Mini Review
Volume 13:7, 2022

Journal of Biosensors & Bioelectronics

ISSN: 2155-6210 Open Access

Bioethanol Production from Agricultural Residues

Ane Galarneau*

Research Director, CNRS Institute Charles Gerhardt of Montpellier, France

Abstract

Because of concerns about depleting fossil fuel supplies, growing population, and industrialization producing ever-increasing fuel use, renewable energy is capturing a larger share of worldwide attention. In reaction to the coming energy crisis, governments all over the world have backed the use of alternative energy sources. The growing cost of oil has heightened interest in biofuels, including bioethanol, biodiesel, and biohydrogen, to mention a few. Biofuels are classified as either first or second generation. First generation biofuels are often produced using traditional processes from carbohydrates, lipids, oils, or agricultural waste. Second generation biofuels are often made from lignocellulosic biomass, which includes cellulosic plant material such as stalks, stems, and wood. Many second generation biofuels are being developed, including biohydrogen, biomethanol, and mixed alcohols.

Keywords: Bioethanol • Hydrogen• Metal Nanowire• Ebiodiesel • Plasmon Resonance

Introduction

Currently, biomass meets around 10% of the world's main energy needs. With growing crude oil costs, resource depletion, political instability in producing nations, and environmental difficulties, biomass has a strong potential to replace the supply of an energy-hungry civilisation such as India. India is a fast rising major economy that has a serious task in meeting its energy demands to feed its burgeoning population. India requires two to three times more energy than it now produces. At the present rate of production and consumption, it appears that meeting this aim will be extremely challenging. As a result, countries like India must invest in renewable energy choices. Currently, sugar and starch-based raw materials, as well as cereal grains, are employed in the manufacturing of bioethanol.

In India, the population has already surpassed one billion people, posing a threat to food security is a national priority, and hence India cannot afford to employ cereal grains for ethanol generation, as is prevalent in other biofuel-promoting countries such as Europe and the United States. So, the accessible sources include plant biomass, which is a plentiful and renewable supply of energy-rich carbohydrates that microorganisms can easily convert into biofuels, the most common of which is bioethanol, which is extensively produced on an industrial scale today. Pretreatment of lignocelluloses is recognised to be essential for rapid enzymatic cellulose hydrolysis. In recent years, much attention has been dedicated to novel sources of vegetable fibres as an alternative to wood raw materials for pulp and paper applications, as well as biocomposites.

Banana, a monocotyledonous annual herbaceous plant, may be a good crop for various purposes. India is the world's second largest fruit grower. Banana is India's most important fruit crop, with significant socioeconomic importance, accounting for 27% of global banana output. It provided 31% of total food output in India. The global banana production is predicted to be 48.9 million tonnes, with India contributing 10.4 million tonnes. India is the world's top producer of bananas, followed by Brazil, Ecuador, the Philippines, and China. Each hectare of banana crop yields roughly 220 tonnes of plant residue, the majority of which is lignocellulose material.

Farmers in nations such as India, where 4.796 × 105 half of the banana is grown, dump banana trash into rivers, lakes, and on roadways, producing major environmental concerns. This agricultural residue requires an ecologically sustainable treatment as well as an alternative commercial purpose. Banana crops' principal residuals are leaves and pseudo stem, both of which contain large quantities of lignocelluloses [1,2]. We reported a process for producing ethanol from lignocellulosics prehydrolyzed by alkali, followed by saccharification carried out by co-cultivation of Aspergillus fumigatus and A. ellipticus and fermentation of the released sugars to ethanol, using a yeast strain Saccharomyces cerevisiae NCIM 3570 in a five litre capacity bioreactor designed for ethanol production.

India is one of the top five producers of bioethanol. Currently, bioethanol is created by the alcoholic fermentation of molasses or simple sugars derived from crops that yield starch or sugar. People have been focusing on forest preservation and developing a sensible approach to use agricultural and forest leftovers in recent years [3]. This trend is being driven by a significant growth in the use of wood fiber-based products, which may lead to illegal logging owing to dwindling allowed wood supplies. Furthermore, the use of cellulose fibre derived from forest and agricultural leftovers offers several advantages, including environmental friendliness, recyclability, and inexpensive or even free raw material. According to statistics, the world's yearly production of lignocellulose fibre from crops was around 4 billion tonnes. In comparison to other important commodities, global yearly steel output was barely 0.7 billion tonnes, while plastic production was only 0.1 billion tonnes. These statistics demonstrate the tremendous potential.While technologies for producing ethanol from simple carbohydrates are well known, those for producing bioethanol from complex lignocellulosic biomass are still in the early stages of research. Agricultural waste products might potentially be cheaply transformed to bioethanol. We employed lignocellulosic substrate from banana pseudo stem to produce ethanol.

Banana plants, which are members of the Musaceae family, are native to the Malaysia-Indonesian area of South East Asia. Bananas are a plentiful natural resource in tropical and subtropical nations across the world. The banana plant is regarded as one of the most beneficial plants on the planet. Almost this plant's components, including as the fruit, peel, leaf, pseudo-stem, stalk, and inflorescence, can all be used. They are utilised in a variety of culinary and nonfood applications, such as thickener, colourant, and flavouring, macro and micronutrient supply, livestock feed, fibres, bioactive component source, and organic fertilisers [4,5].

Conflict of Interest

None.

***Address for Correspondence:** Ane Galarneau, Research Director, CNRS Institute Charles Gerhardt of Montpellier, France, E-mail: anegalarneau@gmail.com*

Date of Submission: 18 June, 2022, Manuscript No. jbsbe-22-73322; **Editor Assigned:** 21 June, 2022, PreQC No. P-73322; **Reviewed:** 25 June, 2022; QC No. Q-73322; **Revised:** 04 July, 2022; Manuscript No R-73322; **Published:** 06 July, 2022, DOI: 10.37421/2155-6210.2022.13.341

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How to cite this article: Galarneau, Ane. "Bioethanol Production from Agricultural Residues." J Biosens Bioelectron 13 (2022): 341.