Effect of ionic liquid pretreatment on the chemical composition, structure and enzymatic hydrolysis of energy cane bagasse

Zenghui Qiu, Giovanna M. Aita *, Michelle S. Walker
Audubon Sugar Institute, Louisiana State University Agricultural Center, Saint Gabriel, LA 70776, USA

HIGHLIGHTS

1. Ethyl-3-methylimidazolium acetate is an effective catalyst for pretreatment of energy cane bagasse.
2. Significant lignin removal with slight glucan and xylan losses were observed.
3. Cellulose and hemicellulose digestibilities were significant.
4. Changes in cellulose crystallinity were observed.

GRAPHICAL ABSTRACT

1. Introduction

Lignocellulose is a suitable and renewable energy resource that can be used for the generation of bio-based transportation fuels and chemicals. Current production of bioethanol (first generation biofuels) relies on the use of sugars from food crops. The sustainable and economic production of first generation fuels has, however, come under close scrutiny in the last decade attributed in most part to the competition for limited land and water used for food and fiber production (Alvira et al., 2010). The recently identified limitations of first generation biofuels have caused great emphasis on second generation biofuels produced from lignocellulosic biomass (Sims et al., 2010). The polysaccharides (hemicellulose and cellulose) present in native lignocellulosic biomass are not readily available for bioconversion into fuels and chemicals. The close association and complexity of the carbohydrates–lignin complex is the main obstacle in lignocellulose degradation (Lee et al., 2009; Zhu et al., 2008). Pretreatment aims at breaking the