Bulletin of Environment, Pharmacology and Life Sciences
Bull. Env. Pharmacol. Life Sci., Special Issue [1]2022 : 1389-1392

Online ISSN 2277-1808
Journal's URL:http://www.bepls.com
CODEN: BEPLAD

ORIGINAL ARTICLE **OPEN ACCESS**

Comparison of Calorific Values of Various Seeds

D.K. Dhongade[1], P.P. Jadhav[1], V.S. Raut[1], C.R. Bobade[1], Y.A. Pathak[2], P.R. Gugale[3]
[1]Department of Physics,Balwant College, Vita District: Sangli,415311 Maharashtra, India
[2]Department of Physics,K.B.P. College,Pandharpur, District:Solapur,413304,Maharastra,India
[3]Department of Zoology,Balwant College,Vita, District: Sangli,415311 Maharashtra, India
Corresponding Author: 2ddinesh@gmail.com

ABSTRACT
Fuels are dense repositories of energy that are consumed to provide energy services such as heating, transportation and electrical generation. Even though most fuels ultimately get their energy from the sun (see energy conservation) they are usually considered to be a primary energy source. When people talk about energy conservation, usually they mean using less fuel. The rapid depletion of traditional petroleum fossil fuel supplies, as well as worries about economic and environmental degradation, needs the development of alternative fuels. The usage of biodiesel made from vegetable oils as an alternative fuel is increasing popularity all over the world. To increase standard of living for creasing population, a country must develop their own energy sources.A transition from conventional energy system to those based on renewable resources is necessary to meet the ever- increasing demand for energy and to address environmental concerns. The purpose of this research is to determine and compare fuel value of various seed which can be used as alternative source of fuel for transportation and other energy needs.
Keywords: *Biodiesel, energy conservation, Calorific value.*

Received 11.02.2022 Revised 19.03.2022 Accepted 24.04.2022

INTRODUCTION

We need energy in house, industry, transport, communication, agriculture, research, etc. Every human activity is concerned with consumption of energy; hence energy has become fourth basic requirement of modern society. and progressIt is known that overall progress of country and standard of living of a given country is directly related to per capita energy consumption of that country. The per capita energy consumption of U.S.A. is about150 KWh per year. To increase standard of living for creasing population, a country must develop their own energy sources.A transition from conventional energy system to those based on renewable resources is necessary to meet the ever- increasing demand for energy and to address environmental concerns [1,2]. While a majority of the world current electric supply is generated from fossil fuel such a coal, oil and nature gas, these traditional energies face a number of challenges including rising prices, security concerns over dependence on imports from a limited number of countries which increases pollution and green house effects [3,4]. The current sources of fossil fuel will last from coming 40-50 years. The difference between Demand and supply is huge, so on one can control on increasing prices of fuel all over the world [5]. An average Indian family spends Rs. 2300 every month on energy. In future Govt. cannot give subsidy on petroleum products and on energy. Besides traditional use of solar energy attempt was also made for scientific use during different period of history. Man knew there are immense potentialities in this subject & according to this knowledge in that particular time he tried to develop systems to utilize solar energy for greater use. The demand for petroleum diesel is increasing day by day as a result of the recent petroleum crisis and lack of supply, necessitating the development of a suitable solution. Biofuels are being seriously considered as potential future energy sources. Biodiesel is an environmentally friendly alternative fuel made from both edible and non-edible oil seeds. It can be utilized in completion engines with minimal to no modifications. Biodiesel is easy to use, biodegradable, nontoxic, and virtually sulfur- and aromatic-free. It can be stored in the same way that petroleum diesel fuel can. When biodiesel is used in conventional diesel engines, unburned hydrocarbons, carbon monoxide, and particulate matter are significantly reduced. Even when combined in petroleum diesel [6]. Its higher cetane number improves the quality of ignition. A large amount of oil can be discovered in the seeds of a variety of fruits. The free fatty acid composition and physicochemical properties of seed oil and biodiesel produced from

different fruit seeds such as Chikku, Awala, Jamun, *Tamarindus indicus*, Orange, *Moringa Oleifera*, and others have been compared. Biofuels have risen to prominence as one of the most significant solutions to challenges such as sustainable development, energy security, and greenhouse gas reduction. Biodiesel an environmentally friendly diesel fuel with petro-diesel-like combustion characteristics has recently sparked a huge amount of attention throughout the world [7]. Biodiesel is a methyl or ethyl ester manufactured from edible and non-edible vegetable oils, recycled waste vegetable oil, and animal fats. Vegetable oils have been used as an alternative fuel for a long time, but they have been phased out due to the cheaper availability of petroleum products. Due to its various advantages, biodiesel is now widely recognized as an effective alternative to conventional diesel.It is non-toxic, renewable, and safe, with a high flash point and fewer sulphur compounds than petroleum (1300c). It emits 80% less hydrocarbons and 50% fewer particles than conventional vehicles and generates very little carbon dioxide.It promotes rural revitalization, which has a positive social impact. Biomass is presently the only alternative fuel with a positive energy balance throughout its existence.Mechanical extraction, solvent extraction, conventional extraction, and supercritical fluid extraction are all techniques used it to extract the oil from the seeds. Solvent extraction of oil is the most widely used method due to high rate of oil extracted from seeds.Solvent extraction bridges the gap between mechanical extraction, which produces oil with high turbidity metal and water content, and supercritical fluid extraction, which is expensive to set up and maintain. The process of increasing the temperature of oil seeds after pretreatments such as cracking, dehulling, and milling by heating, roasting, and steaming them prior to extraction is known as thermal treatment of oil seeds. Heating increases extraction by lowering oil viscosity, releasing oil from intact cells, and moisture in the cells. Temperature is important in seed preparation for mechanical extraction because it promotes a successful solvent process by heating the solvent and speeding up the extraction process. Individual oil droplets merge to form a continuous phase and flow out at the proper temperature and moisture content, boosting oil output. Solvent extraction is the use of chemicals as solvents in the extraction of oil from oil seeds. Solvent extraction is known for its high yielding oil output, ease and swiftness to carry out: relatively cost effective, high overhead cost, and hazardous effects during and after operations. The use of these methods requires a complete refining process to ensure traces of the solvents to be removed totally. Solvent extraction cleaned, dehulled and conditioned flakes with hexane are commercially practiced to extract oil.

In this present work determine fuel value of different seed oil in calari, Joule and British thermal unit at one of the standard methods. All the reading is taken at room temperature

MATERIAL AND METHODS

1) Take the weight of the fuel material.
2) To the measured (1 liter) quantity of water in calorimeter.
3) Measure the initial temperature of water (θ1).
4) Burn the fuel material measure maximum temperature of water in calorimeter (θ2).
5) Thus measure unburned fuel and final net quantity fuel material

Q_1=Initial temperature of water=28^0C
Q_2=Final temperature of water= ^{0}C
S_1=Specific heat of water heater=0.093cal/gm
S_2=Specific heat of water=1cal/gm
M_1=Mass of water heater=1100
M_2=Mass of water=1000gm
Formula used:

1) Heat produced (H)=$M_1S_1(Q_1Q_2)+M_2S_2(Q_2-Q_1)$
2) Fuel value of seeds = Heat produce(H)/Weight of fuel(W)

RESULT AND DISCUSSION

Fuel value of Groundnut seed is very high. It is 45.352 BTU/gm corresponding to 47839.82 J/ gm. The fuel value of the Castor seed and Niger seed is low as compared to Groundnut seed. It is 18.6529 BTU/gm corresponding to 1967.055 J/gm and 16.3016 BTU/gm corresponding to 17795.88 J/gm.

The fuel value of sesame, soybean, mustard, linseed, safflower, are the middle range. Such as fuel of sesame is 33.6483 BTU/gm corresponding to35494.032. fuel of safflower is 25.2362 BTU/gm corresponding to 26620.54 J/gm. The fuel value of soybean 21.45693 BTU/gm corresponding to 22633.89 J/gm. The fuel value of Mustard 24.5779 BTU/gm corresponding to 25926.0965 J/gm. The fuel of linseed 22.4322BTU/gm corresponding to 23662.70 J/gm.

Table 1: Selection of seed

Sr.no.	Types of seeds name (Marathi)	Type of seeds name(English)
1	Shangadane	Groundnut
2	Erande	Castor
3	Teel	Sesame
4	Soybean	Soybean
5	Mohari	Mustard
6	JAVAS	Linseed
7	Kradaee	Safflower
8	Khurasani	Niger

Table 2: observations

Obs. No.	Types of seeds	Mass of seed oil (w_0)	Initial temp.(t_0)	Final temp. (t)	Mass of ash and charcoal ($w_,$)	Temp. T=(t-t_0)	Mass W= (w_0-$w_,$)
1	Groundnut	10 gm	28^0c	59^0c	7 gm	31^0c	3 gm
2	Castor seed	10 gm	28^0c	45^0c	6 gm	17^0c	4 gm
3	Sesame	10 gm	28^0c	51^0c	7 gm	28^0c	3 gm
4	Soybean	10 gm	28^0c	50^0c	5.5 gm	22^0c	4.5 gm
5	Mustard	10 gm	28^0c	42^0c	7.5 gm	14^0c	2.5 gm
6	Linseed	10 gm	28^0c	51^0c	5.5 gm	23^0c	4 gm
7	Safflower	10 gm	28^0c	51^0c	6 gm	28^0c	4.5 gm
8	Niger	1o gm	28^0c	41^0c	6.5 gm	13^0c	3.5 gm

Table 3: Fuel value of different seed

Sr. No	Types of seeds	Heat produced by fuel(H) cal	Fuel value of seed (cal /gm)	Fuel value of seed (J/gm)	Fuel value of seed (Btu/gm)
1)	Groundnut	34171.3	11390.4333	47839.82	45.35214
2)	Castor	18739.1	4684.775	19676.055	18.65290
3)	Sesame	25532.9	8450.96	35494.032	33.6483
4)	Soybean	24250.6	5389.022	22633.89	21.45693
5)	Mustard	15432.2	6172.88	25926.096	24.5779
6)	Linseed	2535.9	5633.9778	23662.70	22.4322
7)	Safflower	25352.9	6338.225	26620.54	25.2362
8)	Niger	14329.9	4094.2572	171895.88	16.3016

CONCLUSION

The calorific value and heat produced by several seed samples were determined in this study. Groundnut seed and sesame were shown to be the best options.

REFERENCES

1. Jon V.G. (2005). Biodiesel processing and production. *Fuel Processing Technology.* 86:1097-1107.
2. Arun A. C., Mahesh V. M., Sanith P, David S.,Kanna R. (2017). Comparison of Calorific Values of Various Fuels from Different Petrol Stations.*International Refereed Journal of Engineering and Science.* 6(2) : 26-29.
3. Abdurakhman, Y. B., Putra, Z. A., Bilad, M. R., Nordin, N. A. H. M. (2018). Techno-economic analysis of biodiesel production process from waste cooking oil using catalytic membrane reactor and realistic feed composition. *Chemical Engineering Research and Design.* .134:564–574.
4. Amiril, S. A. S., Rahim, E. A.,Syahrullail, S. (2017).A review on ionic liquids as sustainable lubricants in manufacturing and engineering: recent research, performance, and applications. *Journal of Cleaner Production.*168: 1571–1589.
5. Berthod, A., Ruiz-Angel, M. J., Carda-Broch, S. (2018). Recent advances on ionic liquid uses in separation techniques: *Journal of Chromatography A.*1559: 2–16
6. Bian, Y., Zhang, J., Liu, C., Zhao, D. (2019). Synthesis of cross-linked poly acidic ionic liquids and its application in biodiesel production. *Catalysis Letters* .150: 969–978.
7. O. G. Igbum, K. Asemave, C. A Nwadinigwe, N. Y. Akaasah. (2013). Heavy Metal Analysis of Blends of Methyl Esters Obtained from Four Virgin Tropical Seed Oils. *International Journal of Science and Research.,* Volume2 (4): 463 – 467.

CITATION OF THIS ARTICLE

D.K. Dhongade, P.P. Jadhav, V.S. Raut, C.R. Bobade, Y.A. Pathak, P.R. Gugale· Comparison of Calorific Values of Various Seeds**.** Bull. Env.Pharmacol. Life Sci., Spl Issue [1] 2022 : 1389-1392