



Fundamental Understanding of Converting *Buddleja davidii* to Bioethanol

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PROGRAM DESCRIPTION

- Development of alternative energy, especially for transportation fuel, is becoming a global urgent priority.
- Biofuels, such as bioethanol, derived from lignocellulosic materials are promising sources of energy.
- Finding suitable bioresources and fundamentally understanding the processes involved in the production stream are two key factors in developing low-cost cellulosic ethanol.



TECHNICAL DETAILS

- The bioresource must have agro-energy features and no food value. *Buddleja davidii* has such features.
- Fundamental Understanding include:
 - Detailed biomass characterization
 - Pretreatment of biomass
 - Investigating compositional & structural changes of cellulose and lignin.
 - Enzymatic hydrolysis – determining the efficiency
 - Fermentation – amount of ethanol produced
- Techniques used:
 - Solid-state, ^{13}C , ^{31}P , 2D, and DEPT NMR
 - GPC and light microscopy.



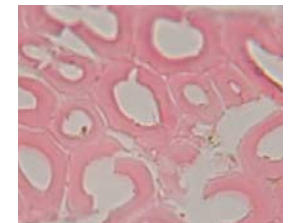
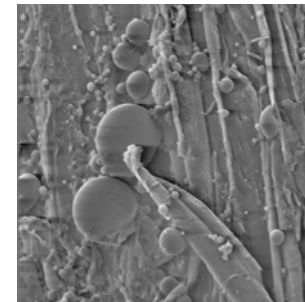
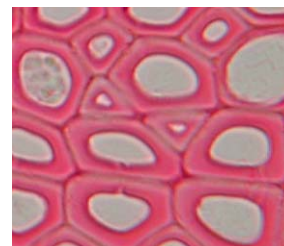
PAYOFF

- Finding new bioenergy resource that could be available in different regions in the world.
- Increasing our fundamental knowledge in this field will allow for significant advancements to unlock cheap cellulosic ethanol.
- New energy source can be developed that can reduce the problem of limited fossil fuels and climate change.



KEY ACCOMPLISHMENTS

- Biomass characterization of *Buddleja davidii*.
- Ethanol organosolv pretreatment
- Efficient enzymatic hydrolysis.
- Structural characterization of cellulose and lignin
- Microscopic investigation of pretreated *B. davidii*.



Professor AJ Ragauskas, Supervisor

