PROJECT REPORT ON

WASTE TO WEALTH-BIODIESEL EXTRACTION FROM SEWAGE SLUDGE AND ENGINE PERFORMANCE STUDIES WITH SEWAGE SLUDGE BIODIESEL (SSB)

(Sponsored by Karnataka State Biofuel Development Board and KSCST Bangalore)

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ABSTRACT

A biofuel is any fuel derived from biomass. Bioethanol and biodiesel are the most widely used liquid biofuels. Various feedstocks such as edible oils, non-edible oils, waste cooking oil, fish oil etc. are being used for biodiesel production. Use of edible oils for biodiesel production is not encouraged since it may lead to escalation of food grain prices.

Sewage sludge is an abundant by-product from wastewater treatment facilities. Sludge treatment comprises a substantial portion of the wastewater treatment costs. Handling and disposing of sewage sludge also pose economic and environmental challenges for wastewater treatment facilities. There is a need to identify cost-effective and sustainable solutions to the utilization of raw untreated sewage sludge. Sewage sludge is another non-food feedstock that offers significant potential for biodiesel production. The feedstock cost is typically the major cost items for the biodiesel process. As sludge disposal poses a challenge for wastewater treatment plants, the cost of sewage sludge as a biodiesel feedstock is projected to be less than the cost of traditional seed oils.

The current project work has been chosen considering the energy crisis and serious environmental pollution, and because of the fact that there are considerable lipids in sewage sludge, which can be turned into biodiesel by esterification or transesterification. The whole process is divided into three steps: heat-drying of sewage sludge, extraction of lipids and transesterification. In this work extraction of lipid was done using an organic solvent methanol in a laboratory setup. The extracted lipid was converted in to biodiesel by transesterification. The biodiesel yield was calculated and was found to be about 11 %. Engine performance tests were carried out using 20% blend by volume of Sewage Sludge Biodiesel- SSB with diesel. Results were compared with that of commercially available honge B20 and diesel.

The present work substantiates the reduction in fuel mass flow rate and increase in increase in the brake thermal efficiency compared to diesel. Volumetric efficiency of SSB20 was 9% higher than diesel. Thus, it can be concluded that blending of SSB with diesel helps to enhance the performance of an engine. It is an alternative for fossil fuels and helps to reduce the sewage treatment and waste management problems.

Keywords: Biodiesel, sewage sludge, lipid extraction, transesterification