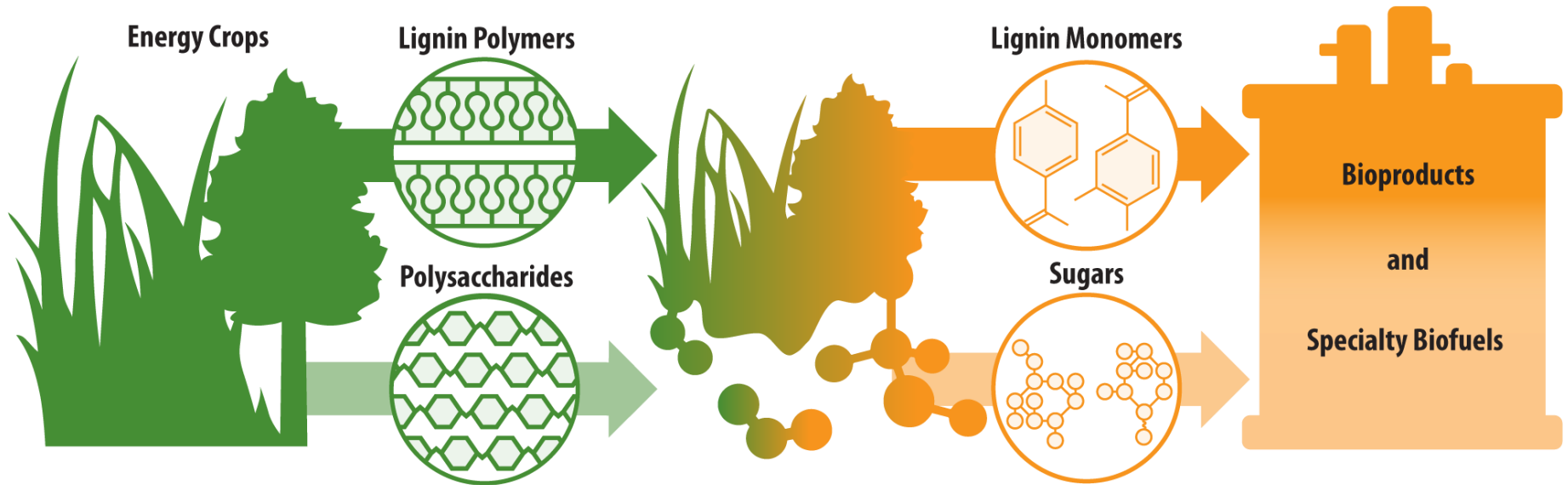


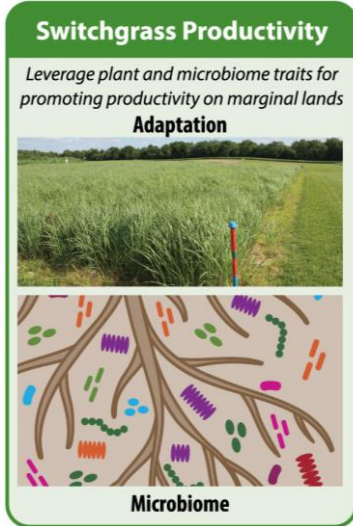
Sustainability Research at Great Lakes Bioenergy

Phil Robertson, Science Director
W.K. Kellogg Biological Station, Michigan State University

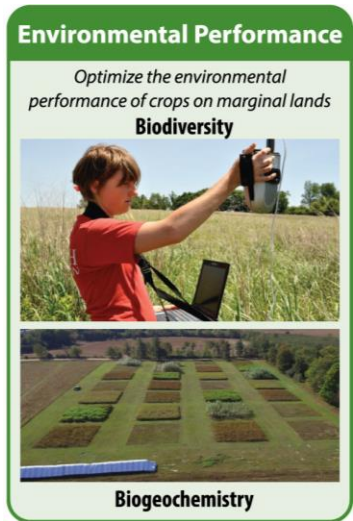


GLBRC is a full-scope DOE Bioenergy Research Center whose mission is to **Generate knowledge to sustainably produce specialty biofuels and bioproducts from lignocellulosic bioenergy crops grown on marginal lands**

Field-oriented sustainability research in GLBRC is designed to:



- Leverage plant and microbiome traits to promote productivity on marginal lands
 - The environmental benefits of switchgrass can be magnified by enhancing productivity with genomic advances in flowering times and overwinter survival
 - Microbiome knowledge will provide options to improve abiotic stress tolerance, especially on marginal lands




- Maximize the environmental performance of bioenergy crops on marginal lands
 - Enhance yields and carbon, nitrogen, water, and biodiversity conservation benefits of bioenergy crops on marginal lands
 - Focal Crops: Switchgrass, Sorghum, Poplar, Prairie
 - Focal Questions: Soil C stabilization, N₂ fixation, N₂O sources, Albedo, Water use and quality

Quantitative Modeling designed to extend empirical results:

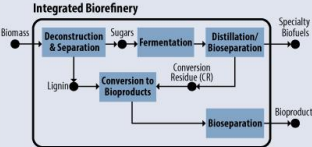
Multi-Scale Modeling

Accurately simulate field-to-product pipelines for future optimization

Landscape Models



Biorefinery Configurations



- Accurately simulate alternative field-to-product pipelines for optimized inputs and outcomes
 - Multiscale models for productivity, biogeochemical, biodiversity, climatic, and economic outcomes
 - Plant-landscape systems models from fields to regions
 - Biorefinery level TEA models
 - Regional LCA models

