Overview:

- Introduction to safflower
- Recent interest by biotechnology sector
- Introduction to SemBioSys Genetics Inc.
- Future safflower genomics plans
Safflower: *Carthamus tinctorius* L.

- Traditionally grown for dyes and medicinal properties
- Currently grown mainly for seed
  - Birdseed
  - Animal feed
  - Industrial oil
  - Edible oil
Safflower: *Carthamus tinctorius L.*

- High oil content seeds
- High oleic and linoleic acid varieties (mono/polyunsaturated)
- Very low sat. fatty acid levels
- High vitamin E content (400ug/mL)
Safflower: Renewed interest for molecular farming in N.A.

- Low risk production platform for recombinant proteins:
  - Easily transformable using Agro
  - Recombinant protein levels in seeds are high
  - Very amenable to large scale production and purification

Technology:
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Containment (regulatory):
- Low tendency to weediness
- High degree of self pollination (>90%)
- Low acreages grown in N. America
- No weedy relatives
- GRAS status
SemBioSys Genetics Inc.

State-of-the-art lab facilities for molecular biology, biochemistry, and plant genetic transformation

Approx 26 R&D staff including 12 Ph.D level scientists

Integrated capacity from gene constructs to field level production

Symbol SBS on TSX

www.sembiosys.com
SemBioSys Oil Seed Systems

Proof-of-Concept
Arabidopsis thaliana

Commercial Production Species
Safflower (Carthamus tinctorius)
Stratosome™ Biologics System
Seed Oilbodies

Cross-section of Oil Seed
The process of flotation-centrifugation results in substantial purification of the oil body fraction.
Production of Oleosin Fusions
Recovery of proteinX on Oilbodies

Protein Gel

ProteinX – Oleosin

Oleosins
Products of interest

- Insulin
- Apolipoprotein A1
- Growth hormones
- Healthy fatty acids
- Antibody production and capture

- Safflower oilbodies for use in cosmetic ingredients
Safflower Genomics platform

- NSERC CRD Grant submitted
  
  Modest budget

  Short term goals:
  
  • Generate safflower BAC genomic library and seed EST library
  
  • Use MAGPIE (www.visualgenomics.ca/) to annotate genes expressed in lettuce and sunflower
  
  • Isolate and characterize oleosin genes (RNAi), other seed storage protein genes
  
  • Identify high expressing seed specific promoters
  
  • Isolate genes involved in lipid metabolism (nutraceutical fatty acids)
Safflower Genomics platform

Long term goals:

• Expand EST library to include other tissues
  - microarrays

• Mapping effort and BAC fingerprinting effort

• Larger scale genomic sequencing effort (i.e. Orion Genomics™)
  - using reduced representation techniques
Collaborations

• SemBioSys Genetics Inc.
• Randy Weselake (Univ. of Alberta)
• Christoph Sensen (Sun Center of Excellence for Visual Genomics)
• Allen Good (Univ. of Alberta)
• Steven Knapp (Univ. of Georgia)
• Richard Michelmore (UofC Davis)
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