THE UNIVERSITY OF GEORGIA Bioenergy

Not Your Usual Power Plant: The Biofuels, Biopower, Biomaterials Initiative (B3I)

As the nation and world look to plants to satisfy growing energy demands and lessen global climate change, University of Georgia researchers are searching for answers to both long-term and near-term research questions associated with bioenergy production. The B3 Initiative unites the University's agricultural, environmental, and engineering legacies with its strength in carbohydrate science, genetics, and microbiology to provide scientific and factual foundations to support an economic and sustainable bioenergy future.

Beyond Corn

The rush toward a biofueled future based on ethanol made from corn, a foundation of the world's food supply, has raised the specter of a food versus fuel battle, and led many – including economists, scientists and ethicists – to conclude that generating biofuels may not be a viable means to reduce our reliance on foreign oil and to curb the effects of global warming.

In Georgia, however, we recognize that we can't stake bioenergy's future on food crops. Instead, our scientists, engineers, and entrepreneurs are developing technologies to use biomass wastes, cellulose-containing trees and grasses, and non-food crops to not only produce fuels, but also power and chemicals.

Areas of Emphasis

Microorganisms and Enzymes Enhancing traits of microorganisms for industrial applications and discovering novel mechanisms for more efficient breakdown of plant matter.

Plants/Genetics/Genomics/ Breeding Understanding how higher plant genomes are structured and evolve and applying this research to determine how genetic and genomic diversity can be used for crop improvement for bio-based products including fuels.

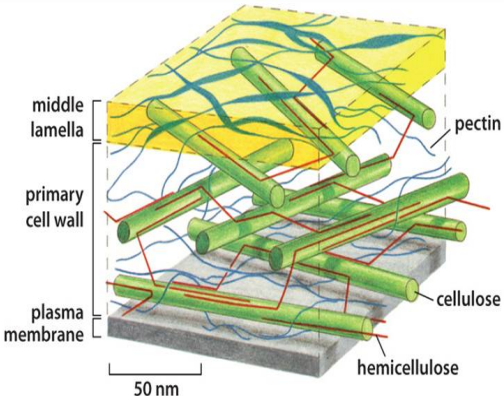
Fermentation / Liquid Fuels Improving existing fermentation processes for ethanol and butanol production, designing new bioreactors, extracting oils for biodiesel production, and recovering co-products enhancing the economic viability of the conversion regime.

Thermochemical Conversion / Pelletizing Pyrolyzing and gasifying biomass for biofuels, including hydrogen; biooils, including flavoring agents; and biochar, a carbon-rich fertilizer. Pelletizing and torrefying for energy dense biomass used for burning with a very high combustion efficiency.

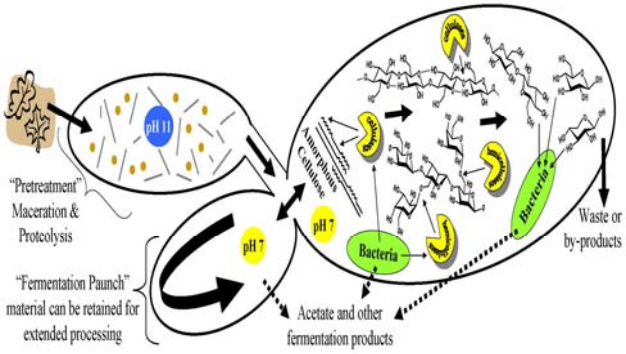
Ecosystems / Sustainability / Nutrition Evaluating feed value and regulation of energy balance in animals and examining practical issues associated with water use, sustainable agriculture and forestry, and designing models for energy by-products in poultry, cattle, and fish diets.

Communication/ Economic Development / External Affairs Developing biomass processing to fuels and energy at pilot development stages. Working directly with policy makers at state and federal levels to educate them on bioenergy issues. Educating individuals and groups from grades K-12, undergraduates and graduate students at the University of Georgia, and industry employees.

A Scientific and Factual Foundation



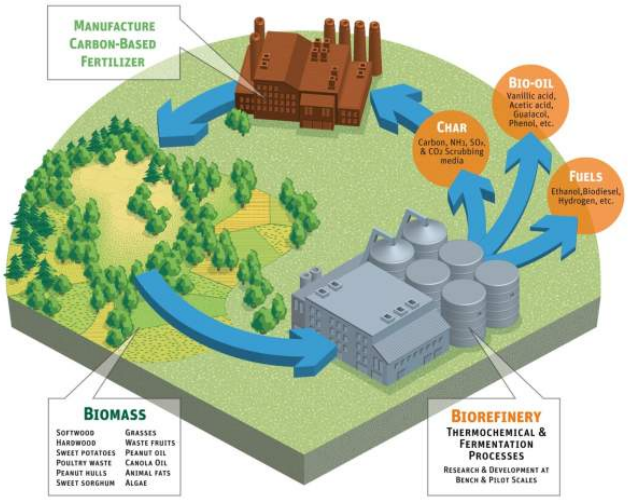
Cell Wall Secrets: A team of UGA scientists, part of a $135 million Department of Energy bioenergy science center, is challenged with finding bioenergy breakthroughs that will make cellulosic ethanol cost-competitive with gasoline by 2013. In collaboration with other institutions and industry, its researchers conduct fundamental science that bridges the gap between the potential of cellulose-based fuels and their reality. Their goal: to find the plants, microbes and enzymes that enable biomass to release their energy stores easily.



Using Nature's Biorefineries as Models: Nature has evolved many systems for breaking down and converting plant matter into useful energy. Examining how microorganisms in concert with plants and animals take apart biomass reveals useful mechanisms for an efficient process that can be mimicked on an industrial scale. One such habitat rich with diverse and previously undiscovered organisms and enzymes is insect digestive systems, which are chockfull of microbes that enable them to digest their biomass food for energy.

Biorefinery and Carbon Cycling: Following the model of the petrochemical industry, the biorefining industry is looking to produce multiple alternative fuels – ethanol, biodiesel, green diesel, heating oil – and also provide renewable bio-oil to chemical companies that manufacture consumer and industrial products.

UGA engineers and scientists have collaboratively launched an innovative and multidisciplinary Biorefining and Carbon Cycling Program centered around the integrated biorefinery. The pilot-scale integrated biorefinery processes a myriad of biomass feed-stocks, including agricultural waste and forest biomass, to produce a variety of fuels and a diversity of revenue-generating products.



Find out more about the University of Georgia Biofuels, Biopower, Biomaterials B3 Initiative (B3I):

Contact: Joy Doran Peterson, Acting Director. jpeterso@uga.edu
Visit: www.bioenergy.uga.edu