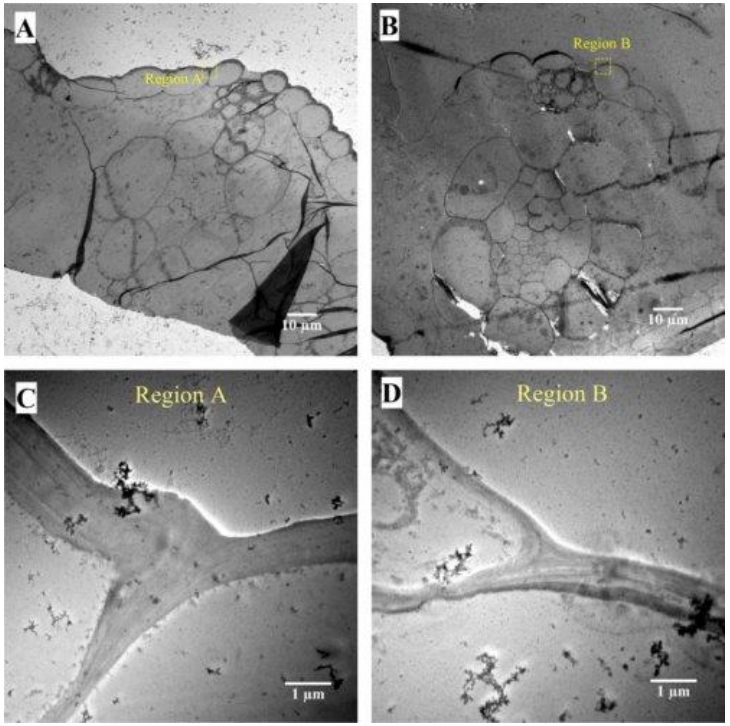
Ultrastructure and Enzymatic Hydrolysis of Deuterated Switchgrass

Cause of higher enzymatic hydrolysis glucose yield from deuterated switchgrass was investigated. Alterations in lignification pattern and looser packing of fibers reduced recalcitrance of deuterated switchgrass

Objective	• Find the cause of higher glucose yields from enzymatic hydrolysis of deuterated switchgrass and better understand cell wall recalcitrance when plants are subjected to environmental stress.
New science	• Differences in lignin distribution and packing of fibers in the cell walls increased surface area of cellulose in deuterated switchgrass, increasing cellulose accessibility and lowering its recalcitrance • Differences in lignification were likely caused by abiotic stress due to growth in deuterated media.
Significance	• It may be possible to engineer plants with reduced recalcitrance by altering the location of lignin within the plant cell wall structure while maintaining the same bulk distribution of lignin, cellulose and hemicellulose

Bhagia, S., Meng, X., Evans, B. R., Dunlap, J. R., Bali, G., Chen, J., Reeves, K. S., Ho, H. C. H., Davison, B. H., Pu Y., and Ragauskas, A. J. 'Ultrastructure and Enzymatic Hydrolysis of Deuterated Switchgrass." 2018, Scientific Reports (In Press).



TEM images of transverse sections of protiated (A, C) and deuterated switchgrass (B, D). Images C and D show magnified regions for the highlighted regions A and B in images A and B, respectively. Scale bars: A, B - 10 µm and C, D – 1 µm. Cell walls of deuterated switchgrass had lignin condensed in specific regions forming light and dark patterns compared to the higher uniformity in lignin distribution in protiated switchgrass cell walls