



# Concept to Commercialization for Specialty Chemicals

## Challenges & Opportunities

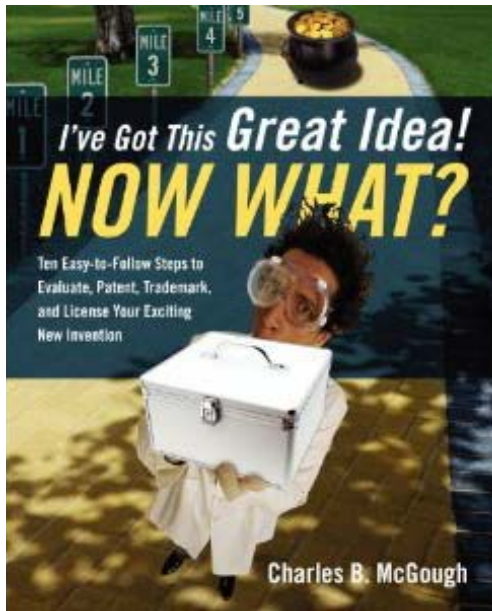
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# Topics

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# From Concept to Commercialization

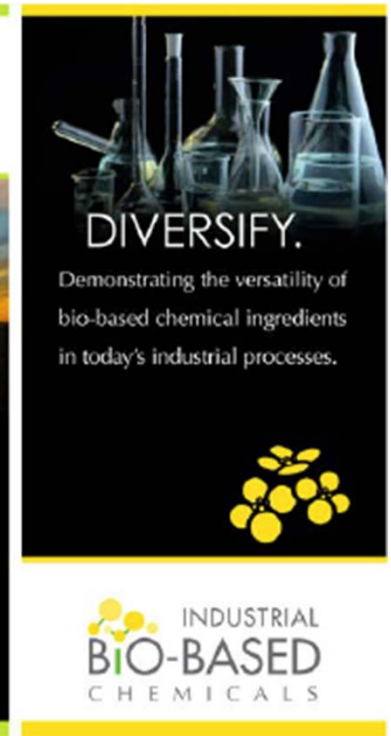


BIO - INDUSTRIAL  
OPPORTUNITIES

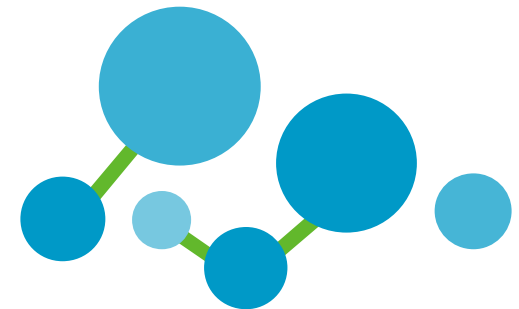


# Specialty Chemical Ingredient Initiative

- Unique government-industry collaboration advancing an emerging bio-based chemistry cluster in Alberta.
- Focused on development and commercialization of innovative, high-value ingredients/products from renewable biomass and biorefining sidestreams.
- [www.agriculture.alberta.ca/biobasedchemicals](http://www.agriculture.alberta.ca/biobasedchemicals)



SPECIALTY  
BIO-BASED  
CHEMICALS





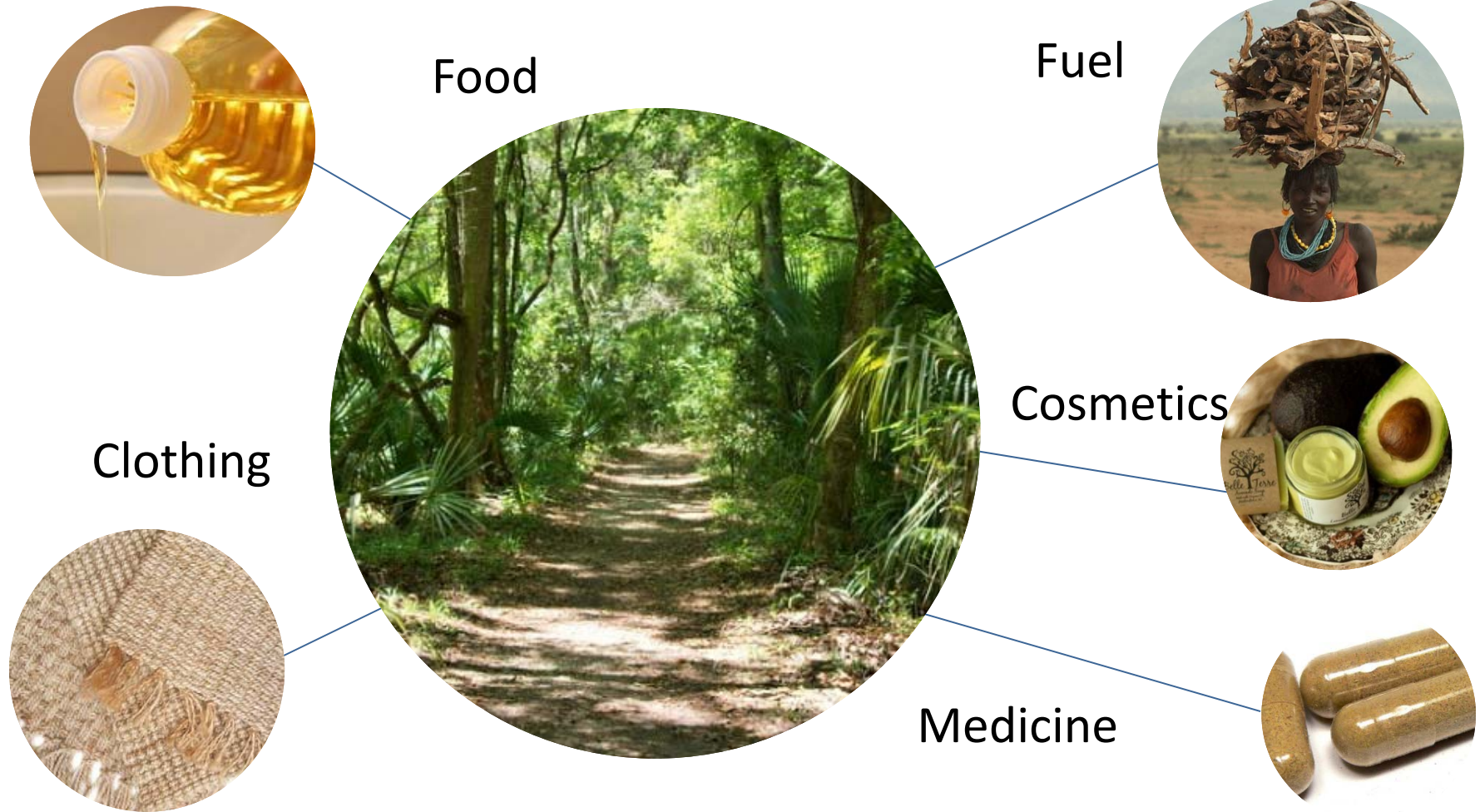
# Specialty Chemical Ingredients Initiative

## Core Goals:

- 1) Growth in Alberta
- 2) Utilization of extracts/ingredients from traditional and non-traditional Alberta grown crops.
- 3) Creation of a diversified economy for this high value added industry.



# Specialty Chemicals



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OPPORTUNITIES



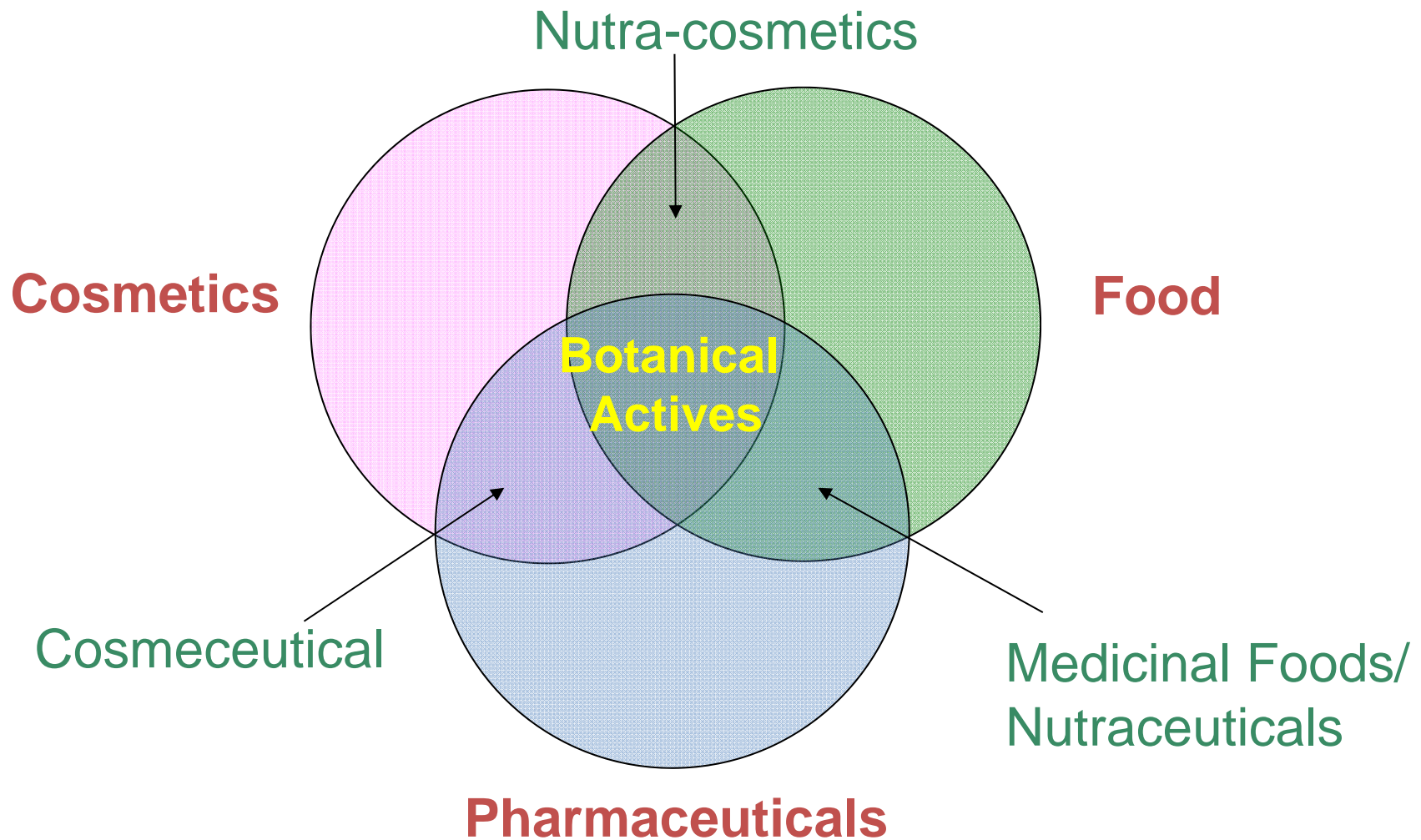
# Specialty Chemicals

- **Bio-based Industrial Chemicals (Construction/Oil/Gas/Institution)**
  - Solvents, plastics, resins, adhesives, lubricants, surfactants, emulsifiers, etc.
- **PhytoCosmetic Ingredients**
  - Plant stem cells, new peptide technologies, skin toning, natural surfactants, natural fixative resins, skin cell signaling actives, natural preservatives, etc.
- **Neutraeuticals/Biopharmaceuticals**
  - Natural Health Product (Herbal extracts/supplements), API and Botanical drugs.
- **Functional Foods**
  - Novel proteins, natural food antioxidants, cardiovascular/cholesterol-lowering actives, natural satiety ingredients, etc.





# Market Convergence of Botanicals





# Growth for Botanical Ingredients

- Increased consumer awareness and preference for active and natural ingredients will drive demand for products such as novel functional foods, nutraceuticals and botanical extracts.
- Botanical extracts will benefit from their perception as being more natural with consumers trending away from synthetic or ingredients derived from petrochemicals.
- Alberta's Oil and Gas industries are "Greening" their processes by utilizing bio-based ingredients and processing aids.
- Increasing use of cosmeceutical skin care products will aid consumption of such high-value bio-based ingredients.



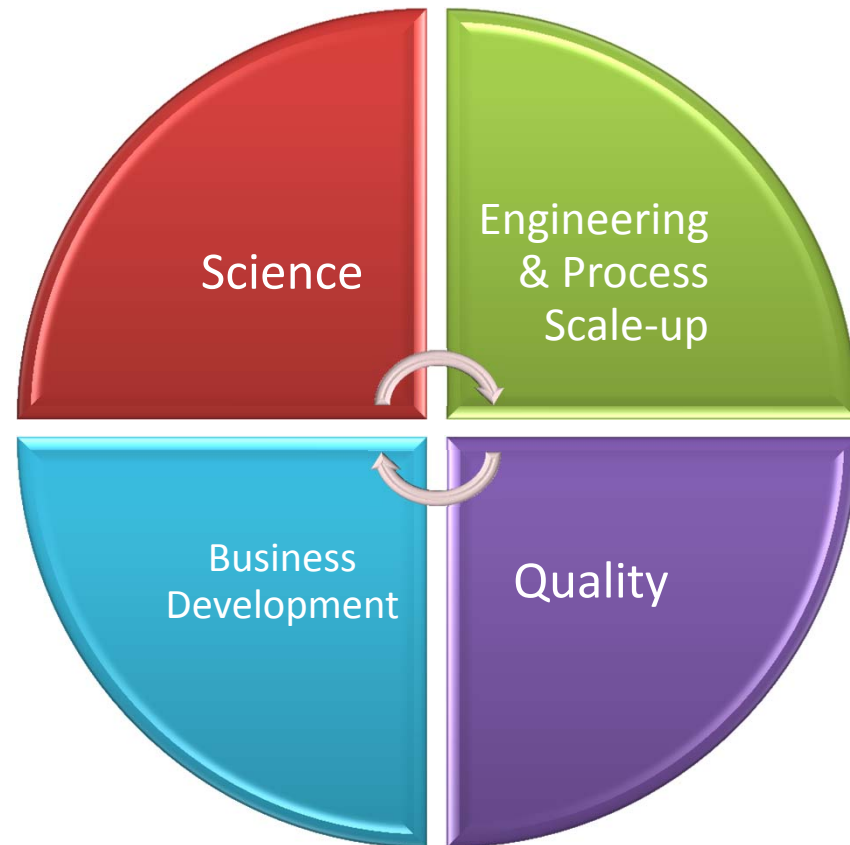
# Green Materials & Products

- Desire to become less dependent on petroleum-based ingredients & products.
- Environmental concern
- Quality Concerns
- Sustainable and renewable concerns
- Turning waste streams into value streams



# From Concept to Commercialization

- Four integrated components
- Varied degrees of experience





# Science

- Understanding your botanical or crop.
- Developing a product/process with commercial intention.
- Strong claim substantiation is important.
- Intellectual property

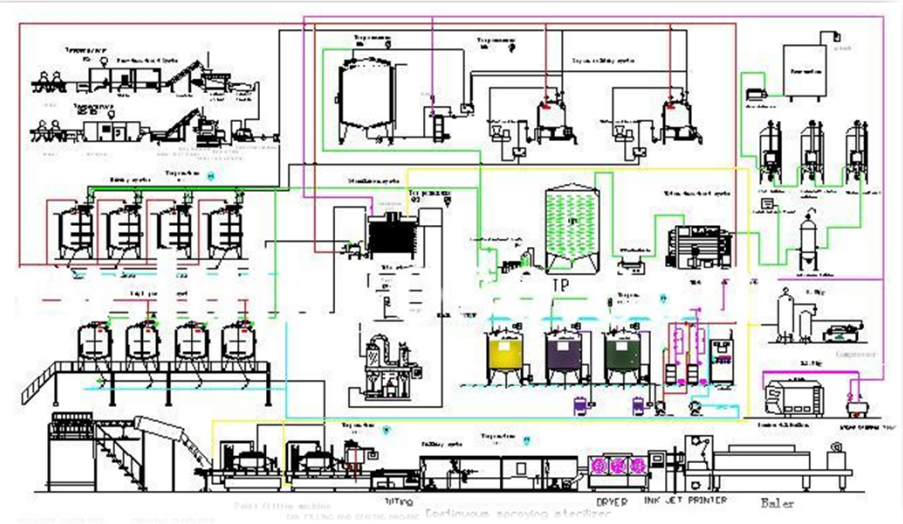


*Physaria tenella*



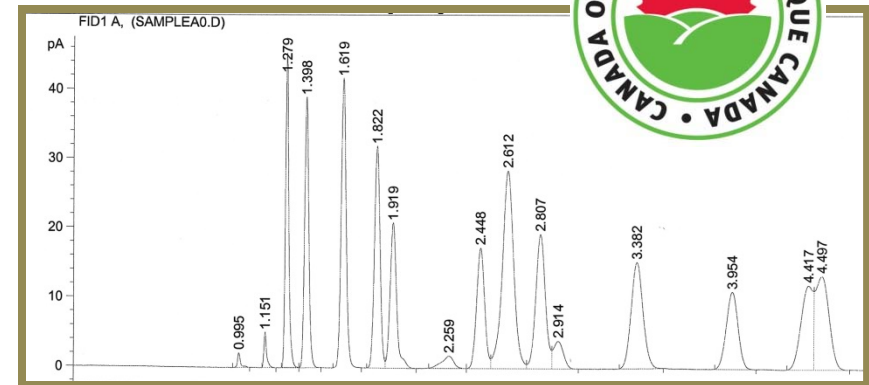
# Engineering & Process Scale-up

- Pilot scale testing
- Equipment evaluation
- New or add-on to existing facility
- Production Cost Analysis



# Quality

- Good Agriculture & Collection Practices (GACP)
- Good Manufacturing Practices (GMP)
- Standardization of active
- Safety
- Regulatory compliance
- Certification





# Business Development

- Competitive Landscape
- Market Research
- Product cost analysis
- Routes to Market
- Funding



# Challenges in Alberta

- Relatively young industries and companies
- Limited success stories
- Size of local market
- Distance to markets
- Supply chain
- Understanding what resources industries want and are available.
- Labour
- Funding
- Development facilities



# Opportunities in Alberta

- Strong Agricultural & Forestry sectors
- Wide range of industrial and specialty crops
- Innovative and entrepreneurial spirit.
- Canadian products are traditionally identified with quality.
- Commitment by both federal and provincial governments to support applied research and new product development.
- Opportunities for international collaboration.





# Bio-Industrial Opportunities Branch



- Industrial Processing experience.
- Strong engineering, scientific & technical expertise.
- Business Development Assistance

- Dry Processing
- Wet Processing
- Product development laboratory
- Explosion-proof extraction area
- Pilot scale processing
- Analytical capabilities



BIO - INDUSTRIAL  
OPPORTUNITIES

# Bio-Industrial Opportunities Branch

## Core Goals:

- 1. New Opportunities from Ag Processing and Production Wastes/By-Products**
  - Reduce/Reuse/Repurpose agricultural production and processing wastes.
- 2. Maximizing Value through Fractionation for Ingredients and Intermediates**
  - Increase utilization and product identification from grains, oilseeds, special crops and biomass.
- 3. Incubation & Pre-Commercialization Business Development**
  - Create an environment for companies to demonstrate, test market and prepare for commercialization.



# Program areas

- Biomaterials & bio-plastics, resins & adhesives
- Cosmetic bio-based ingredients
- Nutraceuticals and supplements
- Industrial processing materials & products
- Functional Foods



# Possible botanical sources

- Food Industry (vegetal waste streams)
- Forestry waste streams
- Existing Agriculture crops
- Marginal/Industrial crops
- Fermentation broths
- Native species
- Specialty botanicals
- Bio-technology streams





# New Extraction & Fractionation Program



Business  
Development  
Assistance



Laboratory to  
Pilot Scale  
process/product  
Development

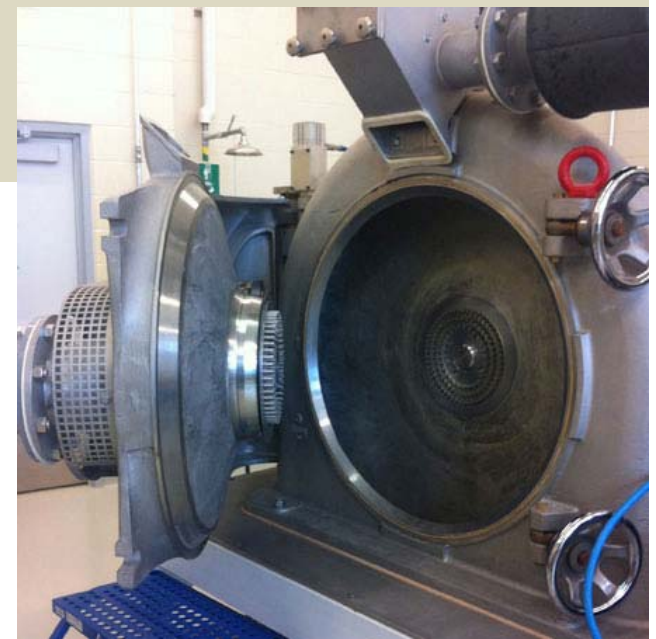


Analytical  
Services support



# Primary Processing

- Bio-mass cleaning
- Sorting
- Milling
- Grinding
- Tempering
- Extrusion



# Secondary Processing

- Extraction
- Maceration
- Distillation
- Centrifugation
- Filtration
- Drying





# Fractionation - Tertiary Processing

- Precipitation/Flocculation
- Membrane Filtration
- Chromatography





# Industrial Hemp (*Cannabis sativa*)

- A developing industrial crop in Canada

- **Current uses**

- Oil
- Seeds
- Protein
- Fiber for clothing
- Cosmetic ingredients



- **Future uses**

- Bulk biomass for structural components (e.g. vehicle parts, building materials, etc.)
- Hulls (sugar components, biofuels)
- Phytopharmaceuticals (e.g. Cannabidiol)



# Summary

- Alberta has strong agricultural & forestry sector capable of supporting the developing of new value-added bio-based products & processes.
- Several provincial research facilities can support industry development from Concept to Commercialization.





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