Industrial Hemp: Economics and Marketing

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Overview

• Industrial Hemp Market Overview
  – Supply and demand
• Hemp Uses
  – Fiber, Seed/Oil, and CBD Oil
• Marketing Considerations
  – Contracting shared risk / reward
• Cost of Production
  – Estimates and important considerations
Reliable, publicly available data and information is lacking.

SUPPLY AND DEMAND
Supply Snapshot

Hemp is grown in China (~150,000 acres), Canada (~100,000 acres) and Europe (~50,000).

In the US in 2018 total hemp acres grown were estimated at over 78,000 acres (25,713 acres in 2017). Includes hemp grown for all purposes (field and greenhouse).

Top five states based on acres.
1. Montana - 22,000 acres (542 acres)
2. Colorado – 21,578 acres (9,700 acres)
3. Oregon – 7,808 acres (3,469 acres)
4. Kentucky - 6,700 acres (3,271 acres)
5. Tennessee - 3,338 acres (200 acres)

2019 acres = up, but ??????
Hemp Demand

• Demand for hemp is rapidly growing driven by CBD oil and, to a lesser extent, seed and fiber.
• Hemp being included in the 2018 Farm Bill has intensified interest.
• U.S. imports of hemp seeds have decreased significantly from all time highs in 2016 of 39.3 million lbs.
  – In 2017, there was a 57% decrease in seed imports from the previous year.
  – This downward trend is expected to continue as the U.S. hemp grain market continues to mature.
Reported Demand

$820 Million U.S. Hemp-Based Product Sales by Category in 2017

- Hemp CBD: $190 million (23%)
- Food: $137 million (17%)
- Industrial Applications: $144 million (18%)
- Other Consumer Products: $105 million (13%)
- Personal Care: $181 million (22%)
- Supplements: $45 million (5%)

U.S. Hemp-Based Products Sales, 2012-2022e

Source: Hemp Business Journal estimates ($ mil., consumer sales)
Where is Demand heading?

WE DON'T KNOW.....
But there are positive indications from many sources.

$1.9 Billion U.S. Hemp-Based Product Sales by Category in 2022e

Source: Hemp Business Journal estimates ($ mil., consumer sales)
Tennessee Hemp Summary

- 58 (75%) participants reported with 130 acres planted:
  - Size of planting area from couple of pots to 44 acres
  - 64 acres grown acres
  - 25 acres harvested (20%)
  - 56 acres destroyed (43%)
- Most planted for CBD, others for fiber and seed.
- Yield: 8 growers reported their floral material yields, ranges from 10 to 1,000 pounds.
- 2018: over 160 people licensed, licensed acreage over 3,400 acres
Kentucky – How are they doing?

- 2017: 213 Growers (Triple TN)
- 3,200 acres Planted, 2,300 acres harvested (72%)
- 2016 Average Yield: CBD (field, floral material) 392 lbs
- Price: Emerging market, high fluctuation. ‘1st year of the program, KDA received reported price of $1,000/lb. However, prices continue to decline, more products on market today will see prices between $5-$10/lb.’
- Marketing: ‘Some companies provide all of the seed and maybe even an additional portion of the costs. The estimated per acre costs is closer to $5,000 per acre.’
Kentucky Hemp Research . . .

### KDA Industrial Hemp Research Pilot Program

**Annual Overview**

<table>
<thead>
<tr>
<th>Production Year</th>
<th># University Projects</th>
<th>Approved Processors</th>
<th>KY Counties with Hemp</th>
<th>Approved Acres</th>
<th>Planted Acres</th>
<th>Harvested Acres</th>
<th>% Grain or Seeds</th>
<th>% Fiber</th>
<th>% CBD</th>
<th>% Grain &amp; CBD</th>
<th>% Grain &amp; Fiber</th>
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<td>7</td>
<td>9</td>
<td>20</td>
<td>14</td>
<td>-</td>
<td>33</td>
<td>47%</td>
<td>32%</td>
<td>21%</td>
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<tr>
<td>2015</td>
<td>8</td>
<td>29</td>
<td>99</td>
<td>41</td>
<td>1,742</td>
<td>922</td>
<td>500</td>
<td>47%</td>
<td>6%</td>
<td>47%</td>
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<tr>
<td>2016</td>
<td>17</td>
<td>45</td>
<td>137</td>
<td>60</td>
<td>4,600</td>
<td>2,300</td>
<td>2,000</td>
<td>34%</td>
<td>6%</td>
<td>6%</td>
<td>60%</td>
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<tr>
<td>2017</td>
<td>17</td>
<td>49</td>
<td>204</td>
<td>71</td>
<td>12,800</td>
<td>3,200</td>
<td>2,300</td>
<td>36%</td>
<td>5%</td>
<td>27%</td>
<td>32%</td>
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<tr>
<td>2018 (Sept)</td>
<td>14</td>
<td>72</td>
<td>210</td>
<td>73</td>
<td>16,100</td>
<td>TBD</td>
<td>18%</td>
<td>4%</td>
<td>61.5%</td>
<td>14%</td>
<td>2.5%</td>
</tr>
</tbody>
</table>

Real. Life. Solutions.

[Link to University of Tennessee Extension's website]

[Logo of University of Tennessee Extension]
INDUSTRIAL HEMP USES

Fiber, Seed/oil, and CBD Oil

CBD Gummies (Hemp)
⭐⭐⭐⭐⭐
$17.99

CBD Vape Oil (Hemp)
⭐⭐⭐⭐⭐
$30.99 – $64.99

CBD Oil (Hemp)
⭐⭐⭐⭐⭐
$34.99 – $134.99
Industrial Hemp Market Overview

• Hemp Uses
  – Fiber
  – Seed / Oil products (non-CBD)
  – CBD Oil

• Hemp varieties and production practices should be characterized by intended use.
  – Different varieties and production practices for different uses.
Industrial Hemp Markets

• Variety selection is essential for final use
• We still don’t know definitively how plants will perform in Tennessee.
  – THC content must be below 0.3% (by dry weight)
  – Varieties of hemp that produce higher CBD oil content are desirable.
• Question: How much of the % of CBD oil (THC?) content is variety specific versus environmental?
• What are the consequences of not meeting the required CBD oil content? (contracting)
Industrial Hemp: Fiber

- Hemp fiber can be used to make twine, paper, carpeting, clothing, building materials, animal bedding, mulch, paper, industrial products, and biofuels.
- Fiber can be injected/molded to form composite materials (packaging, bowls, etc.)
- Production practices can be key when obtaining a market
  - Organic?
  - Sustainability?
Industrial Hemp: Seed / Seed Oil (non-CBD)

- Hemp seed can be consumed in food and feed products similar to other oilseeds produced in Tennessee.
- Hemp seed or oil can be found in cooking oil, salad dressings, pasta, and snack products.
- Oil can be used to make personal care products, pet food, cosmetics, medicines industrial products, paints, solvents, and lubricants.
Industrial Hemp: CBD oil

- Cannabidiol (CBD oil) is a natural component of industrial cannabis or hemp.
- CBD oil is cannabis oil that has a significant content of cannabidiol.
- It is made from the flowers, leaves and stalks of hemp and not from its seeds like hemp oil.
- Proponents of CBD oil claim that it can treat a wide variety of health issues, ranging from everyday ailments to chronic medical conditions. These issues include: Acne, Anxiety, Chronic pain, Depression, Epilepsy, Glaucoma, Insomnia, Loss of appetite, Muscle spasms and Parkinson's disease.
Industrial Hemp: CBD oil

• Cannabis research firm Brightfield Group estimates that the U.S. market for hemp-derived CBD hit $291 million in 2017 and will balloon to $1.65 billion by 2021 – growth of more than 500% in just four years.

  – A projected $184.3 million of those consumer sales will take place in the natural product and specialty market channel.
MARKETING CONSIDERATIONS

Know what you are getting into and weigh the risks and rewards
Marketing Considerations

• Before growing hemp know where and how you will sell your production.
• If possible secure a production contract or price guarantee.
• A production contract should specify:
  – Price
    • How is price determined? Beware of vague language “determined by a third party”.
  – Quantity and quality to be purchased (acres or min/max production to be purchased)
    • % of CBD Oil on a dry matter basis
    • Is delivery required? “
    • What happens if quality is below the specified minimum standards?
  – Production restrictions (organic?)
  – “Act of God” or force majeure
  – Delivery and payment timeline
  – A start and end date
Marketing Considerations

• Price received per pound for every pound produced may be unlikely to be guaranteed
• Weigh the risks and rewards of any marketing /financial arrangement
• “Rolling the dice” on small quantities is very different than large

But You Can
• Cost/Revenue share with processors/transplant or seed provider supplier
  – Processor provide seeds/transplants (result in reducing costs)
  – Similar to crop share: 25:75; 50:50 (depends on how revenue and expenses are divided)
  – What production risks – Weather, Production, Price / Marketing – can be mitigated
  – Contract? Crop Insurance?
• Work with processors to share risk (relationships are important – but they need to be reciprocal)
• Be skeptical of marketing claims / advertisements that seem too good to be true or lack sufficient information.
• Do appropriate background checks and research to protect yourself from those you enter business relationships with.
• Use qualified professionals to review documents before entering into any legally binding arrangement.
COST OF PRODUCTION

Know what you are getting into and weigh the risks and rewards
Hemp Price

- Hemp growers have reported the market is fetching:
  - $20-$150 per pound of dried flower for use in CBD extraction – or even more if the plant CBD content is high.
    - $10/lb per CBD % - 10% CBD oil = $100/lb
    - High CBD content is essential to obtain premium prices
  - 50-225 cents per pound for seeds intended to be pressed for seed oil or consumed as food.
    - Higher prices for consumption as a food
  - 5-19 cents a pound for fiber.

- Tremendous variability and uncertainty are present in hemp markets
- Finding a stable viable market for 2019 production may be challenging

*** the price is what someone is willing to pay in your area. Prices may swing dramatically in 2019, so try to minimize your risk on the front end***
Hemp Yield

• Fiber Yields: 3-6 tons per acre (6-12,000 lbs)
• Seed Yields: 1,000 – 2,000 lbs
• CBD Yields (% CBD Oil) ????
  – depends on what is measured.
  – % CBD oil on dry matter basis, different content based on the part of the plant
Cost of Production

**Fixed Costs**
- Land
- Machinery
  - Production
  - Processing
- Buildings
  - Greenhouse, Drying, storage

**Variable Costs**
- Slips / seeds
- Plastic
- Irrigation (drip tape, water, power)
- Fertilizers
- Weed, Pest and disease control
- Labor
- Machinery
  - Fuel, oil and filter, R&M, Operator Labor, Taxes Insurance and Housing
- Hanging materials and packaging
- Trucking
- License, Sampling, Inspection Fees
- Interest on operating expenses
### Example Hemp Fiber Budget: Variable Costs

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Unit</th>
<th>Price</th>
<th>Your Price</th>
<th>Total</th>
<th>Calculated Estimate</th>
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<tbody>
<tr>
<td><strong>Income</strong></td>
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<td></td>
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<tr>
<td>Hemp fiber</td>
<td>5</td>
<td>ton</td>
<td>$100.00</td>
<td>$500.00</td>
<td>$0.00</td>
<td>$0.00</td>
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<tr>
<td><strong>Variable Costs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Custom</td>
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<td></td>
<td></td>
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<tr>
<td>Soil test</td>
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<td>$2.00</td>
<td>$2.00</td>
<td>$0.00</td>
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<tr>
<td>Hauling round bales</td>
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<td>bale-miles</td>
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<td>Fert./Soil Amendment</td>
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<tr>
<td>Lime+spreading</td>
<td>0.5</td>
<td>ton</td>
<td>$16.00</td>
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<tr>
<td>N</td>
<td>100.0</td>
<td>lb.</td>
<td>$0.24</td>
<td>$24.00</td>
<td>$24.00</td>
<td>$0.00</td>
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<tr>
<td>P</td>
<td>20.0</td>
<td>lb.</td>
<td>$0.30</td>
<td>$6.00</td>
<td>$6.00</td>
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<tr>
<td>K</td>
<td>20.0</td>
<td>lb.</td>
<td>$0.23</td>
<td>$4.60</td>
<td>$4.60</td>
<td>$0.00</td>
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<td>Other</td>
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<tr>
<td>IH registration fee</td>
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<td>acre</td>
<td>$20.00</td>
<td>$20.00</td>
<td>$20.00</td>
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<tr>
<td>IH THC testing fee</td>
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<td>$2.00</td>
<td>$2.00</td>
<td>$0.00</td>
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<tr>
<td>Seed</td>
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<tr>
<td>Industrial hemp seed</td>
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<td>$87.50</td>
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<td>Rye cover crop seed</td>
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<tr>
<td>Operator labor</td>
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</tr>
<tr>
<td>hour</td>
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<td>Diesel fuel</td>
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<td>Tractors</td>
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<td>Repairs &amp; Maintenance</td>
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<tr>
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<td>$12.45</td>
<td>$12.45</td>
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<td>Additional expenses</td>
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</tr>
<tr>
<td>Interest on operating capital</td>
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<td>$5.62</td>
<td>$5.62</td>
<td>$5.62</td>
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<td><strong>Total Variable Costs</strong></td>
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<td>$279.95</td>
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## Example Hemp Fiber Budget: Fixed Costs

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<th>Fixed Costs</th>
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<th>$27.48</th>
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<td>$18.40</td>
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<td>Tractors</td>
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<td>$100.00</td>
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<tr>
<td>Additional expenses</td>
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<td>$145.88</td>
<td>$0.00</td>
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<td>Land charge</td>
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<td>acre</td>
<td>$425.83</td>
<td>$425.83</td>
<td>$0.00</td>
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</tbody>
</table>

**Total Fixed Costs**

<table>
<thead>
<tr>
<th>Total Costs</th>
<th>$425.83</th>
<th>$0.00</th>
</tr>
</thead>
</table>

| Returns over variable costs | $220.05 | $0.00 |
| Returns over total costs   | $74.17  | $0.00 |

Note: a round bale of industrial hemp fiber weighs approximately 1,200 lbs.

Source: Penn State University
https://extension.psu.edu/industrial-hemp-production

Real. Life. Solutions.
Cost of Production: Important Questions

- Seed/Seedlings
  - Are the varieties I want available?
  - What risks do I face through variety selection?
    - Quality, certified or verified…..
  - Will the varieties selected produce as expected in Tennessee?

- Labor
  - Do I have access to sufficient labor?

- What are my weed/insect/disease control strategies?

- Planting through harvest equipment
  - Do I have access to the required equipment?

- Drying / Storage
  - Do I have access to necessary infrastructure and equipment?

- Access to markets
  - Can I sell the final product?
  - What if I don’t meet the quality requirements? (ie lower CBD Oil %)
Cost of Production: Considerations

• In budgeting the two most often underestimated expenses are:
  – Labor (both management and employee)
  – Capital recovery
• Track expenses and revenue closely, this will allow you to examine changes over time and aid in expansion / financing decisions.
• Keep good records – both production and financial.
Questions, Discussion, and Good Luck

THANK YOU