GrowCanada® Partners In Innovation
A prosperous, sustainable and competitive agriculture sector in a flourishing bio-economy built:

on leadership
In scientific research, innovation
And the adoption of new technologies, and

on working together
In “win: win: win” value chain strategic alliances

To be a world leader in providing new products and new solutions for agricultural, nutritional, health, energy and environmental challenges facing consumers here in Canada and in markets around the world, so that all Canadians will enjoy the economic, environmental and social benefits of the bio-economy.
The transformation of agriculture will be driven by research, innovation and adoption of new technology.
Examples for the proportion of HT-systems in selected countries according to AgBioWorld, Beckie et al., Fernandez-Cornejo&Caswell, PhillipsMcDougall, PlantTech, Sankula, Suszkiw, USDA, J. Wells, and others.

% HT Crops

0 20 40 60 80 100
Australia Canada USA

Sunflower Corn Rice Cotton Soybeans Canola
Transforming crop production - the technology toolbox

- Technology explosion
  - Genomics
  - Combinatorial chemistry
  - High throughput screening
  - Advanced formulation
  - Environmental science and toxicology
  - Precision breeding
  - Crop transformation
  - Bioinformatics
Top 10 Research & Development Expenditures

Bayer CropScience In-house Data

Mio. EUR

- Bayer CropScience
- Syngenta
- Monsanto
- BASF
- DuPont
- Dow
- Sumitomo
- Makhteshim
- Nufarm FMC

Agrochem
BioScience
Cost of New Product R&D (USD)

Source: Phillips McDougall study for ECPA and Crop Life America

Total $152 m.

- Development: $67 m.
  - Chemistry: $30 m.
  - Biology: $32 m.
  - Registration: $13 m.
  - Tox / Env Chemistry: $13 m.
  - Toxicology: $18 m.
- Research: $72 m.
  - Chemistry: $32 m.
  - Biology: $10 m.
- Total: $152 m.

Total $184 m.

- Development: $79 m.
  - Environment Chemistry: $25 m.
  - Toxicology: $20 m.
  - Field Trials: $16 m.
  - Registration: $11 m.
  - Tox / Env Chemistry: $18 m.
- Research: $94 m.
  - Chemistry: $41 m.
  - Biology: $44 m.
  - Total: $184 m.

GrowCanada
WHERE INNOVATION TAKES ROOT
Number of Products Launched Leading to a Successful Product Launch
Source: Phillips McDougal Study for ECPA and CropLife America

<table>
<thead>
<tr>
<th></th>
<th>1995</th>
<th>2000</th>
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<tbody>
<tr>
<td>Research</td>
<td>52,500</td>
<td>139,429</td>
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<tr>
<td>Development</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Registration</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Acknowledgment: Bayer CropScience
The conventional Herbicide Market will continue to represent more than $\frac{3}{4}$ of the total Market in foreseeable Future.

- Selective Herbicides: 60%
- Nonselective Herbicides: 16%
- Non Crop: 11%
- PGRs: 9%
- 'HT Herbicides incl. TUA: 4%

Global Herbicide & PGR Market 2005 ca. € 12 bio

HT Crops will continue to grow in the Americas

Acknowledgement; Bayer CropScience
• Flat to declining mature market
  – 0.8% increase p.a through to 2010
  – sales in Canada $1.1 –1.3 bil per year
• Growth in developing economies (c.p. & biotech)
• Fewer relative $ in Crop Protection R&D
• Harder, more costly to discover better (active/safe) products
• Competition for company resources
• Climbing regulatory costs
• Farmers – careful spending
• Fewer submissions, fewer new products – Canada 10-12 new a.i..s per year
• Herbicides – waiting for a blockbuster? – lower value market – resistance management a threat
• Fungicides, insecticides, seed treatments ($1.5 bil), formulations/timing of apps – more emphasis
• Special crops sector – niche products, higher value
• Minor use policy for crop protection (and plant biotech traits?)
• Rise of generic industry
• Nanotechnology on the horizon
  – nanocapsules/particles delivery systems for pesticides
  – Nanosensors for plant health monitoring and pest detection
• Cost: $100 mil
• Growth at 6.2% per annum through to 2010
• Future
  – Canola a platform of interest
  – More trait stacking, drought tolerance, shatter resistance, enhanced nutritional properties, yield enhancements, nitrogen efficiency
  – Vegetable seed company acquisitions
• Fuel traits
  – Increased crop yield, oil yield, drought tolerance, higher amylase
The New Bioeconomy creates exponential value.

NEW PRODUCTS

CHEMICAL CROP PROTECTION
$25 billion

CROP PRODUCTION (GENETICS & CHEMICALS)
$40 billion

NEW MARKETS

NEW BUSINESS

NEW SOLUTIONS

BIOECONOMY
$500 billion

1995

plant biotechnology

plant breeding

chemical crop protection

fungicides

herbicides

insecticides

others

2015
Firm turns safflower into insulin

BY LEONARD ZEHR
BIOTECHNOLOGY REPORTER

In a breakthrough that could rival the discovery of insulin by Canadians Frederick Banting and Charles Best in 1921, a Calgary biotech company claims to have produced commercial quantities of human insulin from genetically modified safflower plants, a move that could change the economics of the diabetes market.

“We believe that when we’re successful, people in the developing world, who otherwise wouldn’t get insulin because there isn’t enough supply or they can’t afford it, will get it,” said Andrew Baum, president and chief executive officer of Sem-BioSys Genetics Inc.

Currently, pharmaceutical companies use genetically engineered bacteria and yeast to produce synthetic insulin in large steel vats.
The colonel to cut trans fats from his secret recipe

KFC Canada to make menu more healthy with switch to canola oil early next year

By Keith McLelland

Early next year, trans fats will be largely eliminated from Colonel Sanders' secret recipe of 11 herbs and spices.

KFC Canada said yesterday that it will switch by early next year to Canadian-made canola cooking oil—a process that will make the food more healthy without changing the taste, according to the fried chicken chain.

As a result, 90 per cent of its menu items will become trans-fat free, meaning they will contain less than 0.2 grams of trans fats per serving.

"For me that's good, but that's not good enough. I've got the team working with the suppliers of those (other 10 per cent) of products and by early in the new year, they will be all zero grams of trans fat," promised Jeff O'Neill, president and chief operating officer of the Privates Canadian Income Fund, which operates 786 KFC restaurants in Canada.

Mr. O'Neill said the new frying oil will be more expensive, but the increased costs will not be passed along to consumers. He said KFC Canada will find ways to manage the increased costs so the trans-fat-free menu doesn't affect margins.

"This is a good news that KFC is taking this move. They're joining a growing number of fast-food outlets that are taking trans fats out of their fried foods," said Stephen Stuebner, director of health policy at the Heart and Stroke Foundation of Canada.

Trans fats are formed when oil is partially hydrogenated—a process in which liquid oil is made into semi-solid fats like shortening and hard margarine. Regular consumption of trans fats appears to dramatically increase the risk of heart disease. Consumption of just five grams a day increases the risk of heart disease by almost 20 per cent.

"One piece of KFC chicken and french fries currently has 10 grams of trans fats. The slimy on trans fat

<table>
<thead>
<tr>
<th>KFC</th>
<th>French fries</th>
<th>Chicken nuggets*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toronto</td>
<td>9</td>
<td>9.6</td>
</tr>
<tr>
<td>Vancouver</td>
<td>4.5</td>
<td>3.3</td>
</tr>
<tr>
<td>Burger King</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>Toronto</td>
<td>5.4</td>
<td>2.4</td>
</tr>
<tr>
<td>Wendy's</td>
<td>3.1</td>
<td>2.4</td>
</tr>
<tr>
<td>Toronto</td>
<td>2.3</td>
<td>0.8</td>
</tr>
<tr>
<td>McDonald's</td>
<td>1.7</td>
<td>0.8</td>
</tr>
<tr>
<td>Toronto</td>
<td>1.5</td>
<td>0.3</td>
</tr>
</tbody>
</table>

*Deep-fried chicken pieces are known as Popcorn Chicken at KFC. KFC's Chicken Nuggets at McDonald's, Chipotle Tacos at Burger King.

How other U.S. chains are reacting

Burger King Holdings Inc. said in June, 2006, it was "actively researching" alternatives to high-fat products. The company said its plan to eliminate trans fats from its menu in the next few years. The company has said it has "considered several options" and that, based on testing, it has chosen the flavor of the product.

Dunkin' Donuts Inc. has a new menu item eliminating trans fats from its smoothies, muffins and cookies and is researching alternative ways to make doughnuts healthier while still satisfying customers.

SOURCE: INDUSTRIAL LABORATORIES OF CANADA, REUTERS NEWS AGENCY, CEN

1. Science in the Public Interest
1. Implement policy frameworks/regulation that enable innovation.
   - “smart” regulation approach
   - Accelerate the development of science-based policies and regulation
   - Communicating to the public
2. Help farmers adopt and adapt to innovation opportunities
   - Assisting with on-farm infrastructure changes
   - Providing training
   - Closing the technology gap with the U.S.
• 200 specific control points
• Encompass food safety, environmental & social components
  • **Major** (100% compliance)
  • **Minor** (95% compliance)
  • **Recommended**

**Scope of EurepGAP Standards**

**Control points and compliance criteria**

- Food Safety
- Environment
- Social
- Total

*Source: EurepGAP*
Crop Protection Stewardship

- Obsolete Product Management
- Industry Research & Development
- Manufacturing Standards
- Empty Container Recycling
- Agri-Chemical Warehousing Standards
- Responsible Use/Integrated Pest Management
  - Marketing Code
  - MRL Databases (Maximum Residue Limit)
  - MSDS (Material Safety Data Sheets)
  - Grower Safety
- Training & Certification

CropLife Canada
representing the plant science industry

stewardshepfirst
working responsibly to protect people and the environment
Plant Biotechnology Stewardship

- Gene Discovery
- Plant Development
- Seed Production
- Seed Marketing & Distribution
- Crop Production
- Crop Utilisation
- Product Phase-out

stewardshipfirst™
3. Promote market acceptance and enable export market access
   • Communicating technology’s contribution to agriculture
   • Seeking elimination of non-tariff trade barriers
   • Assisting with regulatory capacity building
4. Embrace a new name to reflect the new opportunities and the new way of doing business. ....

Department of Agriculture, Food and Bio-resources
Innovation and Partnership in the Bio-Economy
A Discussion Paper on the future of Canadian Agriculture
For copies of the Grow Canada Innovation paper and the Stewardship Benchmarking report go to:

www.croplife.ca
Thank You
The bio-economy value chain needs to work together to meet consumers’ demands and identify technology-based solutions. As an organization with members who are technology developers, CropLife Canada is committed to working with our value chain partners – especially farmers – to achieve prosperity in agriculture.
Global Status of Biotech Crops in 2005

- **21 countries have adopted biotech crops**
  
  In 2005, global area of biotech crops reached 90 million hectares, representing an increase of 11% from 2004, equivalent to 9 million hectares.

*Source: Clive James, 2005 ISAAA Briefs 34*
<table>
<thead>
<tr>
<th>Region</th>
<th>Impact</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Europe + Japan</td>
<td>High and increasing</td>
<td>Driven by food scares + loss of trust in regulators + industry; many country/company-specific schemes</td>
</tr>
<tr>
<td>Asia</td>
<td>Medium and increasing</td>
<td>Driven initially by export customers but increasingly demanded by local markets</td>
</tr>
<tr>
<td>Latin America</td>
<td>Medium and increasing</td>
<td>Driven initially by export customers but increasingly demanded by local markets</td>
</tr>
<tr>
<td>Africa</td>
<td>Low but increasing</td>
<td>Driven initially by export customers but local schemes also emerging</td>
</tr>
<tr>
<td>North America</td>
<td>Low</td>
<td>High level of confidence in government + regulators but opportunities exist for differentiation</td>
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</tbody>
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