



2008 AGRO Early Investigator

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Dr. Ashli Brown is an Assistant Professor at Mississippi State University in the Department of Biochemistry and Molecular Biology. The rapidly depleting crude oil reserves and issues such as global climate change, environmental concerns, and energy security, have prompted her to focus her research on renewable alternatives such as green fuel, biodiesel, and bioethanol. She believes feedstocks which do not compete with food crops and the development of novel uses for the co-products (glycerol and distiller's grains) produced in these processes are required for these alternatives to become economically-feasible energy sources.

In collaboration with a team of researchers from the Renewable Fuels and Chemicals Laboratory at the David C. Swalm School of Chemical Engineering at Mississippi State University, Dr. Brown is using oleaginous yeast, which has been cultivated on medium containing glycerol alone and in combination with a variety of sugars as a potential lipid source. The oil produced by these microbes can be catalytically cracked to make bio-petroleum. She is identifying and characterizing the cellulase-hemicellulase complexes of the oleaginous yeast used in their microbial oil

project in order to optimize the fermentation of biomass into biofuels. Dr. Brown and her colleague Dr. Jeffery Wilkinson (Biochemistry and Molecular Biology, Mississippi State University) with the help of Dr. Paul Williams (USDA-ARS, Corn Host Plant Resistance Unit) are characterizing critical factors in *Aspergillus* that control the degradation of aflatoxin in order to use aflatoxin contaminated corn as a substrate for ethanol production.

An additional challenge with biodiesel is its relatively short shelf life. Oil breakdown can occur through hydrolysis and oxidation of unsaturated fatty acid methyl esters resulting in an increased acid number and viscosity. Working in collaboration with the Mississippi State Chemical Laboratory (MSCL), she is currently developing a sensitive online, automated GC/MS method for monitoring oxidation.

Dr. Brown graduated with honors from the University of South Florida in December 2003, with a PhD in Chemistry. Her graduate research was focused in biochemistry where she characterized the enzyme arginine kinase from the American cockroach, a leading causative agent in allergenic asthma. The extensive kinetic inhibition studies conducted in this project are currently being evaluated for potential ways to control population growth. In 2006, Dr. Brown completed a postdoctoral fellowship with the USDA-ARS where she implemented a "push-pull" strategy to aid in the management of the multicolored Asian Lady Beetle. Critical to the success of this project was her design and development of a unique method to monitor swarming beetles using GC/MS in conjunction with ARC-GIS software. These educational experiences have led Dr. Brown to value multi-disciplinary approaches to agricultural challenges. It is her hope that her multifaceted research approach in renewable alternative fuels will increase the profitability and the bond between American agriculture and bio-refineries.

*Dr. Brown will present her paper in the
Bioenergy Production: Challenges, Concerns, and Consequences Symposium
on Tuesday afternoon, August 19.*