

# BESC Special Issue in *Biotechnology for Biofuels*: Findings and Perspectives from 20+ papers

- The BioEnergy Science Center (BESC) has focused on understanding lignocellulosic biomass formation and deconstruction *en route* to the production of biofuels. This deeper understanding of plant cell wall structure and the biological mechanism for efficient depolymerization and fermentation was necessary to provide the underpinnings to “overcome biomass recalcitrance” – the central theme of BESC.
- This dedicated issue features both topical reviews and research articles. An overview of the ten-years of BESC research and top accomplishments is provided by Gilna et al.
- Most of these contributions draw on participants from multiple BESC partner institutions, showcasing the collaborative impacts of a multi-institutional center, critical for accelerating research in bioenergy. Over the course of its decade long tenure, BESC researchers contributed 945 papers in peer reviewed journals and inspired hundreds of early-career scientists to enter the bioenergy field.

1. Yang, et al., Overexpression of a domain of unknown function 231-containing protein increases O-xylan acetylation and cellulose biosynthesis in *Populus*
2. Nelson, et al., Development and use of a switchgrass (*Panicum virgatum* L.) transformation pipeline by the BioEnergy Science Center to evaluate plants for reduced cell wall recalcitrance
3. Rao, et al., Dynamic changes in transcriptome and cell wall composition underlying brassinosteroid-mediated lignification of switchgrass suspension cells
4. Peralta, et al., Xylan epitope profiling: an enhanced approach to study organ development-dependent changes in xylan structure, biosynthesis, and deposition in plant cell walls
5. Thomas, et al., Comparative evaluation of *Populus* variants total sugar release and structural features following pretreatment and digestion by two distinct biological systems
6. Brunecky, et al., Natural diversity of glycoside hydrolase family 48 exoglucanases: insights from structure
7. Krueger-Zerhusen et al., Structure of a *Thermobifida fusca* lytic polysaccharide monooxygenase and mutagenesis of key residues
8. Thomas et al., Adding tetrahydrofuran to dilute acid pretreatment provides new insights into substrate changes that greatly enhance biomass deconstruction by *Clostridium thermocellum* and fungal enzymes
9. Willis et al., The TcEG1 beetle (*Tribolium castaneum*) cellulase produced in transgenic switchgrass is active at alkaline pH and auto-hydrolyzes biomass for increased cellobiose release
10. Sander et al., Targeted redox and energy cofactor metabolomics in *Clostridium thermocellum* and *Thermoanaerobacterium saccharolyticum*
11. Park et al., Defined tetra-allelic gene disruption of the 4-coumarate:coenzyme A ligase 1 (Pv4CL1) gene by CRISPR/Cas9 in switchgrass results in lignin reduction and improved sugar release
12. Zeng et al., Visualizing chemical functionality in plant cell walls
13. Macaya-Sanz et al., Agronomic performance of *Populus deltoides* trees engineered for biofuel production
14. Johnson et al., Field-grown miR156 transgenic switchgrass reproduction, yield, global gene expression analysis, and bioconfinement
15. Eminoğlu et al., Deletion of the *hfsB* gene increases ethanol production in *Thermoanaerobacterium saccharolyticum* and several other thermophilic anaerobic bacteria
16. Harman-Ware et al., The effect of coumaryl alcohol incorporation on the structure and composition of lignin dehydrogenation polymers
17. Verbeke et al., The effect of switchgrass loadings on feedstock solubilization and biofuel production by *Clostridium thermocellum*
18. Wilbanks et al., Comprehensive characterization of toxicity of fermentative metabolites on microbial growth
19. Smith et al., Designer biomass for next-generation biorefineries: leveraging recent insights into xylan structure and biosynthesis
20. Li et al., The effect of liquid hot water pretreatment on the chemical–structural alteration and the reduced recalcitrance in poplar
21. Tian et al., Metabolome analysis reveals a role for glyceraldehyde 3-phosphate dehydrogenase in the inhibition of *C. thermocellum* by ethanol
22. Zheng et al., Expression of *adhA* from different organisms in *Clostridium thermocellum*
23. Gilna et al., Progress in understanding and overcoming biomass recalcitrance: a BioEnergy Science Center (BESC) perspective

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