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BEEM: Bioproducts and Enzymes from Environmental Metagenomes

Status	Approved
Competition	Applied Genomics in Bioproducts or Crops
Sector	Environment
Genome Centre	Ontario Genomics Institute
Project Leaders	Elizabeth Edwards, U. of Toronto / David Major, Geosyntec Consultants (Guelph)

Project Description

Today's global economy is based upon the production of fossil fuels. But increasingly, as we grapple with the depth of the environmental footprint that the production and use of those fuels leaves, we are searching for sustainable alternatives. One of the most exciting alternatives involves using plant-based material to produce biofuels.

An economy based on the use of these renewable resources will depend upon products made from agricultural crops, feedstock and waste materials. This bio-economy will revolve around new processes that transform low-cost materials into high-value products, while minimizing the release of carbon dioxide and other contaminants into the environment.

Our team of chemical engineers, biologists and policy experts will apply our knowledge of gene sequencing and computer modelling to identify, screen, analyze and clone new proteins. We will determine their potential as catalysts to transform low-value plant residues and waste products into valuable bioproducts. We will screen for communities of microbes that are essential to the fermentation of renewable agricultural or waste materials to convert them into fuel. We will also search for microbial communities that we can use to restore contaminated land and water, by understanding their natural function as one of nature's recyclers to break down the pollution at contaminated sites. We will carefully assess the viability of new biotransformation processes considering economic, policy and regulatory constraints.

We have already worked with pulp and paper mills to develop microbial processes that have reduced the harmful byproducts they produce and generated energy to help power their operations. We have also developed and commercialized a microbial community, called KB-1[®], that is already being used to clean up sites contaminated with solvents. In this project, we plan to apply our basic research knowledge and skills to develop other microbial-based processes to transform, reuse, recycle and remediate contaminants and byproducts from common industrial and agricultural processes. Our goal is to contribute to the sustainability of the biorefineries of the future.

