

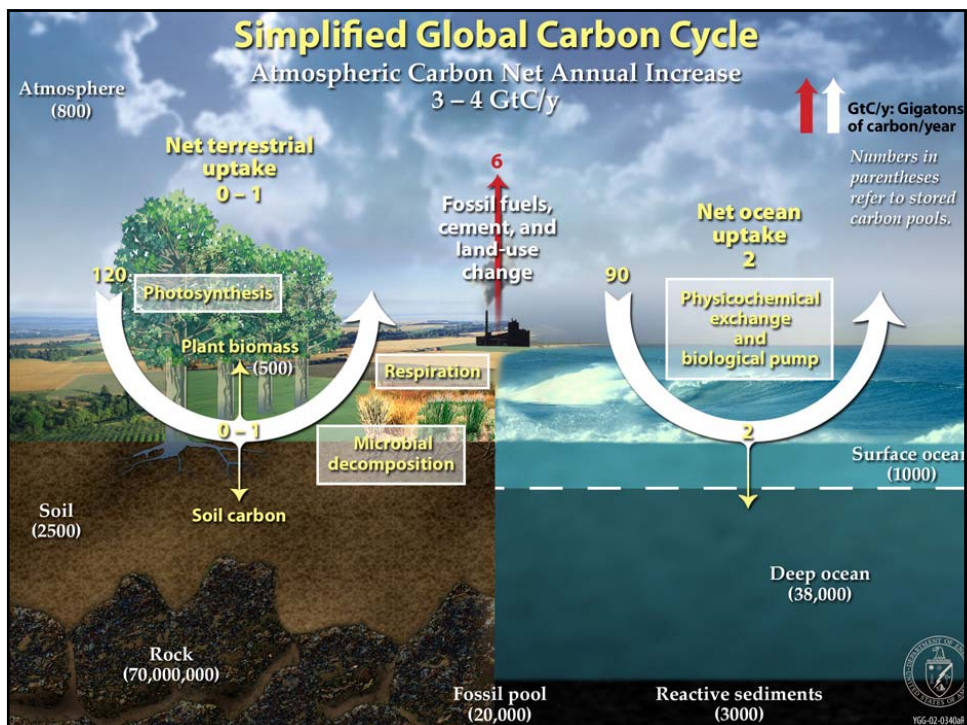
Biofuels and bioproducts genomics

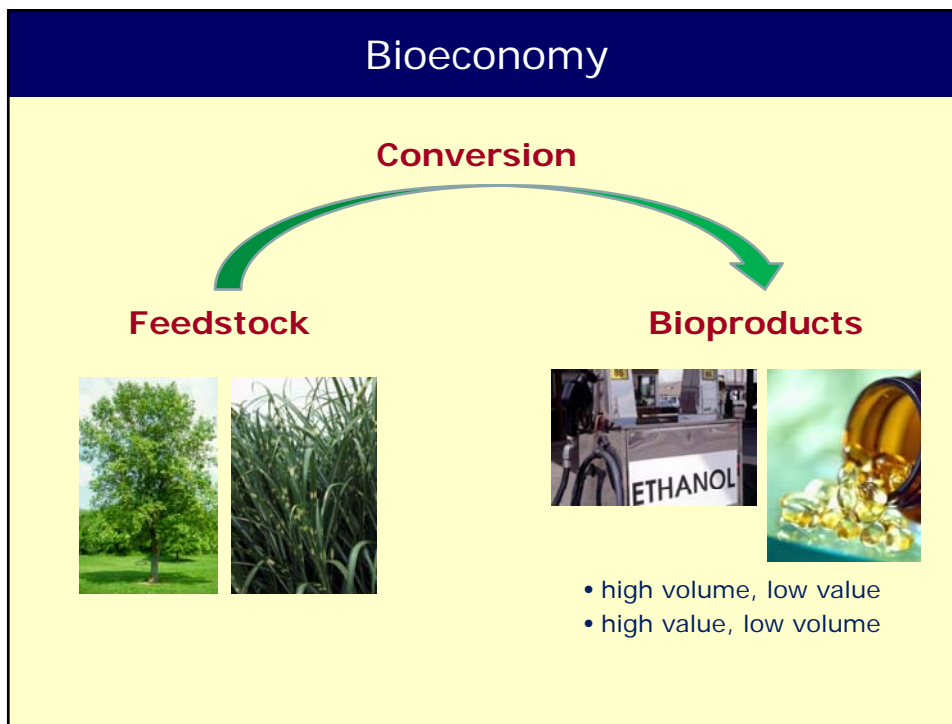
CRRG Roundtable on environmental issues

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<https://fungalgenomics.concordia.ca>





Role of genomics in bioeconomy

- Bioeconomy is fundamentally about the harnessing of the output of living systems to create the energy, chemicals and materials that feed modern society.
- Genomics concerns the understanding of living systems at the most fundamental level.
- Conclusion – genomics will shape and contribute to the development of the bioproducts sector in profound ways.

Feedstock genomics



Optimization:

- production on more marginal lands
- reduced input growing regimes
 - fertilizer
 - irrigation
- improved yield and quality
- diverse climatic conditions

Important considerations:

- energy vs food/feed crops
- energy balance
- alignment with rural agenda
- water utilization and soil replenishment
- biodiversity and conservation
- validating environmental performance and sustainable development

Biofuels comparison

Feedstock



Corn ethanol

Sugarcane ethanol

Oilseed biodiesel

Cellulosic ethanol

Energy balance
 { input
 output



1:1.3



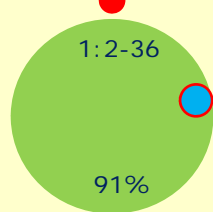
1:8



1:2.5



1:2-36



Reduction in CO₂ emissions

22%

56%

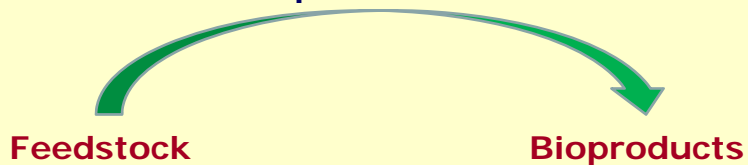
68%

91%

Source: "Green dreams" October 2007, National Geographic

Sustainable conversion technologies

Massive use of novel biocatalysts
(enzymes) and new fermentation
processes



Conversion factories are to be built in
rural communities

Value-added products



Papaver somniferum



Taxus brevifolia

Biorefinery model

- Extract maximum possible value from a given feedstock stream
- Transform low or negative value biomass into higher value products
 - e.g., phenolic polymer in lignin into specialty chemicals
- Metabolic engineering of plants and microorganisms to produce high-value bioactive compounds
 - e.g., codeine and taxol

Coming events

- Fourth competition of genomic Canada
 - Crop genomics for a health Canada
 - Securing Canada's future bio-based economy through genomics
 - Announcement expected in March 2008
 - Research on social, economic, environmental, legal and social issues will be embedded into each large-scale project
- International GE³LS Symposium - Navigating the Changing Landscape
 - April 28-30, 2008
 - The Westin Calgary