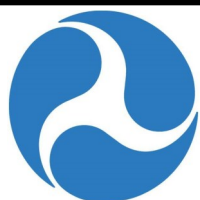


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U.S. Department of  
Transportation



Project Title: *Development of a Process for Bioethanol Production using Eastern Redcedar*

## DR. MARK WILKINS

### Project Goal

The goal of this project was to develop a pretreatment and bioconversion process to use eastern red cedar to produce biofuels and commodity chemicals.

The main objectives were:

- Development of an effective pretreatment process for red cedar pretreatments.
- Observe the effect of red cedar oil during red cedar processing.

### Project Outcomes

- A red cedar pretreatment procedure was developed and optimized for efficient production of fermentable glucose. We found 82% overall wood-glucan-to-glucose yield at 200°C, 10 min, 3.75 g sulfuric acid/100g of dry biomass and 20 g sodium bisulfite/100 g of dry wood.
- Hydrolysis at 16% solid loading (dry basis) produced 105 g/L of glucose in 120 h with a digestibility of 89%.
- A significant model was obtained from the statistical optimization, which predicted 91% overall wood-glucan-to-glucose yield at 200°C, 7.5 min, 3.75 g sulfuric acid/100g of dry biomass and 22.5 g sodium bisulfite/100 g of dry wood. Validation experiments supported the model by achieving 87% wood glucan-to-glucose yield.
- Red cedar oil was inhibitory to cellulolytic enzymes, but did not impact glucose fermentations using *S. cerevisiae* D5A strain. The inhibitory effect of red cedar oil can be prevented by extracting cedar oil prior to conducting hydrolysis and/or fermentations.
- Chemical composition of the heartwood and sapwood fractions showed no significant difference between the glucan and lignin fractions, which indicated that both parts of the trunk could be used for fuel production.



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**End Date:** 11/30/2012

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Oklahoma State University: A portion of one month's salary of Dr. Wilkins for each year, fringe benefits on that salary, & waived indirect costs at a rate of 47.7% of total direct costs.

