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Biomethane using Anaerobic Digestion

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Abstract

To support life and growth, the growing world population will need sustainable ways. The continued depletion and growing waste of energy resources will make it difficult for the world's expanding population to survive in the years to come. A sustainable strategy to deal with the growing global food waste problem as well as the dwindling energy supplies can be found in the bioconversion of waste produced at various levels of the food value chain into ethanol. The food waste can be a perfect alternative substrate for creating a decentralised bioprocess due to its high carbohydrate and nitrogen content. In order to make the process profitable, bottlenecks in the substrate collection and transport, pretreatment, fermentative organisms, and product separation must be addressed.

Keywords: Population • Global • Ethanol • Bioprocess

Introduction

The current analysis focuses on the prospects and difficulties for employing food loss and waste at various points along the food value chain, as well as its pretreatment, the fermentation process used to create bioethanol, and prospective methods to boost process economics. Additionally explored are the effects of the substrate, the development of the fermentation process, the downstream processing, and the by-product stream on the commercial viability of bioethanol production from food waste [1].

By 2050, there will be 9.8 billion people on the planet, increasing demand for food and energy resources. The main cause of climate change, biodiversity loss, and rising pollution, according to the 2022 SDGs progress report, is unsustainable patterns of consumption and production. In order to solve these difficulties, there is a global consensus on achieving and creating sustainable practises. The United Nations established 17 Sustainable Development Goals (SDGs) in 2015, which included reducing food waste and ensuring access to cheap, clean energy (SDG 7). These goals are intended to promote peace and prosperity for people and the planet for current and future generations. The recent occurrences of COVID-19, the Russia-Ukraine war, higher fuel prices, and unemployment made the situation worse [2].

Food costs will rise in 47% more nations in 2020 compared to just 16% in 2019, while crude oil prices will experience significant fluctuations, falling to 20 USD/Bbl during COVID 19 and reaching 120 USD/Bbl during the Russia-Ukraine War. Such unfortunate situations frequently hinder the efforts and progress on the SDG targets, worsening the hunger issue and making it more important to develop other energy sources and better recover and repurpose the energy and resources lost in food waste [3].

Research into and advocacy for the use of biofuels were sparked by the pressing need for many countries to achieve energy production self-sufficiency. After the Arab Oil Embargo ended in 1973, the Organization of the Petroleum Exporting Countries (OPEC) implemented a strategic change in this direction by imposing a petroleum embargo that resulted in a four-fold increase in oil prices. Research on ethanol production from food waste dates back to 1920, when it was thought that leftovers from the production industry, like sugarcane molasses and maize cannery waste, might have application in the manufacturing of ethanol. Numerous biofuels, such as methanol, methane, natural gas, propane, hydrogen, etc., have been investigated during the development of biofuels [4].

Literature Review

There are various agricultural, economic, environmental, and geographical limits as a result of the increased use of land, fertilisers, and water resources to meet the demands of the external market for biomass energy crops. The Chinese government has prohibited the use of corn for ethanol production since 2006 as a result of these problems with corn utilisation. It also makes it difficult for landlocked nations to use the limited agricultural land for food or fuel. A successful bioethanol production using maize or sugarcane could lead to problems with worldwide prices, much like those experienced with the petroleum-based product, as the demand for bioethanol rises around the world. In the last few decades, attempts to identify affordable, long-lasting, and widely accessible substrates for the synthesis of bioethanol have expanded [5].

Food waste is the most plentiful, affordable, and widely accessible substrate that can be used for the manufacture of bioethanol among the several substrates that have been investigated and tested. Each year, around 1.3 billion tonnes of food are wasted worldwide, resulting in the loss of 3.3 trillion USD in economic output in terms of land, water, energy, and raw resources utilised to produce food. According to the FAO's 2022 study, 828 million people experienced hunger in 2021, up from 150 million in 2019; 3.1 billion people lack access to a decent diet, and yet such massive amounts of food are wasted. Greater urbanisation, higher living standards, poorer agricultural production, inferior packing and processing techniques, ineffective marketing data, and impulsive purchases [6].

The traditional techniques for valorizing and recycling food waste included anaerobic digestion to create biogas, burning to recover energy, use as animal feed, or composting. Demonstrates the allocation of food waste in the USA by proportion among various applications. Unquestionably, these traditional methods have been promoted in social, economic, and environmental contexts. However, they have a number of drawbacks, including longer times for energy production (anaerobic digestion), high capital and energy costs, and production of persistent organic pollutants (POPs) during combustion, susceptibility to pathogenic microbes in animal feed, unpleasant odour, and GHG production during composting. A study found that 95% of all generated food waste is sent to landfills, where it releases 3.3 billion tonnes of CO_2 annually, making it the third-largest greenhouse gas.

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The waste created across the entire food value chain, from manufacturing to consumption, is known as food waste. When it comes to classifying food loss and waste, researchers have differing opinions. Food loss has been defined as the non-delivery of food goods to consumers as a result of problems with initial production, handling, storage, transportation, processing, and product import. It can include crop, livestock, and fish human-edible commodity waste that, up to and excluding the retail level, directly or indirectly entirely departs the post-harvest/slaughter/catch supply chain by being dumped, burnt, or otherwise disposed [7].

Discussion

The use of a bioreactor in the creation of bioprocesses offers a controlled environment that can better promote cell growth, substrate conversion, and biological process productivity while lowering the overall cost of production of desired products and making the process economical. The yield and productivity of the bioprocess are significantly influenced by the reactor configuration, the operational circumstances, and the mode of operation. Submerged fermentations make up the majority of the bioprocesses developed with FLW for the generation of bioethanol. Rushton impellers, baffles, aerated vessels, and continuous stirring for batch processes are the typical configuration for the bioreactors used in the submerged fermentation. High solid loading will be necessary for the FLW to produce bioethanol economically. High solid loading can occasionally cause mixing issues that result in under aerated mixtures.

Conclusion

The need for sustainable solutions to support and sustain the growth and proliferation of current and future generations has been justified by unplanned anthropogenic activities. Since fuel prices are rising, the population is increasing, and there are fewer resources available, there is an unprecedented demand for alternative biofuels. Bioethanol is a preferred biofuel due to its economic success and technological preparedness. Despite all the benefits that bioethanol provides, if the existing practise of using food products for bioethanol synthesis is not replaced by other sustainable substrates, a food vs. fuel argument will probably challenge the status quo of bioethanol usage in the years to come. Finding new sustainable resources to create bioethanol is vital as the globe struggles to meet rising energy demands.

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Conflict of Interest

There is no conflict of interest by author.

References

1. Xu, Ning, Shixun Liu, Fengxue Xin and Jie Zhou, et al. "Biomethane production from lignocellulose: Biomass recalcitrance and its impacts on anaerobic digestion." *Front bioeng botechnol* 7 (2019): 191.
2. Molino, A., F. Nanna, Y. Ding and B. Bikson, and G. Braccio. "Biomethane production by anaerobic digestion of organic waste." *Fuel* 103 (2013): 1003-1009.
3. Messineo, Antonio, Manfredi Picciotto Maniscalco and Roberto Volpe. "Biomethane recovery from olive mill residues through anaerobic digestion: A review of the state of the art technology." *Sci Total Environ* 703 (2020): 135508.
4. Ma, Shuaishuai, Hongliang Wang, Binshou Wang and Xiaohui GU, et al. "Biomethane enhancement from corn straw using anaerobic digestion by-products as pretreatment agents: A highly effective and green strategy."*Bioresour Technol* 344 (2022): 126177.
5. Nguyen, Dinh Duc, Byong-Hun Jeon, Jae Hoon Jeung and Eldon R. Rene, et al. "Thermophilic anaerobic digestion of model organic wastes: Evaluation of biomethane production and multiple kinetic models analysis."*Bioresour Technol* 280 (2019): 269-276.
6. Yan, Hu, Chen Zhao, Jiafu Zhang and Ruihong Zhang, et al. "Study on biomethane production and biodegradability of different leafy vegetables in anaerobic digestion." *AMB Express* 7 (2017): 1-9.
7. Shen, Yanwen, Jessica L. Linville, Meltem Urgun-Demirtas and Robin P. Schoene, et al. "Producing pipeline-quality biomethane via anaerobic digestion of sludge amended with corn stover biochar with in-situ CO2 removal." *Appl Energy* 158 (2015): 300-309.

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