Symbiosis Conference: Expanding Commercialization of Mutualistic Microbes to Increase Bioenergy Crop Production Agenda

Thursday, June 20–Friday, June 21, 2013
Cornell University, Ithaca, New York

Conference Thesis: Utilization of mutualistic symbionts in bioenergy crop production will decrease resource requirements, enhance economics, and address negative impacts of climate variability		
Thursday, June 20, 2013		
8:30 a.m.–9:00 a.m.	Breakfast	
Session I: Plenary Introduction, Biomass Production, and Symbiont Basics		
9:00 a.m.–9:15 a.m.	Conference and Plenary Introduction	Cyd Hamilton, *American Association Advanced Science Fellow*
9:15 a.m.– 9:50 a.m.	Biomass Production, Historical and Current	John Ferrell, *Department of Energy's Bioenergy Technologies Office*
9:50 a.m.– 10:25 a.m.	Overview of Basic Research and Microbial Plant Symbioses	Catherine Ronning, *Department of Energy's Office of Science*
10:25 a.m.– 10:45 a.m.	Break	
Session II: Models and Systems Biology—Stable Mutualisms ***Moderated by Dr. James White, Jr.***		
10:45 a.m.–11:20 a.m.	Defensive and Nutritional Effects of Microbiome	Dr. James White, Jr., *Rutgers University*
11:20 a.m.–11:35 a.m.	*Populus* Root-Associated Microbial Community Exploration	Dr. Dale Pelletier, *Oak Ridge National Laboratory*
11:35 a.m.–11:50 a.m.	Maximizing Mutualistic Symbioses	Jean-Michel Ané, *University of Wisconsin*
11:50 a.m.–12:05 p.m.	Introgression, Yield, Nutrient Use, and Resistance	Michael Grisham, *U.S. Department of Agriculture*
12:05 p.m.–1:30 p.m.	Lunch	
Session II: Models and Systems Biology—Stable Mutualisms (continued) ***Moderated by Dr. James White, Jr.***		
1:30 p.m.–1:45 p.m.	Nutrient Movement within Complex Symbiont Systems	Dan Moebus-Clune, *Cornell University*
1:45 p.m.–2:00 p.m.	Mycorrhizal Effects on Nutrient Efficiency and Yield	Heike Bücking, *South Dakota State University*
2:00 p.m.–2:15 p.m.	Improving Colonization by Mutualists	Gerald Tuskan, *Oak Ridge National Laboratory*

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2:15 p.m.–2:30 p.m.	Plant Breeding and Disease Resistance	Hilary Mayton, *Rutgers University*
2:30 p.m.–3:00 p.m.	Break	
Session III: Agency Perspective–Policy, Regulation, and Sustainability ***Moderated by Dr. Cyd E. Hamilton***		
3:00 p.m.–3:35 p.m.	Biomass Feedstocks at Low Cost and High Quality	Bryce Stokes, *Department of Energy's CNJV*
3:35 p.m.–3:50 p.m.	Low-Input Production Systems on Marginal Land	Mei Chuansheng, *IALR*
Session IV: Commercialization—Barriers and Strategies to Move from Greenhouse to Field Scale ***Moderated by Dr. Cyd E. Hamilton***		
3:50 p.m.–4:20 p.m.	Why and How to Make Endophytes Commercially Accessible	Gary Harman
4:20 p.m.–4:50 p.m.	Exploring the Plant Microbiome and Realizing its Potential	Geoffrey von Maltzahn, *Flagship Ventures*

Friday, June 21, 2013	
8:30 a.m.–9:00 a.m.	Breakfast
Session V: Discussions and Brainstorming	
9:00 a.m.–9:15 a.m.	**Summary and Report Outline** *Moderated by Cyd E. Hamilton*
9:15 a.m.–10:45 a.m.	**Plant Characteristics Integral to Bioenergy Crop Production and Management** *Moderated by James White, Jr.* How can incorporation of symbionts enhance bioenergy crop yields? Is there a way symbionts can alter management of energy crops to facilitate maintenance of high community biodiversity, reduce soil erosion, increase GHG sequestration, reduce GHG emission, etc.? Are there plant characteristics altered due to mutualistic symbiosis possibly of concern in terms of bioenergy crop characteristics e.g., ash production or water content?
10:45 a.m.–12:15 p.m.	**Systems Biology, Genomics Tools... Integral to Ensuring Stable Mutualistic Outcome** *Moderated by James White, Jr.* What have we learned about stability of mutualisms? What about potential resiliency of symbiotum when exposed to climate variability? Does stability or resiliency of symbiotum yield rely on multiple or dominant microbial taxa? If we don't have these answers do we need them to increase scale of commercialization? What technologies, collaborations, approaches can be used to address issues in a timely manner?
12:15 p.m.–1:15 p.m.	Lunch
Session V: Discussion (continued)	
1:15 p.m.–2:45 p.m.	**Addressing Environmental Sustainability of Bioenergy Crop Production via the Employment of Microbial Mutualists** *Moderated by Cyd E. Hamilton* Overall, what are the primary concerns about utilizing mutualistic symbionts from an ecological sustainability

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perspective? What are the indices and criteria used by agencies (DOE, BETO) to define sustainable? Is this different from what we see in policy such as the RFS2 and if so is it a concern for bioenergy crop production? Questions of land use change (LUC), indirect land use change (ILUC), tillage, soil phenomena, trophic dynamics, etc. Can we increase GHG storage and decrease GHGe via mutualistic symbionts in bioenergy crops?
2:45 p.m.–3:15 p.m. Break
Session V: Discussion (continued)
3:15 p.m.–4:45 p.m. **Successes and Challenges to Large Scale Commercialization of Mutualistic Symbionts for Bioenergy Crop Production** *Moderated by Gary Harman* What have individuals and companies done well when commercializing these or similar products? What were the failures and why? Based on what we learned yesterday and the knowledge we came with, what are novel challenges? What are the potential challenges for end users? Based on end-user needs, what can extension specialists provide in terms of education and connecting diverse stakeholders (information dissemination)? What collaborations are needed for commercial success? How are collaborations maintained to reach the commercial goal?
4:45 p.m.–5:30 p.m. **Prepare Report Outline and Solicit Names for Suggested Authors**