- WITH IN THE SECOND TO THIRD GROWING SEASON; REDUCE HEIGHT TO JUST BELOW UNION, if it has not eroded naturally.
- Natural erosion will reduce height, but if not, use a hoe, rake or high pressure water to accomplish
- Scion roots that develop, while less than 1/4" to 3/8" can be exposed or cut, without fear of harm to tree.
- Wait too long (1/2" +) and scion roots have influence on vigor

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Trellis Construction

- **4-Wire System.**
- String high tensile wire at 36, 56, 76 and 96 inches apart in height.
- Connect leaders of trees to wires using the 4 inch tree fix rubber bands (only necessary for 2 wires such as 36 in and 76 or 96 in wire (height). Can do more if needed in second or third year.
- **2/3-Wire System**
- String wire at 36, 66, and 96 inches (3-wire) and 30 in and 84 in (2 wire) apart in height
- Fix 5/8-3/4 in. bamboo, 8 ft long from bottom wire past top wire. Use "Wire Clips" (6 or 8 in long) to fasten bamboo to bottom and top wires. The bamboo is used to support a rapidly growing leader with some fruit crop. The leader should be supported to 10 feet in height and be achieved by the 3rd leaf.

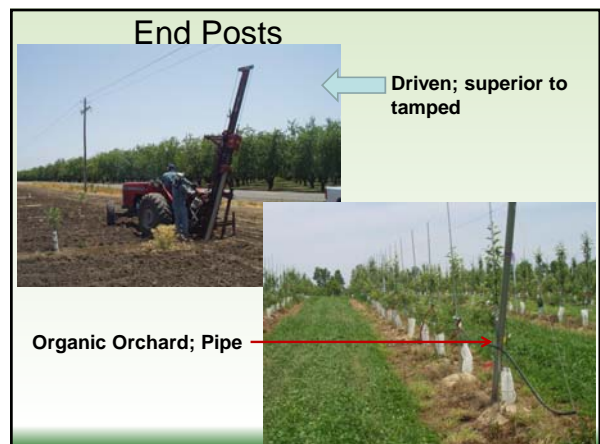
Constructing a trellis; The anchor should not be an afterthought.
By Geraldine Warner
<http://www.goodfruit.com/Good-Fruit-Grower/April-15th-2010/Constructing-a-trellis/>

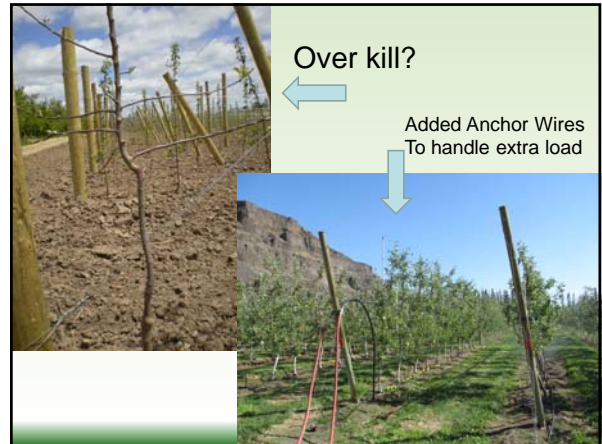
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Anchors

1. Place anchor at least the same distance away from the end post as end-post height.
2. Avoid digging a hole for the anchor and tamping with soil. If must do that, use crushed limestone (tamped). Screw anchors, rotate into ground (1 ft pilot hole to start).
3. Anchors can be many materials buried or screw anchors (Most commonly used, 3 ft long shafts are ok but 4 ft is standard and 5 ft long best for long rows). Best are 6 in diam (8 inch plates for long rows or sandy soil).
4. Double or triple the wire strength connection anchor to end post.
 1. 12.5-gauge high tensile wire breaking strength is 1400 lbs (each strand). 3 – 4 wires means tripling or quadrupling pressure up to 4000 lbs.
5. Many growers do not like "H-Brace" if large load as they may come out of ground.

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Line Posts

- Pressure treated 12 to 14 ft tall X 4 in topped posts. Place at 30-36" depth in soil.
- Steel posts or pipe for Organic.
- Interval Spacing:
 - 25 ft = Best and most expensive (most important if attach overhead micro-sprayers for frost/pest application (future).
 - 30-35 ft = Best
 - 40 ft = Standard
 - 50 ft (not recommended for Tall Spindle and VA systems with weight)

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Wire

1. Typically 12.5 gauge Class III galvanized high tensile (breaking strength 1380 lbs).
2. Use a "Spinning Jenny" Reel to deliver wire.
3. Workers must wear eye protection and gloves.
4. Tighten to 200 to 250 lbs PSI to be able to support a crop.
5. Wire should be tacked with staples on the "upwind" side of posts (west side) (row direction should be N/S). Staple with 2" barbed staples.
6. Threading through posts with 1/2" holes can work, particularly short rows. The only negative is that posts can settle in line dropping or rising in elevation over time.

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Wire and tree support

Bamboo attached with wire clip

No bamboo or individual tree support 4-5 wire system

PNW Bamboo/Wire System

Top Wire at 9'

2nd Wire at 7-7.5'

1st Wire at 6 ft

This system allows workers To work across rows

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