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Hops: Trellis, Irrigation, and Establishment (and costs)

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Leelanau County, MI

MSU IPM Academy
February, 2014
Climbing bines

• Bine climbs with the aid of “Trichomes”
• In the wild—they climb up companion species
• Commercial production—Requires a trellis system for support
• Typical set-up
  – 18’ tall
  – Plants spaced 3’ x 14’
  – 1000-1200 plants/acre
• Vine wraps around string-clockwise-function of phototropism (light) and thigmotropism (touch)
Conventional High Trellis
Standard Tall Trellis Hopyard Design
Important to build a Solid Trellis!!
Short Trellis

- 3’ x 8’, 9’, or 12’
- Labor Reduction
- Lower Establishment Cost
- Lower yields
- Ill-adapted varieties
Alternative Spacing: NZ
Irrigation

- 75-80% of total annual hop water use occurs after mid-June
- Greatest daily amounts late July-early August
- Majority of roots are in top 4’
- Hops usually extract 50-60% from top 2’, but can extract water from 8’ or below
- Overall use around 30 inches/year, depends on season

Irrigation Tips

• Baby plants more frequent light applications
• Carefully monitor soil water levels (tensiometer)
• With drip you should always think about clogged emitters:
  – Algae, silt or chemical deposits, etc.
  – Filtration, acid injection, chlorine injection.
• Applying fertilizers without enough water can lead to salt buildup
• Weed control-very important
• Good mite and aphid control-will reduce stress on plants
• Do not underwater
• Right size your well for your acreage
• Different zones for different cultivars
Irrigation: Examples

- Puterbaugh Farm-RAM pressure compensating- emitters every two feet.
- 2-4 hours cycles every other day in cooler temps, every day in hot temps
- Take the soil to saturation level but not beyond, because it would take fertilizer too deep.
- Flush lines once a month-flushes out sediment.

http://hopsdirect.blogspot.com/2008/07/drip-irrigation-systems.html
Irrigation: Examples

- Loftus Ranches
- Run two drip tubes per row
- 8 gallons per plant per day in hot season (4 on, 8 off, 4 on)
- ~8000 gallons/acre
Irrigation: Examples

NWMHRC

• Run one drip tube per row
• .42 gallon emitters every two feet
• RAM tubing
• 30 minute flush, 45 minute fertigate, 30 minute flush (every other day)
• NOT ENOUGH WATER
Fertigation
Table 1. 2013 Hopyard Preparation and Establishment Costs (Per Acre and Per 5 Acre yard)

<table>
<thead>
<tr>
<th>Land Preparation</th>
<th>Per Acre</th>
<th>Notes</th>
<th>5 Acre Yard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disc</td>
<td>$ 26.00</td>
<td>$26/acre</td>
<td>$ 130.00</td>
</tr>
</tbody>
</table>

**Establishment**

- **Post Holes- digging** $ 312.50  2.5 hrs * $125/hr (145 hp tractor) $ 1,562.50
- **Post Holes-placement** $ 750.00  6 hrs * $125/hr $ 3,750.00
- **Poles-field** $ 1,590.00  50 @ $30/pole $ 7,950.00
- **Poles-end** $ 1,840.00  46 @ $40/pole $ 5,360.00
- **Earth Anchor** $ 650.00  50 per acre @ $13 each $ 3,250.00
- **Wire** $ 1,000.00  Galvanized 7 strand ($800) + #9 ($200) $ 5,000.00
- **Misc Hardware/supplies** $ 500.00  staples, etc. $ 2,500.00
- **Labor-poles** $ 480.00  4 workers- $10/hr x 12 hrs $ 2,400.00
- **Management** $ 240.00  12 hrs @ $20/hr $ 1,200.00
- **Hop Plants** $ 3,000.00  ($3/plant, 1000 plants per acre; 14’ x 3.5’) $ 15,000.00
- **Labor-planting** $ 700.00  (70 hrs x $10/hr) $ 3,500.00
- **Irrigation^** $ 1,500.00  Includes installation $ 7,500.00
- **Well** Variable $ $ 7,500.00

**Total Initial Costs** $ 12,588.50 $ 59,102.50

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^ For a 5 acre yard: 53 field poles/ac & 27 end poles/ac=265 field poles and 134 end poles or 80/acre

^ 50 gallon/min, 2 inch main (no filtration)-cost is variable depending upon needs, # zones, etc.
**Table 2. 2013 Hopyard Annual Operating Costs and Returns (Per Acre)**

<table>
<thead>
<tr>
<th>Annual Operating Costs</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coir (1 string yr 1; 2 strings yr 2 +, $.20/ string; clips $80)</td>
<td>$240.00</td>
<td>$480.00</td>
<td>$480.00</td>
<td>$480.00</td>
<td>$480.00</td>
</tr>
<tr>
<td>Labor-stringing (5 workers x 10 hours X $10/hr)</td>
<td>$350.00</td>
<td>$500.00</td>
<td>$500.00</td>
<td>$500.00</td>
<td>$500.00</td>
</tr>
<tr>
<td>Labor-training</td>
<td>$500.00</td>
<td>$750.00</td>
<td>$750.00</td>
<td>$750.00</td>
<td>$750.00</td>
</tr>
<tr>
<td>Pest/Disease Chemicals (insecticide/fungicide/herbicide)</td>
<td>$400.00</td>
<td>$600.00</td>
<td>$600.00</td>
<td>$600.00</td>
<td>$600.00</td>
</tr>
<tr>
<td>Fertilizer</td>
<td>$250.00</td>
<td>$275.00</td>
<td>$275.00</td>
<td>$275.00</td>
<td>$275.00</td>
</tr>
<tr>
<td>IPM Consultant</td>
<td>$25.00</td>
<td>$25.00</td>
<td>$25.00</td>
<td>$25.00</td>
<td>$25.00</td>
</tr>
<tr>
<td>Repairs/Parts/Maintenance</td>
<td></td>
<td>$250.00</td>
<td>$250.00</td>
<td>$250.00</td>
<td>$250.00</td>
</tr>
<tr>
<td>Machinery/Labor-Stringing</td>
<td>$100.00</td>
<td>$100.00</td>
<td>$100.00</td>
<td>$100.00</td>
<td>$100.00</td>
</tr>
<tr>
<td>Machinery/Labor-Fertility</td>
<td>$300.00</td>
<td>$400.00</td>
<td>$400.00</td>
<td>$400.00</td>
<td>$400.00</td>
</tr>
<tr>
<td>Machinery/Labor-Mowing/Till</td>
<td>$100.00</td>
<td>$100.00</td>
<td>$100.00</td>
<td>$100.00</td>
<td>$100.00</td>
</tr>
<tr>
<td>Machinery/Labor-Spraying</td>
<td>$300.00</td>
<td>$350.00</td>
<td>$350.00</td>
<td>$350.00</td>
<td>$350.00</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td>$2,565.00</td>
<td>$3,830.00</td>
<td>$3,830.00</td>
<td>$3,830.00</td>
<td>$3,830.00</td>
</tr>
</tbody>
</table>

| Harvest                                                                               |        |        |        |        |        |
| Labor-harvesting (10 hrs, 4 workers-cut, load)                                         | $400.00 | $400.00 | $400.00 | $400.00 | $400.00 |
| Management ($20/hr* 10 hrs)                                                            | $200.00 | $200.00 | $200.00 | $200.00 | $200.00 |
| Machinery ($125/hr)                                                                    | $1,250.00 | $1,250.00 | $1,250.00 | $1,250.00 | $1,250.00 |
| **Subtotal**                                                                          | $1,850.00 | $1,850.00 | $1,850.00 | $1,850.00 | $1,850.00 |

| **Total Annual Operating Costs**                                                      | $2,565.00 | $5,680.00 | $5,680.00 | $5,680.00 | $5,680.00 |

- Analysis does not include land cost or overhead like interest on loans, taxes, etc.
- Does include per hour rate for machinery, labor, and management that would be charged if hired out (opportunity cost)
- Standard trellis design is 3.5 x 14 ft ~1000 plants/acre
### Post Harvest Costs

<table>
<thead>
<tr>
<th>Costs</th>
<th>0</th>
<th>$5,000.00</th>
<th>$7,250.00</th>
<th>$9,500.00</th>
<th>$9,500.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Picking processing fees ($6/lb.) (energy, supplies, labor, etc.)</td>
<td>$4,500.00</td>
<td>$6,750.00</td>
<td>$9,000.00</td>
<td>$9,000.00</td>
<td></td>
</tr>
<tr>
<td>Transport to processor (variable)</td>
<td>$500.00</td>
<td>$500.00</td>
<td>$500.00</td>
<td>$500.00</td>
<td></td>
</tr>
<tr>
<td>Interest on Equipment (picking machine, hammer mill, pelletizer)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sales Costs (Commission, transportation, shipping, etc.)</td>
<td>$0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>0</strong></td>
<td><strong>$5,000.00</strong></td>
<td><strong>$7,250.00</strong></td>
<td><strong>$9,500.00</strong></td>
<td><strong>$9,500.00</strong></td>
</tr>
</tbody>
</table>

### Gross Revenue/acre

<table>
<thead>
<tr>
<th>Description</th>
<th>0</th>
<th>50%</th>
<th>75%</th>
<th>100%</th>
<th>100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total yield in pounds dried/acre</td>
<td>0</td>
<td>750</td>
<td>1125</td>
<td>1500</td>
<td>1500</td>
</tr>
<tr>
<td>Fresh wholecone wet ($5-6 /lb.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wholecone dried ($10-12/lb)</td>
<td>0</td>
<td>$10,500.00</td>
<td>$15,750.00</td>
<td>$21,000.00</td>
<td>$21,000.00</td>
</tr>
<tr>
<td>Pellitized ($12-14/lb.)</td>
<td>0</td>
<td>$10,500.00</td>
<td>$15,750.00</td>
<td>$21,000.00</td>
<td>$21,000.00</td>
</tr>
</tbody>
</table>

### Net Revenue/acre

<table>
<thead>
<tr>
<th></th>
<th>$ (2,565.00)</th>
<th>$ (180.00)</th>
<th>$ 2,820.00</th>
<th>$ 5,820.00</th>
<th>$ 5,820.00</th>
</tr>
</thead>
</table>

- **UVM**-$1.60/lb for picking only
- **A couple of MI processors**- ~$5.50/lb (including a 10% sales commission)
- **Ontario** $4.50/lb (no sales or marketing)
- **Quebec and BC**- (they charge 35% of sales amount) or currently $5.50/lb since they are selling for close to $16/lb (including access to mechanized harvester + dryer) and post-harvest services (including pelletization, packaging, commercialization)
- **A group in Wisconsin** was charging $4/lb just for pelletizing, packaging, and selling.
- **Depends on your assumptions** (lbs per acre, cost of labor, payment on debt, etc.), but it looks like things are shaking out at around **$5/lb for the process of picking through selling.**
TAKE HOME MESSAGES

• Quality is crucial
• Do not skimp on establishment
• You will not get rich growing hops
• Hi initial and annual costs with questionable returns in the future

• Wolf (picker) $50,000+
• Hammermill & Pelletizer $10,000-15,000
• Vacuum Sealer $2000-2500
• Dryer $12,000 +
• Energy (wet hop to pellet) $1.50 / lb
• Cold Storage $ ????
• Annual labor for 14 acres Crew of six (2 months working 10 hour + days) $600/day

• Don’t underestimate the amount of labor required
• Need for picking and processing equipment if you plant >1/2 acre
• Line up supplies well in advance
• How will you sell your hops?
• Will most likely need a price premium to do organic
http://www.hops.msu.edu