PRODUCTION OF BIODIESEL FROM FRESH WATER ALGAE AND COMPARISON OF ALGAL BIODIESEL WITH STANDARD BIODIESEL AND DIESEL

Saloni V. Mahyavanshi[1], Dr. Krishpa B. Shah[2], Dr. Brijesh Shah[3]
[1]PG research scholar, [2]Guide (Assistant Professor), [3](Assistant Professor)
[1]Microbiology
[1]Dolat Usha Institute of Applied Sciences and Dhiru-Sarla Institute of Management & Commerce, Valsad 396001, Gujarat, India.
[3]BKM science college Valsad 396001, Gujarat, India.

Abstract: Biodiesel is Biodegradable, Non toxic, less CO_2, NO_X emission. Continuous use of petroleum sourced fuels is now widely recognized as unsustainable because of depleting supplies and the contribution of these fuels to the accumulation of Carbon dioxide in the environment. Biodiesel derived from oil crops is a potential renewable and carbon neutral alternative to petroleum fuels. Unfortunately, Biodiesel from oil crops, waste cooking oil animal fat cannot realistically satisfy even a small fraction of the existing demand for transport fuels. Algae have emerged as one of the most promising sources for Biodiesel production. It can be inferred that Algae grown in CO_2 enriched air can be converted to oily substances. Such an approach can contribute to solve major problems of air pollution resulting from CO_2 evolution and future crisis due to a shortage of energy sources. In the current study, Algal species were collected from Fresh water Algae from Bam Khadi at Shanker talav, Dungri, Valsad. In the first step oil from Algae species was extracted using n-hexane and Di-ethyl ether and the mixture of both as Solvents, while in the second stage extracted oil was converted into biodiesel via Transesterification reaction. This study was undertaken to know the proper transesterification, amount of biodiesel production and physical properties of biodiesel.

***IndexTerms*- Biodiesel, renewable energy, Algal oil, biomass, transesterification, glycerol**

I. INTRODUCTION

Increasing population and industrialization has created serious problems of energy requirement. The current scenario of consumption of fuel has led to a situation that will be no oil reserves beyond 2050. Though, oil remains may be in a surplus amount, environmental pollution inclusive of CO_2, emission could be a jeopardizing effect globally, which might lead to climatic change (Yen *et al.,* 2013). The petroleum reserves are highly concentrated in certain regions of the world, therefore those countries not having these resources are facing energy/foreign exchange crisis, mainly due to import of crude petroleum. It is predicted that 45% of the total energy requirements would be fulfilled by oil and gas which has a vital role in satisfying energy needs of the world (Khan *et al.,* 2009). The petroleum reserves are highly concentrated in certain regions of the world, therefore those countries not having these resources are facing energy/foreign exchange crisis, mainly due to import of crude petroleum (Bisen *et al.*, 2010).

Petroleum product consumption is increasing day-by day because of tremendous increase in vehicle on road. Thus hydrocarbon consumption increase the environmental pollution. Fossil fuel depletion causes increase in diesel demand and uncertainly of its availability is considered as an important factor, which has triggered research towards searches for alternative energy (can be supplemented or replaced for fossil fuels). Petroleum diesel combustion is a major source of green house gas (GHG). Apart from these emissions, petroleum diesel is also major source of other air contaminants including NOx, SOx, CO, particulate matter and volatile organic compounds. As biodiesel production and use increase, new feed stocks are being developed and may soon be introduced into the market. Some examples include pennycress, camelina, cuphea, brown grease, and various strains of algae. Biodiesel is a non-toxic and biodegradable alternative fuel derived from renewable sources (Hossain *et al.*, 2008).

Biodiesel is the mono-alkyl esters of long chain fatty acids, which is derived from transesterification of biological matter. It is an excellent renewable and safe alternative fuel with environment friendly nature (Patil *et al.*, 2011). Biodiesel production from renewable sources can also boost farming and fuel production industries (Xue *et al.,* 2006). The algae are now becoming the main source of biofuel production in the world. They are considered as the safer, non- competitive & rapidly growing organisms among those could be used for biodiesel production. They have the abilities to grow without much care on waste nutrients (Robert, 2013), and are considered the better source of biodiesel production as other sources can cause food problems as they are mainly including those plants which are used for food (Patil *et al.*, 2008). Sources of commercial biodiesel include oil from waste cooking, corn, palm, animal fat, canola and jatropha. However, using plant oil for biodiesel production is not only controversial but also requires substantial quantity of land (Lee *et al.*, 2011). Studies showed that tobacco seeds can also be used for biodiesel production (Veljkovic *et al.*, 2006). The main advantages of biodiesel, other than being a renewable energy source, is that its burning is much cleaner than that of fossil fuel, and it can be used in the present diesel engines without modifications, Algae are one of the most exciting future solutions for our energy crisis, especially that of transportation fuel (Schenk, 2008). Algae need very low requirements to grow including carbon dioxide, sun light and water (Schenk, 2008).

Algae grow very fast and have lipid content higher. They have short generation time, i.e., they can double their mass every few hours (Schenk, 2008). Biodiesel can be produced through direct transesterification of algal biomass or by a two-step process which lipids are