Nuwan Sella Kapu, J Fundam Renewable Energy Appl 2017, 7:7 (Suppl)
DOI: 10.4172/2090-4541-C1-038

Bamboo: A fast-growing feedstock for a biorefinery

Nuwan Sella Kapu[1], Zhaoyang Yuan[1], Lingfeng Zhao[1], Xue Feng Chang[2], Yangbing Wen[3], Heather Trajano[1], Rodger Beatson[2] and **Mark Martinez[1]**
[1]Department of Chemical & Biological Engineering, University of British Columbia, Canada
[2]Chemical and Environmental Technology, British Columbia Institute of Technology, Canada
[3]Tianjin University of Science and Technology, China

Bamboo is a fast-growing species that is widely distributed in many parts of the world, especially in Asia, with India and China leading in acreage. Moreover, over 1200 species of bamboo have been reported indicating the existence of remarkable genetic diversity. Over the past decade or so there have been increased efforts to develop bamboo as a feedstock for conventional pulp and paper products, dissolving pulp, and cellulosic ethanol. However, its high silica content is a challenge for bamboo processing. Consequences of high silica such as scale build-up in evaporators are well acknowledged in the pulp and paper industry. Recently it was reported that silica also affects enzymatic hydrolysis during cellulosic ethanol production. We investigated alkali-and acid-based chemical methods and mechanical treatments to develop technologies for using bamboo as a feedstock in biorefinery applications. Treatment with NaOH at moderate temperatures led to the removal of more than 95% of silica in bamboo. We successfully integrated this method to a modified kraft pulping process scheme to co-produce dissolving grade pulp, lignin, cellulosic ethanol, and silica at 32%, 20%, 9%, and 1% (% wt. on input dry bamboo), respectively, at lab-scale. Further studies have shown that NaOH treatment can be bolted-on as a unit operation in several approaches for cellulosic ethanol production from bamboo. On the acidic treatment front, we improved the conventional pre-hydrolysis kraft pulping process by incorporating mechanical refining and xylanase treatment to produce dissolving grade pulp. Collectively, these results demonstrate the feasibility of using bamboo as a promising feedstock for a biorefinery.

Biography

Nuwan Sella Kapu has more than fifteen years of experience in the plant sciences and biomass processing. He obtained his Ph.D. (2006) in Plant Biology specializing in cell wall biology and biochemistry from the Pennsylvania State University, University Park. In 2007, he joined Expansyn Technologies, Inc., a start-up company, as Principal Scientist to spearhead research and development programs to commercialize plant cell wall proteins to produce biofuels. From 2010-2015 Nuwan led research efforts in ethanol fermentation and bamboo pulping with Drs. Jack Saddler, Mark Martinez and Rodger Beatson at UBC. He later joined FPInnovations as a Scientist in the Chemical Pulping-Process Engineering group and worked on mill-targeted, applied research programs in kraft pulping. His current research at UBC is focused on developing technologies for bio-products and biorefineries.

nuwan.kapu@ubc.ca

Notes: