Trellis Design & Construction

2 to 2:30 p.m.
Friday March 8th, 2019
Show-Me Grape & Wine Conference

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ISU Extension
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Contact Missouri One Call a least 3 days and not more than 10 days prior to digging.

https://www.mo1call.com/
Many Systems

Arbor

The Four-Cane Kniffin
(courtesy of Michigan State University)
Renewal spurs

4 cane kniffin

Geneva Double Curtain

Munson

Vertical Shoot Positioned

Single curtain, bilateral cordon or high cordon
South Dakota
Hutterite Vineyard
High Cordon Bilateral

AKA: Single High Wire
Vertical Shoot Position (VSP)
Geneva Double Curtain (GDC)
Six Cane Kniffin

Cane Pruned System
Specialized Trellising Tools

- Post Hole Auger
- Wire Spinning Jenny
- Hydraulic Post Driver
- Chain-Grab Wire Puller
- Crimping Tool

Paul Domoto, ISU
Trellising Hardware

12.5 ga High-tensile Wire & 9 ga Soft Wire

Wire Strainers

1 Strainer handle

Crimping Sleeves

Tension Indicator Spring (Optional)

Steel Brace Pins (for H-Brace)

3/8 x 9"

3/8 x 4"

Wire Vise (for Rows < 200 ft)
Other Tools & Materials

**Tools:**
- Hammer
- Fencing pliers
- Steel bar
- Tape measure
- 6 ft measuring stick
- Plumb bob
- Cordless Drill w/ 3/8” bit (for brace construction)

**Materials:**
- 1 3/4” or 2” Staples
- (Grounding rods, wire, & clamps)
- (Hardwood twitch sticks)
Trellis Post Materials

Red, southern yellow, or lodgepole pine:
- Pressure-treated with chromated copper arsenate (CCA).
- Life expectancy of 20 to 30 years (suppliers should be able to provide a guarantee).

Steel stakes:
- Can be substituted for line posts.
- Subject to bending and leaning.
- Should be used in combination with wood posts.

Other alternatives:
- Native timber
- Fiberglass
- Recycled plastic
- Reinforced concrete
Landscape Timbers Typically Last Only 2-5 Yrs. Before Replacement is Needed
### Using Untreated Native Timber *

<table>
<thead>
<tr>
<th>Species</th>
<th>Resistance to Decay</th>
</tr>
</thead>
<tbody>
<tr>
<td>Osage Orange</td>
<td>Exceptional</td>
</tr>
<tr>
<td>Black Locust</td>
<td>Exceptional</td>
</tr>
<tr>
<td>Red Mulberry</td>
<td>Exceptional</td>
</tr>
<tr>
<td>Eastern Red Cedar</td>
<td>Very resistant</td>
</tr>
<tr>
<td>Honey Locust</td>
<td>Moderate</td>
</tr>
</tbody>
</table>

*Native woods do not have useful natural resistance to termites.*

Charring the buried portion of a post may have merit. It reduces the availability of a food source, and generates wood tar that has some anti-microbial activity. There is no proof of benefit, but it might not hurt and may very well help to prolong the life of a post.
# Wood Trellis Post Comparison

## Size vs Strength

<table>
<thead>
<tr>
<th>Size * Dia. (in)</th>
<th>Cross-sectional Area</th>
<th>Lateral Breaking Point</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sq. in.</td>
<td>% of 4&quot;Post</td>
</tr>
<tr>
<td>2.5</td>
<td>4.91</td>
<td>39</td>
</tr>
<tr>
<td>3</td>
<td>7.07</td>
<td>56</td>
</tr>
<tr>
<td>3.5</td>
<td>9.62</td>
<td>77</td>
</tr>
<tr>
<td>4</td>
<td>12.57</td>
<td>100</td>
</tr>
<tr>
<td>5</td>
<td>19.64</td>
<td>156</td>
</tr>
<tr>
<td>6</td>
<td>28.27</td>
<td>225</td>
</tr>
</tbody>
</table>

* Measured at narrow end

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**Preferred Post Size:**

- Line Post: 3 to 4 inch diameter
- End Post: 5 to 6 inch diameter
8 ft Steel Stakes being used in combination with native timber posts
Driving Posts

In proper position:
- Straight
- Narrow end down
- Correct depth

A pre-cut measuring stick provides a quick reference for gauging the proper depth.
Wheatheart Post Pounder

Approx. $14,000+

Two Saints Winery
St. Charles, IA
Earth Anchor Requirements

**Shaft:**
- Minimum: 1/2” x 36”
- Preferred: ≥ 5/8” x ≥ 40”

**Helix:**

<table>
<thead>
<tr>
<th>Dia. (in.)</th>
<th>4</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area (sq. in.)</td>
<td>12.6</td>
<td>28.3</td>
</tr>
<tr>
<td>% of 6-inch</td>
<td>44.5</td>
<td>100</td>
</tr>
</tbody>
</table>

Suitable for rows up to (ft)* ~250 600

* Suitable row length decreases on lighter, sandy soils.
Anchored End Post System
with an Earth Anchor

Suitable for rows up to 600 ft, but this is affected by soil texture and anchor’s helix diameter.

- 3-4” x 8’ line post
- 5” x 10’ end post
- 6’ tall
- 2’ deep
- 3 - 4’ deep
- Earth anchor 4-6” helix x 40”
- Brace wire
H-Brace End Post System
Required for rows over 600 ft

3-4” x 8’ line post

Brace post
5-6” x 9-10’ end post

Brace pin
6’ tall

Brace wire

2’ deep

Requires 4 additional posts per row to construct the braces.

3-4’ deep
Attach Brace Wire
forming a loop & twist to tighten

Staple to secure brace wire

Brace wire
End Post System with a Tie-back Post
Posts in Swales

Posts in swales are prone to being pulled out by the wire tension. Use longer posts, and drive them deeper.
Planting on a Contour

Straight rows are preferred for stretching wire, but rows can be planted on a contour if the sharpness of the curve does not exceed 5 degrees per 30 ft of span. Pivot posts should be at least 4” dia. x 9’ and driven 3’ deep.

A plywood template can be made to gauge a 5 degree curve.

Pivot Post

5°

8’

8.25”
TJ’s Fencing
Harpers Ferry, IA
563-586-2023

Ron Corey, Corning, IA
Uses fiberglass oil well sucker pipe for fence posts.
Stone Hill Winery
Vignoles
Metal H-Brace
Signs are a REAL help!

Dave Cunningham
Rippey, la.
Wire Tension Gauge

40” nail span by ½ inch depth
lbs. to pull wire ½ inch x 20 = lbs of Tension.
250 lbs is Ideal

- Estimated that a temperature drop from 80° to -20° F can increase the tension on 500 ft of 12.5 gauge high-tensile wire by 130 pounds due to shrinkage.
- Tension indicator springs will absorb most of the additional tension.

Loosen in the Winter
Tricks of the Trade
Double Stapling

to attach wire to the side of a post

Drive staples at an angle to wood grain.
Wire Connectors
Recycled Metal Cans
Galvanized wire rubbing against mild steel will rust.

Drilling Holes in Post
Hard to change wires and time consuming. CCA treatment can corrode galvanized wire
Cover metal post ends to keep from snagging nets.
Wire Vice ??
Often cuts
Galvanization on Wire
Don’t recommend trellis wire tightener at anchor.

Winterhaven Vineyard & Nursery – Janesville, MN
Alternate Tie-off Methods

Wire Vice (cannot reduce tension)

For rows 200 ft or less

Crimping Sleeve

Wire Strainer at one end

Suitable for 200 ft to 500 ft rows

Wire Strainer in the middle

For rows 500 ft or longer

Iowa State University
Extension and Outreach

Paul Domoto, ISU
U.S. Steel 1982, 48 pp. EXCELLENT!
https://iastate.box.com/s/vau55ozir20nzrabb55kygw8uf72kcg2
Remove Vineyard Acres out of USDA Farm Program Acres Prior to Planting Grapes!

Contact Your County FSA Office

https://www.fsa.usda.gov/