Insight into grass cell wall biosynthesis

Pubudu Handakumbura, Samuel P Hazen

Department of Biology, University of Massachusetts, Amherst, MA

Utilization of domestic resources has become a necessity in order to maximize the potential for sufficient energy production. Biofuels are a promising renewable energy source that has great potential to meet global energy needs. Cellulose, one of the key components of the plant cell wall, is the most abundant, potentially cost-effective and renewable carbon source available on earth. This polysaccharide can be readily converted into simple sugars suitable for biofuel conversion. A major limiting factor to using plant biomass is the cost associated with feedstock pretreatment that is required to deconstruct biomass to simple sugars. We seek to develop energy crops that are highly amenable to biomass feedstock conversion through elucidating and manipulating cell wall biosynthesis of grasses. We have generated loss-of-function mutants in the grass model specie *Brachypodium distachyon* by specifically targeting putative cell wall genes using artificial microRNAs. We are also developing mutants of putative key transcriptional regulators in order to elucidate the regulation of cell wall biosynthesis. The resulting transgenic plants will be analyzed for changes in target gene expression, cell wall morphology, and biofuel feedstock properties. Functional characterization of these key biosynthetic enzymes and transcription factors will provide a starting point to understanding the transcriptional regulation and the potential for energy crop improvement.