

Agricultural Biotechnology

How is it impacting the world today?



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Outline

- What is biotechnology?
- Are biotech products safe?
- Why do we need biotechnology?
- Benefits of biotechnology
- Questions?



What is biotechnology?

- Ever expanding toolbox of scientific activities
- Plants have been given new characteristics for centuries through selective breeding
 - Breeding plants to increase desirable characteristics like sweetness or seedless
 - Reducing negative characteristics like bitterness, susceptibility to insects or low yields



What is biotechnology?

- Principles of Heredity – Gregor Mendel
- DNA Double Helix – Watson and Crick
- Modern plant biotechnology uses the DNA double helix for more precise breeding increasing the range of potential changes in a shorter timeframe
- Genetic modification (GM) or genetic engineering (GE) involves altering the genetic material of a plant to create a crop with specific beneficial characteristics



Are biotech products safe?

- Canada has one of the safest food supplies in the world
- Biotech crops are the most highly federally regulated product
- Biotech crops have been grown and consumed for almost 2 decades - over three trillion meals have been consumed



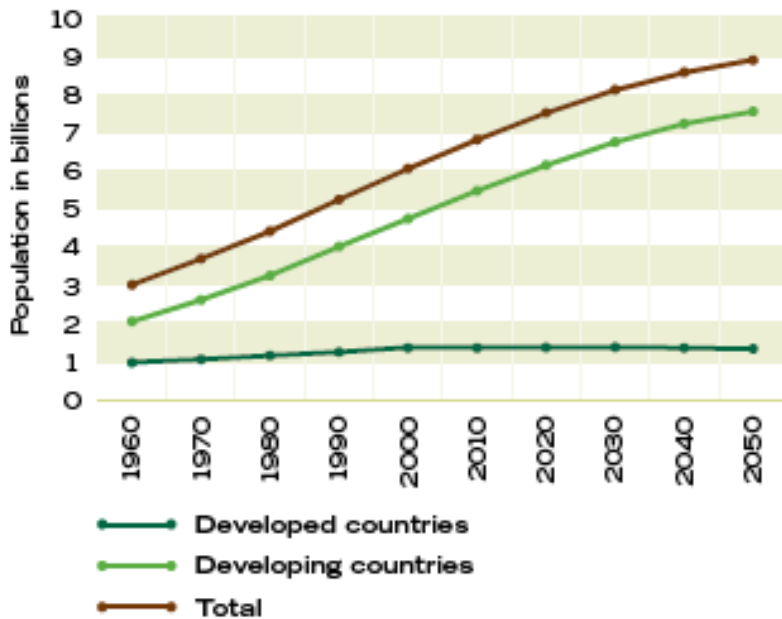
Are biotech products safe?

- The Canadian Food Inspection Agency (CFIA) and Health Canada ensure all GM products are safe for people, animals, and the environment before they are made available for sale and use
- Research conducted both in the lab and in the field takes 8-13 years before it can be approved and commercialized.
- Guidelines for safety review are based on scientific principles developed in conjunction with the United Nation's Food and Agriculture Organization (FAO) and the World Health Organization (WHO)



Why do we need biotechnology?

POPULATION GROWTH,
ACTUAL AND PROJECTED 1960-2050



3.0 billion
1960



6.0 billion
2000



9.0 billion
2050

- Population expected to reach nine billion people by 2050
- Biotechnology can help provide high quality, affordable food to help feed the World's growing global population



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Benefits of biotechnology

- High yielding crops help farmers feed the growing population by producing more food on less land
- Since 1996 biotech crops have added:
 - 74 million tonnes of soybeans
 - 80 million tonnes of corn
 - Almost 5 million tonnes of canola



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Benefits of biotechnology

- Provide consumers with more abundant healthy food
- Biotech crops help reduce agriculture's environmental footprint:
 - Saved over 62 million hectares of land from being turned into farmland
 - In 2008, carbon dioxide emissions were reduced by over 15 billion kilograms - equivalent to removing 7 million cars from the road for a year



Benefits of biotechnology - Examples

Soybean oil



- Research has led to soybeans with healthy profiles:
 - Source of essential omega-3 fatty acids (FA)
 - Alternative to fish oil containing the same FA profile as fish (EPA)
 - Reduces the risk of heart disease, stroke and disease
 - Low-linolenic varieties free of trans fat



Benefits of biotechnology - Examples

Golden Rice

- Contains beta-carotene or Vitamin A, iron and zinc
- Vitamin A deficiency is a major cause of blindness
- Golden rice will help prevent millions of cases of blindness and micronutrient malnutrition in developing countries



Benefits of biotechnology - Examples

Cassava

- 3-fold increased protein content provides nutrition to third world countries



Sorghum

- Improve digestibility boosts the uptake of vitamins, essential amino-acids, iron and zinc



Benefits of biotechnology - Examples



Bt Corn

- Provides the ability for corn plants to fight two major pests
- Minimizes damage caused by the pest reducing dangerous mycotoxins
- Reduces the number of pesticide applications to manage the pests
- Fewer passes over the field reduces greenhouse gas emissions



What will future innovations offer?

- Crops with increased ability to fight pests and disease, for example:
 - Sclerotinia (blackleg) resistance on canola
 - Rust resistance in soybeans
 - Lygus bug resistance on soybeans
 - Increased corn-borer resistance



Benefits of biotechnology - Examples



Herbicide Tolerant canola

- Herbicide tolerance for weeds built into the plant
- Uses less herbicides
- Allows farmers to control weeds without tilling the land
- Prevents soil erosion and water evaporation
- Reduces greenhouse gas emissions



Benefits - Future innovations

- Disease fighting properties
 - Tomatoes with increased lycopene to fight prostate cancer
 - Tomatoes with 10 times the normal levels of folic acid, a B vitamin essential in healthy cell formation
 - Corn and soybeans with increased Vitamin C and E



Benefits - Future innovations

- Fresher, longer-lasting and tastier foods
 - Sweeter peppers and peas
 - Strawberries with improved freshness, texture and flavour
 - Reduced browning and better shelf life of apples, tomatoes, bananas, melons and potatoes



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What will future innovations offer?

- Drought-tolerant crops
 - By 2025, the UN estimates approximately 1.8 billion people will be living with water scarcity
 - Water efficient maize is expected to provide yield increases of 20 to 50 per cent under moderate drought conditions in drought-prone Africa



Benefits of biotechnology

Canadian farmers have a world-renowned track record of producing safe, nutritious and affordable food
and
plant biotechnology helps make that happen.



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THANK YOU!

QUESTIONS?

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