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Biodiesel Production Using the Visceral Organs of Apple snail (Pila globosa)

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Abstract- Biodiesel is an alternative diesel fuel that is produced from vegetable oils and animal fats. The world meat production from pork, poultry and beef is 42.7%, 33.4%, 23.9% respectively including non edible organs. Most of these organs like intestine, head and fat bodies etc. contain lipids. The organs of Pila globosa contain lipid and it is good alternative source for biodiesel production. Lipids react with methanol in presence of NaOH, which results into biodiesel and glycerol. After separation of biodiesel and glycerol by separating funnel, biodiesel can be used as a fuel and glycerol can be used in manufacturing of colors.

Key Words: Biodiesel, Pila globosa, Methanol, Soxhlet, Glyserol, IR Sectrophotometer,

1 INTRODUCTION

India is the largest single consumer of fossil fuels in the world. Every year India consumes 125 billion gallons of gasoline and 60 billion gallons of diesel fuel. With current energy consumption the desire to find alternative feedstock for our energy need is increasing. One such alternative feedstock is vegetable oil. Vegetable oil offers the benefit of a greener synthetic route obtaining diesel fuel. This fuel is commonly known as biodiesel and can be synthesized on an industrial scale. The methods of biodiesel synthesis have been known for easy. In recent year the production of biodiesel from waste organs of animals (non-edible) is possible. Non edible organs used to the production of the biodiesel and it significantly reduce environmental impact. The main problem of the biodiesel industry is the availability of cheap and abundance of high quality feedstock. Therefore finding alternative feedstock such as an animal fat, (organs like intestine, head and fat bodies etc.) is considered as necessity for the industry.

2 MATERIALS AND METHODS

1. Culturing Method:

Species were selected on the basis of their economic importance and nutrient values. The snails were collected from the market and identify in the Zoological Survey of India (ZSI). The collected samples from the market area were washed with fresh water and freshly used for further experimentation.

2. Extraction of Fat Contents from the *Pila globosa*-

The Soxhlet's apparatus was assembled (fig. 1). 150 ml methanol solvent is used along with 150 mg of visceral organs of *pila globosa*. The solvent was boiled at a steady rate. The experiment was left to run through four refluxes. After completion of the refluxes, the thimble was removed and the extract was collected.

3. Purification of Extract-

Rota evaporator is used for the removal of excess of methanol. As per the standard method methanol was removed from the extract at 500 PSI, at 60°c temperature. After purification of extract, we obtained 70 % methanol in the vaporized form,

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which can be reusable. Remaining residue was the mixture of oil and glycerol.

4. Production of Biodiesel from Extracted Residue:-

0.35 gm of finely ground anhydrous NaOH added into the 40 ml of residue and dissolved with magnetic stirrer. After heating at about 60°c, there was a cloudy appearance in the conical flask. Separate two layers were formed in the mixture after some time. The glycerol remained into the bottom and the supernatant oil float on the top. Allowed the supernatant oil to drain and collected in a beaker.

Figure 1: Fat extraction by soxhlets apparatus

Figure 2: Biodiesel

5. Analysis of sample by FT-IR Spectrophotometer-

FT- IR spectrophotometer used to analyze diesel contents from supernatant sample and to analyze different functional groups. With proper calibration detected the graph as per the standard procedure (fig. 3).

Result and Discussion:

Name of the animal	Part used	Weight	Solvent (Methanol)	Total Sample yield (ml)	Methanol yield (ml)	Biodiesel yield (ml)	Glycerol yield (ml)
Pila globiosa	Fat bodies	150 gm	150 ml	140 ml	90 ml	18 ml	22 ml

Table 1: Observation table

Biodiesel was detected from the supernatant by using IR Spectrophotometer and recorded graph. This graph shows different types of the functional group peaks and these functional groups also identified with the help of standard values of functional groups (IR detection table). This graph shows the strong **ester peaks** at **1746.19 cm^{-1}** and this peak value is approximately similar to the standard strong ester peak value 1740-1750 cm^{-1}. Then we concluded that the extracted supernatant is biodiesel.

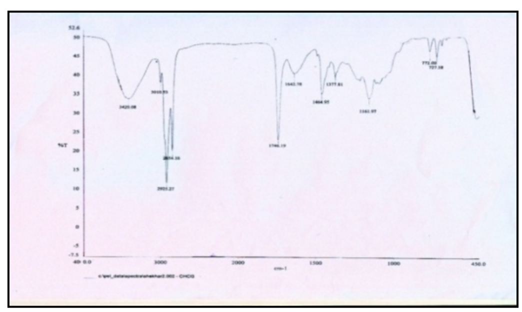

Figure 3: Graph showing the presence of Biodiesel.

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Sr. No.	Functional group	Identify functional group	Permanent value	Identify value
1	Aldehyde	No	1720 cm¯1	-
2	**Ester**	Yes	1740-1750 cm¯1	**1746.19 cm¯1**
3	keton	No	1715 cm¯1	-
4	Aromatic	Yes	1620-1680 cm¯1	1642 cm¯1
5	Alkane	No	1650 cm¯1	-
6	Alcohol	No	3600 cm¯1	-
7	Cyanide	No	2250 cm¯1	-
8	Alkenes	Yes	2900 cm¯1	2854 cm¯1 ,2925 cm¯1
9	Amines	Yes	3500 cm¯1	3420 cm¯1

Table 2: IR Frequency Detection

Conclusion:

One step alkaline catalyzed transesterification was found to be in effective biodiesel production from *Pila globosa*. The cost of *Pila globosa* oil biodiesel was almost decreasing in a number of twice that of soya bean oil biodiesel due to the high prize of the *pila globosa* biodiesel. However, substantial reduction in the *pila globosa* biodiesel costs would be expected when there was no alternative use of the non-edible of *pila globosa*. We can conclude that the given IR spectrophotometer frequency of isolated sample shows the ester group.

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Reference:

1. A. Zawadzju, D.S. Shrestha, B. He (2007) Biodiesel Blend Level Detection Using ultraviolet absorption Spectra. American Society of Agricultural and Biological Engineers ISSN 50 (4); 1349-1353

2. Murphy, Kellyann M., "Analysis of Biodiesel quality using reversed Phase High-performance liquid chromatography" (2012) Pomona Senior Theses. Paper 45.

3. Biodiesel synthesis, Organic Chemistry Laboratory CH 243

4. Saka S, Kusdina D. Fuel from rapeseed oil as prepared in super critic methanol, fuel, (2001) 80 P 225

5. C. R. Vera, S.A. Dlppolito, CL Pieck, J.M. Parera., Production of biodiesel by a two step supereritians reaction process with adsorption refining, Enpromer Page 1-10

6. N Kondamudi, J. Strull, M Misrs and S Mohapatra A Green process for biodiesel production from feather meal, Journal of Agricultural and food Chemistry, (2009) 57 P 6163-6166

7. H.M. El-Mashad, R.J. Avena-Bustillos, F. Zhag A two-step process for biodiesel production from salmon oil, Biosystems Enginnering 99 (2008) P 220-227

8. A. Singh, B. He, J. Thompson, J. Van Gerpen Process Optimization of Biodiesel Production Using Alkaline Catalysts, Applied Engineering in Agriculture Vol. 22 (4): 597-600

9. Biodiesel Production from Wikipedia, the free encyclopedia.

10. Francois Bergeron and Michael Benning Comparision of Two Fat Extraction Method, (2011).

11. Mike Beradley, Ph.D., Termo Fisher Scientific, Madison, WI, USA Biodiesel (FAME) Analysis by FT-IR, Thermo Scientific.