Canadian Biomass Supply Chain
Improvements to Increase
Investment Opportunities

Industrial hemp

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Vegreville
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- 95 years of operation (former names: Alberta Research Council, Alberta Innovates Technology Futures)
- 350 professional staff (scientists, engineers, technicians, business experts)
- 3000 clients (entrepreneurs, businesses and agencies)
- +1 million sq. feet of laboratory, pilot plant, scale-up
- Research farm - 640 acres of land
Establishing hemp as a mainstream crop for industrial applications

• Fibre contained in hemp stems has great potential to be a valuable feedstock for several well established industries

• To realize potential residing within this crop 16 years ago we assembled a program offering solutions from “Seed to final product”
  o Feedstock development
  o Fibre processing
  o Biocomposite research
  o Market development
Feedstock development domain goals

To develop supply of fibre of **uniform quality and quantity** and to **reduce costs** of fibre production
Three pillars of hemp feedstock development

• Gene discovery
• Breeding cultivars adapted to the prairies
• Agronomic studies
Hemp selection and breeding

• Germplasm evaluation
• Selection of top performers under Alberta soil/climatic conditions
• Maintenance breeding of cv. Silesia
• Initiation of new cultivars breeding for the Prairies
Agronomic studies - Optimization of cultivation practices

Three sites AB (Lethbridge, Vegreville and Falher) covering all agro-climatic zones of the province

- Seeding dates (mid May - mid June)
- Fertilizers (cattle manure, mineral)
- Seeding densities (100 and 250/300 seed/m²)
- N rates and forms (ammonia, urea)
- Harvest dates (for juvenile fibre)
- Herbicide resistance
- Post harvest biomass management - retting
Attainable hemp biomass yields across Alberta

- High fibre yields in the northern portion of the province
- Irrigation increases fibre yield of dual purpose cultivars
- Biomass yields affected by the weather
Hemp straw inventory

- Grain varieties dominate – low biomass yield/quality
- Until recently - virtually no commercial sales of straw
- Presently - demand for high quality straw is growing

<table>
<thead>
<tr>
<th>Grain varieties</th>
<th>Straw Yield (t/ac)</th>
<th>Bast fibre (%)</th>
<th>Hurd (%)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>1-2</td>
<td>15-20</td>
<td>40-50</td>
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<tr>
<td>Fibre varieties</td>
<td>4-5</td>
<td>20-25</td>
<td>50-60</td>
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Hemp harvest

- Harvest of grain type (short stature) varieties may pose a problem (wrapping fibre on moving parts)
- New combines handle hemp straw better
- Need for combines harvesting dual purpose (tall) varieties
- Straight straw harvest is not difficult
Post harvest management - retting

A process of beginning to separate the bast fibres from the hurds

- Types: field – dew retting, tank retting, enzymatic/chemical
- Length of field retting – 4-6 weeks (or over winter) to complete
- Critical for optimum fibre yield and quality
Biomass collection - baling
Straw processing - decortication

- Vegreville VanDommele (Cretes) system commercially available from Belgium utilizing a hammer mill type decorticator

- Capabilities:
  - 4 step process capable of producing 60-95% clean material (bast fibre)
  - Process 1 tonne/hr of input material to produce 1 tonne/day of >95% clean long bast fiber
  - 2-8 inches in length
  - Can process hemp or flax, retted or unretted, round or square bales
InnoTech Alberta fibre fractions

Bast fibre

Hurd
Pan-Canadian hemp and flax field retting study

• Scope - develop innovative agronomic practices to facilitate production of high quality fibre from Canadian agricultural biomass

• Coordinated by CIC; collaborators: InnoTech Alberta, NRC, PAMI, Biolin, and Logistic Unicorp

• Six sites – AB (2), SK, MB, ON, QC

• Three retting regimes – summer, fall, winter

• Biomass processed (decorticated) using lab and commercial scale equipment at Vegreville

• Evaluation of impacts of regional variations (moisture/temperature) and agricultural practices on fibre properties and suitability for different receptor industries manufacturing fibre products
Biomass utilization: Receptors of InnoTech Alberta fibre
Thank you