Feasibility of Small Farms Growing Hops & Specialty Grains Profitably in Howard County

Hobie Cohen, Nora Pittmann & Andrew Roehl
Agenda

Introduction
Market Overview
Feasibility Analysis
Next Steps
Discussion
Consulting Team

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MBA ‘16
Project Manager
University of Maryland

Hobie Cohen
MBA ‘16
Engineer,
Lockheed Martin

Andrew Roehl
MBA ‘17
Litigation Paralegal,
Jones Day
• POC: James Zoller
  • Owns 75 acre family farm
  • Began growing 1 acre of hops 2 years ago
Problem: Hops/Grains Feasibility

- Small farms (5-20 acres) are not making a profit
- Existing and new farmers in the county looking for new, more profitable opportunities
- The county has selected hops and specialty grains as two products for further research
- Determine if hops and grains are viable profitable products for smaller farms in Howard County
Research Methodology

Primary
- 17 breweries, distilleries, home brew shops, farm breweries
- 6 professors and extension agents
- 5 Howard County Farms and farmers

Secondary
- USA Census Data; Cornell University and University of Vermont hops research
Feasible in Future but Not Today

- Howard County small farmers unlikely to be profitable in current markets
- Significant barriers to entry for both markets
- Buying local not enough
- High quality and consistent yields valued by breweries and distilleries
The Market for Beer and Spirits

- **MD and D.C. Breweries:**
  - 70 Breweries (60 MD) (10 D.C.)
  - 10 farm breweries (grow/brew in same location)
  - 7 distilleries
  - 5 homebrewing shops
  - MD and D.C. breweries source ingredients from Europe, Canada, and rest of U.S.A.

**Number of MD Breweries**

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
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<tbody>
<tr>
<td>2011</td>
<td>25</td>
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<tr>
<td>2012</td>
<td>31</td>
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<td>2013</td>
<td>34</td>
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<tr>
<td>2014</td>
<td>40</td>
</tr>
<tr>
<td>2015</td>
<td>60</td>
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</table>
What does HC need to grow Hops?

- Ideal Climate
- Ideal Soil
- Rhizomes Designed for NE
- Hops Knowledge
- Equipment
- Processing
Howard County is Not Ready

<table>
<thead>
<tr>
<th>Feature</th>
<th>Yes/No</th>
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<tbody>
<tr>
<td>Ideal Climate</td>
<td>Yes</td>
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<tr>
<td>Ideal Soil</td>
<td>Yes</td>
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<tr>
<td>Rhizomes Designed for NE</td>
<td>No</td>
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<tr>
<td>Hops Knowledge</td>
<td>No</td>
</tr>
<tr>
<td>Equipment</td>
<td>No</td>
</tr>
<tr>
<td>Processing</td>
<td>No</td>
</tr>
</tbody>
</table>

**Market Overview**

- **Ideal Climate**: Yes
- **Ideal Soil**: Yes
- **Rhizomes Designed for NE**: No
- **Hops Knowledge**: No
- **Equipment**: No
- **Processing**: No

**Introduction**

- **Feasibility Analysis**

**Next Steps**

**Discussion**
One Run of Beer Requires 3 Acres Hops

• For average annual run of one type
• Assumptions
  • 1 ounce - ½ lb dry hops per 5 gal; assume 1.5lb dry hops per barrel
  • 1500lb yield dry hops per acre in NW; ⅙ yield in MD
  • 500 barrels average annual run of a beer for microbrewery
How Much Will 3 Acres Cost?

Farm Set-Up
$25,019

- Poles
- Cable
- Rhizomes
- Orchard Ladder

Processing
$64,850

- Harvester
- Dryer
- Moisture Probe
- Hops Analysis
- Compactor
- Vacuum Sealer
- Pelletizer

Introduction  Market Overview  Feasibility Analysis  Next Steps  Discussion
Will 3 Acres Make Money?

• ~$7,500 revenue by 3rd Year
• ~$23,000 potential annual expenses (including labor)

• Assumptions
  • 250 lbs of hops per acre production
  • $10 per lb to sell pelletized Cascade hops
  • Harvest: 1st Year: 0%, 2nd Year: 50%, 3rd Year 100%
What Does Howard County Need to Grow Grains?

- Ideal Climate
- Ideal Soil
- Grains Designed for NE
- Grains Knowledge
- Equipment
- Processing
Howard County is Not Ready

<table>
<thead>
<tr>
<th>Ideal Climate</th>
<th>Ideal Soil</th>
<th>Grains Designed for NE</th>
<th>Grains Knowledge</th>
<th>Equipment</th>
<th>Processing</th>
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</thead>
<tbody>
<tr>
<td>Yes/No</td>
<td>Yes/No</td>
<td>Yes/No</td>
<td>Yes</td>
<td>Yes/No</td>
<td>No</td>
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</tbody>
</table>
One Run of Liquor Requires 6.5 Acres of Grain

• For average annual run
  • Need less for beer
• Assumptions
  • 67 bu/acre wheat, barley, or rye
  • 55 lb/bu wheat, barley, or rye
  • 1 ton/month required for average annual run of liquor at small distillery
How Much Will 6.5 Acres Cost?

Annual Cost
$2,450

- Seed
- Fertilizer
- Chemicals
- Custom Operations
- Fuel, lube, and electricity
- Repairs
- Other Variable Expenses
- Interest on Operating Capital
- Hired Labor
- Opportunity Cost of Unpaid Labor
- Capital Recovery of Machinery and Equipment
- Opportunity cost of land (rental rate)
- Taxes and insurance
- General farm overhead

Malting Processing
Estimates Unavailable
Will 6.5 Acres Make Money?

- ~$2,450 cost
- ~$2,400 straw revenue
- ~$14,400 malted grain revenue
- Ability to malt unknown; malted grain revenue questionable

Assumptions
- $375 production cost per acre wheat, barley, or rye
- $200 per ton to sell straw
- $0.60 per lb to sell malted grain
Next Steps to Improve Feasibility

- Additional research into growing and production; development of breeding program
- Hops equipment co-op to reduce start-up costs
- Supply chain to source hops-growing materials not currently sold in Maryland
- Building/funding processing facilities in Howard County
<table>
<thead>
<tr>
<th>Establishment</th>
<th>Location</th>
<th>Opportunity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barley and Hops Grill and Microbrewery</td>
<td>Frederick</td>
<td>Chinook, Columbus, Cascade hops</td>
</tr>
<tr>
<td>Frisco Taphouse and Brewery</td>
<td>Columbia</td>
<td>Setting up system in summer 2016 to enable whole leaf brewing</td>
</tr>
<tr>
<td>Maryland Homebrew</td>
<td>Columbia</td>
<td>Smoked malts; Whole leaf hops: Warrior, Target, Nugget, Tettnang</td>
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<tr>
<td>Nepenthe Homebrew</td>
<td>Baltimore</td>
<td>Seeking small hops purchases: 30 ounces every 3 weeks</td>
</tr>
<tr>
<td>MISCellaneous Distillery</td>
<td>Mount Airy</td>
<td>Specialty grains (buckwheat, other)</td>
</tr>
<tr>
<td>Twin Valley Distillers</td>
<td>Rockville</td>
<td>Unmalted grain in 50lb bags; purple corn</td>
</tr>
<tr>
<td>Lost Ark Distilling Co</td>
<td>Laurel</td>
<td>Malted rye; willing to experiment with small batches of local grains (blue corn, teff)</td>
</tr>
<tr>
<td>New Columbia Distillers</td>
<td>DC</td>
<td>Malted barley</td>
</tr>
</tbody>
</table>
Questions?

Thank You!
Appendix
Farming Hops

- Bittering hops commodity; aroma hops differentiated
- 96.7% of U.S. hops is farmed in Pacific Northwest
  - 2015 hops production: MD (15 acres); U.S.A. (43,633 acres)
- Grown/Processed using specialized equipment ($40K - $100K)
- Mechanized process required to be profitable
- Takes up to 4 years to get full yield
- Requires specific environmental conditions, such as latitude of 35-55 degrees
  - Howard County is at 39 degrees latitude
Farming Specialty Grains

• **Barley/Rye/Wheat**
  - Used to make beer and whiskey
  - Grow fairly well locally
  - Local yield (bu/acre) is higher than in North Dakota (leading grain producer)
  - Use same equipment as for other typical grains ($5K - $100K)

• **Barley**
  - Two-row and six-row used for alcohol (two-row better yield)
  - Six-row grows better on East Coast
Hops in Demand

- Hops varieties most common in craft brews
  - Generally:
    - Bittering: nugget, columbus, tomahawk, zeus, warrior
    - Aroma: cascade, crystal, willamette
    - Dual: citra, centennial, chinook, simcoe
  - Locally:
    - Bittering: nugget, columbus
    - Aroma: cascade, amarillo, Czech saaz
    - Dual: citra, centennial, chinook
# Hops Farming in Maryland

## Strengths
- May be able to fetch high price in homebrew shops (pelletized)
- Local interest in quality product (interest does not necessarily equate to sales)

## Opportunities
- Howard County Agricultural Grants
- Brewpubs, homebrew shops (smaller producers that do not can or keg)
- Popular/Grows well locally: Chinook, Cascade, Nugget, Centennial
- Partner with UMD Extension School or MD Brewers Association Agricultural Resources Committee
- Sell hops on Lupulin Exchange

## Weaknesses
- Local climate is not ideal for hops
- No processing facilities in Maryland
- Costly specialized equipment; labor intensive harvest
- Switching - 4 years to get full yield
- Cannot easily combine hops from different sources
- Lack specialty knowledge and proprietary hops possessed by multi-generational farmers in NW
- Must be competitively priced

## Threats
- Drought/insects/disease can wipe out whole crop
- Existing contracts in place for breweries
- Larger hops farms in NW producing cheaper hops with higher reliability of supply
## Specialty Grain Farming in Maryland

### Strengths
- Winter wheat/rye can be grown as cover crops
- Likely possible to mix local grains with others
- Local demand for quality product (interest does not necessarily equate to sales)

### Weaknesses
- No processing facilities in Maryland
- Not so simple to add alcohol quality grains into crop rotation
- Switching - costly equipment to grow only a few acres of grain
- Consistency is questionable
- Must be competitively priced

### Opportunities
- Distilleries may take unmalted grain
- Winter wheat desired for pastry making in PA

### Threats
- Drought/insects/disease can wipe out whole crop
- Existing contracts in place for breweries/distilleries
- Larger farms in NW producing cheaper and more consistent quality product
(Un)Conventional Uses

- **Hops**
  - Beer
  - Soap (smells good)
  - Pillow fill (relaxation, sleep aid)
  - Herbal medicine (relaxation, sleep aid, antibiotic)
  - Tea
  - Edible shoots (tastes like spinach/asparagus)
  - Livestock feed (reduces bacteria)

- **Specialty grains**
  - Alcohol: beer, bourbon (51% corn), rye, wheat whiskey, vodka
  - Baked goods
  - Cereals
  - Soups
  - Livestock feed