Research Article

Awareness on production of biodiesel from household waste

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ABSTRACT

Introduction: Waste frying oils transesterification was studied for the purpose of achieving the best conditions for biodiesel production. Biodiesel is proved to be the best replacement for diesel because of its unique properties such as significant reduction in greenhouse gas emissions, non-sulfur emissions, non-particulate matter pollutants, low toxicity, and biodegradability. Waste edible oil is an feedstock in the biodiesel production. The discussion will cover various aspects from oil composition, oil yielding, economics, cultivation materials, land availability, and also the resources availability. **Materials and Methods:** A questionnaire has been conducted among 100 students from Saveetha Dental College on awareness on the production of biodiesel from household waste. **Results:** Most of the waste accumulated in India is found to be form household wastes. 80% of the participants do not know about the zero waste system. There are 45% of the participants who are aware of glass Büchner system. In the present generation, more than 95% of the world biodiesel is produced from the edible oil which is easily available in many large-scale industries from the agriculture land. **Conclusion:** Production of biodiesel from waste cooking oils for diesel substitute is particularly important because of the decreasing trend of economical oil reserves, environmental problems caused due to fossil fuel use, and the high price of petroleum products in the international market. An awareness on the production of biodiesel from household waste was created.

KEY WORDS: Biodiesel, Disposal, Feedstock oil, Transesterification, Waste

INTRODUCTION

Biodiesel (fatty acid) was an non-toxic and biodegradable alternative fuel that is obtained from the renewable sources.[1] A major hurdle in the commercialization of biodiesel is coming from the coconut oil, which is compared to the petroleum-based diesel fuel, the cost of manufacturing and mainly the raw material cost.[2] Used cooking oil, this is one of the economical sources for the biodiesel production among the household waste.

However, the products formed during frying, such as free fatty acid and some triglycerides, can affect the transesterification reaction and the biodiesel properties.[3,4] Apart from these lines, the biodiesel obtained from waste cooking oil gives better performance on the engines and less emissions when they test on the commercial diesel engines.[5]

Biodiesel is the high potential as a new and renewable energy source in this era. Biodiesel can be used as an alternative fuel for vehicles and can replace fossil fuels such as petrol and diesel. In the present generation, more than 95% of the world biodiesel is produced from the edible oil which is easily available in many large-scale industries from the agriculture land.[6]

It provides a market for excess production of vegetable oils:

- It decreases the dependence on imported petroleum
- It does not contribute to global warming due to its closed carbon cycle.

Continuous and large-scale production of biodiesel from the edible oil without any proper planning will cause a negative impact to the world, such as food supply by depletion, leading to economic imbalance.[7] A possible solution to overcome this problem is to use more non-edible oil or waste edible

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oil. In this context, the next question that comes in mind would be if the use of non-edible oil is more of using edible oil.[8,9] Apart from that, if waste edible oil was to be used, it is sufficient to meet the demand for biodiesel. Waste edible oil is an feedstock in the biodiesel production. The discussion will cover various aspects from oil composition, oil yielding, economics, cultivation materials, land availability, and also the resources availability.[10] Biodiesel, which is always a renewable fuel, is mainly made by transesterification of vegetable oil with the alcohol, which was becoming more readily available for blending with conventional diesel fuel for use in transportation applications.[11] Fossil fuels such as petroleum, coal, and natural gas, which have been used to meet the energy needs of mankind are associated with negative environmental impacts such as global warming. Similarly, the fossil fuels accumulated over series of geological activities are irreversibly consumed at a rate more than million times faster than they were formed.[12] This has left us in a precarious position, especially for petroleum products. The hike in the price of petroleum and its products, both in national and international scenes, is frequent for two reasons; the mounting demands and fast depletion of reserves the duo of which call for an alternative source of energy.[13,14] Similarly, in developing countries, the price paid for petrol, diesel, and petroleum products now dominates over all other expenditures and forms a major part of country's import bill.[15] Biofuel/Biodiesel is made from the natural oils and fats which are been considered as a promising substitute for the petrol diesel.[16] Although biodiesel may not entirely replace the fossil fuel, the reasons below justifies: The aim of the current study is to create awareness on the production of biodiesel from household waste.

MATERIALS AND METHODS

A questionnaire-based survey was conducted among the students of Saveetha Dental College, Chennai and the data were collected. The survey was prepared on survey planet and was circulated among the students. The questionnaire consists of 10 questions related to the survey. The survey was conducted among 100 students.

RESULTS

Participants are aware of biogas and its advantages. Most of the waste accumulated in India is found to be from household wastes [Figure 1]. 80% of the participants do not know about the zero waste system. There are 45% of participants who know about the glass Büchner filtration system which is used to obtain the biodiesel from vegetable oil [Figure 2]. In 2017, more than 95% of the Indian biodiesel was produced from the edible oil which is easily available in the large scale industries from the agricultural industries [Figure 3].

DISCUSSION

The discussion will cover various aspects ranging from oil composition, oil yield, economics, cultivation requirements, land availability and also the resources availability. India faces major environmental challenges associated with the waste generation and inadequate waste collection and disposal.[17] Current systems in the world are coping up with the volumes of household waste generated by an increase in the urban population, and this impacts on the environment and public health. The challenges and barriers are significant. Participants are aware of biogas and its advantages. Most of the waste accumulated in India is found to be from household wastes. 80% of the participants do not know about the zero waste system.

Almost 50% of the people are aware of glass Büchner system. In 2013, this system was introduced. Most

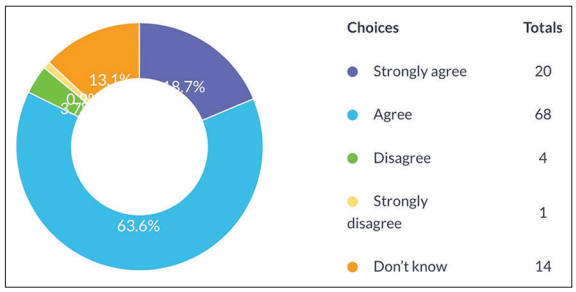

Figure 1: 26% of waste accumulated in India is found to be from household disposal?

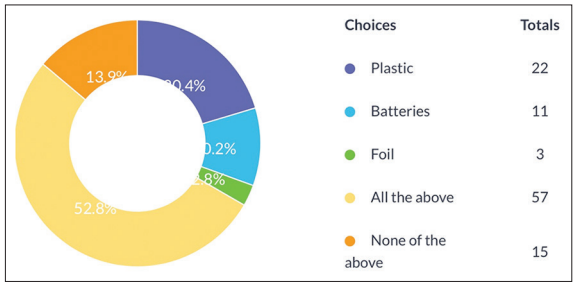

Figure 2: Which of the following below do you think can be recycled?

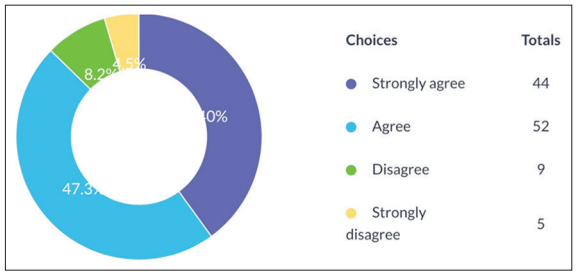

Figure 3: Biogas could be converted from used oils, vegetable scrapping, and sewage for domestic purpose?

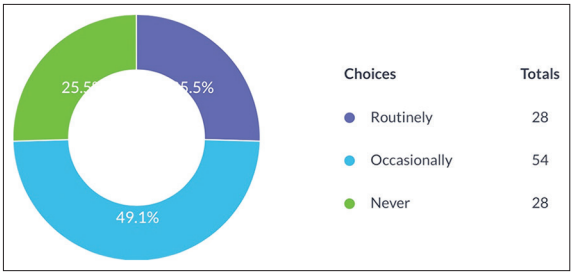

Figure 4: How often do you recycle household waste?

of the people came to know through the media, and there was an article about this system in The Hindu newspaper. Hence, due to this media and articles, people were aware of this system. At present situation, they know that recycling is the best process that no other thing can be done.[18]

There are 45% of participants who know about the glass Büchner filtration system which is used to obtain the biodiesel from vegetable oil. In 2017, more than 95% of the Indian biodiesel was produced from the edible oil which is easily available in the large scale industries from the agricultural industries.[19]

The idea of using alternative fuels has been widely spreading for many years now as a replacement for fossil fuels [Figure 4]. The importance of this idea came from the large scale of utilization of fossil fuels in mechanical power generation in various sectors, such as agriculture, commercial, domestic, and transport sectors, and also the fact of the continuous rise in fuels cost and their eventual vanishment.[20] The use of vegetable oils and their derivatives was found to be one of the reasonable solutions. However, the direct use of vegetable oils in diesel engines was found impractical due to several factors, such as the high viscosity, acid composition, and free fatty acid content.

CONCLUSION

Cost of biodiesel can be reduced by waste cooking oil as feedstock. Nearly 96% of the participants are aware of production of biodiesel from household waste. High fatty acid content in waste cooking oil should be reduced by pretreating waste cooking oil with acid catalyst.

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