



Home	About Us	For Authors	Current Issue	Past Issue	Archives	Pay Online	FAQ	Contact Us
----------------------	--------------------------	-----------------------------	-------------------------------	----------------------------	--------------------------	----------------------------	---------------------	----------------------------

Call for Paper : June 2019

Submission Last Date : 30- June

Review Status : In 2 Days

Online Publication : In 2 Days

[Submit Manuscript On line](#)

Author Guidelines >

Processing Charges >

Final Online Submission >

Indexing >

ImpactFactor >

FAQ >

Editorial Board >

Topics Covered >

Copyright Claims >

Current Update

International Research Journal of Engineering and Technology (IRJET) is an peer reviewed, open access, high Impact Factor, Multidisciplinary journal in English for the enhancement of research in various discipline of Engineering, Science and Technology. Prime Focus of the Journal is to publish articles related to the current trends of research. IRJET brings together Scientists, Academician, Engineers, Scholars and Students of Engineering Science and Technology. Published by Fast Track Publications.

Why Select IRJET?

- An ISO 9001:2008 Certified International Journal.
- Fast, Easy and Transparent paper publication process.
- Low publication fee to promote the research work.
- IRJET impact factor value : 7.211 for the year 2018
- IRJET is indexed in Google Scholar, academia.edu, Scribd, Slideshare & more..
- Open Access Journal database for high visibility and promotion of your articles.
- Open Access Journal (No Subscription required to download Papers).
- Strict Plagiarism Policy
- IRJET provides Free Soft Copy of Certificate of Publication to each Authors.
- IRJET provides Hardcopy Certificate of Publication to each Authors.
- Authors can submit the papers at any time by online submission.
- Authors can pay Accepted paper publication Fee online by Net Banking/ Credit Card/ Debit Cards/ Cash Card/ Mobile Payment/ Paypal, instantly in any day any time.
- Transactions on the site are protected with 256-bit Secure Sockets Layer (SSL) encryption.
- Publication within a short period after acceptance & final submission.
- Fast Reliable website & Dedicated server/Daily updation /Right click protected.
- Author's queries shall be resolved within 24 hours of time.
- 23,000+ papers published..
- IRJET journal has been submitted to SCOPUS early 2019 and currently under evaluation for inclusion.(Verify here)
- **Frequency:** 12 Issues Per Year | Estd Year : 2014
- **Areas Covered:** Engineering, Science, Technology (Multidisciplinary)

Call for Paper - Volume 6 Issue 6 , June - 2019	
Submission Last date	30- June - 2019
Initial Online Submission	Click Here to Submit
Submit Via Email	editor@irjet.net
Final Online Submission	Click Here to Submit (Only Accepted Papers)

Last Date for Payment : 03- July- 2019

IRJET- Highlight's

23,000+
Articles Published

IRJET Citation Report

Citation indices	All	Since-2014
Citations	4765	4708
h-index	15	14
i10-index	59	59

[Verify Here](#)

Reviewer Login

Username	<input type="text"/>
Password	<input type="password"/>
<input type="checkbox"/> Remember Me	
<input type="button" value="Log in"/>	

Digital Repository Universitas Jember


EDITORIAL BOARD

Editor in Chief

Dr:Tharun

International Research Journal of Engineering and Technology (IRJET), INDIA. editor@irjet.net

Advisory/Editorial/Reviewer Board Members

01	Dr:Onder Turan Associate professor ,Anadolu University Faculty of Aeronautics and Astronautics, Turkey	
02	Dr: Mohamed Abdel-Baset Metwalli Attia Faculty of Computers and Informatics, Zagazig University, Egypt. Head of Department of Quality Assurance at Isdream Company, Cairo Egypt.	
03	Prof.Moataz M. Elsherbini Assistant Professor,Communications & Electronics Engineering Dept. Faculty of Engineering at Shoubra - Benha University, Egypt	
04	Prof.S.Balamurugan Department of IT, KalaignarKarunanidhi Institute of Technology, Coimbatore, Tamilnadu, India	
05	Dr: Padmayya S. Naik Professor ,Department of Mechanical Engineering, Anjuman Institute of Technology and Management, Karnataka,India	
06	Dr:Vishnu Narayan Mishra Assistant Professor, Department of Mathematics,Sardar Vallabhbhai National Institute of Technology, Surat (Gujarat), India	
07	Dr:Sreekanth K J Research Scientist at Kuwait Institute for Scientific Research , Kuwait	
08	Dr:N.Kumar Associate Professor, Dept. of Computer Science and Engineering,Vels University, Pallavaram, Chennai,India	
09	Dr:Seyed Ebrahim Vahdat Assistant Professor,Department of Engineering, Ayatollah Amoli Branch, Islamic Azad University, Amol, Iran	
10	Dr:Farzad Mohammadzadeh Shahir Head of Faculty of Electrical and Computer Engineering,Islamic Azad University,Iran.	



Home	About Us	For Authors	Current Issue	Past Issue	Archives	Pay Online	FAQ	Contact Us
------	----------	-------------	---------------	------------	----------	------------	-----	------------

IRJET JOURNAL ARCHIVES

- Volume 6, Issue 06 Jun-2019
- Volume 6, Issue 05 May-2019
- Special Issue AIME May-2019
- Volume 6, Issue 04 Apr-2019
- Volume 6, Issue 03 Mar-2019
- Volume 6, Issue 02 Feb-2019
- Volume 6, Issue 01 Jan-2019
- Volume 5, Issue 12 Dec-2018
- Volume 5, Issue 11 Nov-2018
- Volume 5, Issue 10 Oct-2018
- Volume 5, Issue 09 Sep-2018
- Volume 5, Issue 08 Aug-2018
- Volume 5, Issue 07 July-2018
- Volume 5, Issue 06 Jun-2018
- Volume 5, Issue 05 May-2018

- Volume 5, Issue 03 Mar-2018
- Volume 5, Issue 02 Feb-2018
- Volume 5, Issue 01 Jan-2018
- Volume 4, Issue 12 Dec-2017
- Volume 4, Issue 11 Nov-2017
- Volume 4, Issue 10 Oct-2017
- Volume 4, Issue 09 Sep-2017
- Special Issue ISMST Aug-2017
- Volume 4, Issue 08 Aug-2017
- Volume 4, Issue 07 July-2017
- Volume 4, Issue 06 Jun-2017
- Volume 4, Issue 05 May-2017
- Volume 4, Issue 04 Apr-2017
- Volume 4, Issue 03 Mar-2017
- Volume 4, Issue 02 Feb-2017
- Volume 4, Issue 01 Jan-2017
- Volume 3, Issue 12 Dec-2016
- Volume 3, Issue 11 Nov-2016
- Volume 3, Issue 10 Oct-2016
- Volume 3, Issue 09 Sep-2016
- Volume 3, Issue 08 Aug-2016
- Volume 3, Issue 07 July-2016

Volume 6- Issue 1 - January 2019		
01	Innovative Design of Aperture Antenna for Wideband Application -Kennedy A. Iro anusi	
02	The Influence of Biodiesel Fuel Oil Blend Java Callophyllum Innopillum Performance and Emissionso n Diesel Engine Single-Cylinder -Wahidin, Nasrul Ilimnafik, Agustriono	
03	Biomass and Carbon Stock Assessment of Peat Swamp Forest Ecosystem: A Case Study in Permanent Forest Reserve Pekan Pahang, Malaysia -Mohd Afzanizam, M. E.Philip, Shahrul, A.B, Mohd Haniff, H	
04	Non-Newtonian Fluid Speed Breaker -Runal P.Pawar, Shruti.Donode, Prafulsingh Chouhan, Satendrakumar Bopche, Pranali Ramteke, Pooja J. Chavhan	
05	Design of Inverter- Less Solar DC Off-Grid System for Indian Homes -Vrushabh S. Waghmare, Anup P. Rautkar, Mangesh J. Nemade	
06	Smart Braking System (SBS) for Automobiles -Sanyam Tyagi, Deepanshu Aggarwal, Bhism B. Tripathi, Ashish Bajiya	
07	A Novel Survey on Cloud Security using Digital Watermarking -Vaishali D. Kamble, Kanchan Doke	
08	Smart Medication & Monitoring System for Secure Health using IoT -Priyanka J. Solanke, K. Lakshman	

"The influence of biodiesel fuel oil blend Java Calophyllum innoxium performance and emission on diesel engine single-cylinder"

Wahidin¹, Nasrul Ilminafik², Agus Triono³

^{1,2,3}Departement in mechanical engineering, University of Jember 15310

ABSTRACT: Because of the depletion of world oil reserves and the increasing environmental concerns, then the alternative fuel of choice in their use. Preparations of vegetable oils offer an attractive alternative fuel to be used as biodiesel. This work investigates the performance parameters of the engine and emission characteristics of direct injection diesel engines using biodiesel blends java Calophyllum innoxium oil without engine modifications. That there be a fruit of biodiesel and oilseed (CI) or "Calophyllum innoxium" with low emission levels in diesel engines. The use of biodiesel in diesel motors CI single cylinder 7 HP with a range of rotation from 1000 to 2000 rpm with a load 5 kW without modification to the tool range 0-99.9% opacity meters and vibration meter Model VB-8200 with Velocity measurement: 200 mm / s Acceleration: 200 m / s Experiment is done by the system blending of 0%, 10%, 20%, 30%, 40% and 50% by not adding any equipment, biofuels are united in a tank with a blends as desired, Research and vibration emissions are lower than pure Biodiesel (B0). Lowest yield value of density / opacity below 0.2% and the value of vibration below 30 ms.

Keyword: Biodiesel, Calophyllum innoxium / Calophyllum innoxium oil, diesel engine, vibration, emissions

I. Introduction

One of the causes of global warming such as exhaust emissions from vehicles, especially cars with engine specifications diesel. At principles emission emphasis is on the use of clean fuels. Once the use of biodiesel as a fuel for diesel engines is Calophyllum innoxium oil (CI). The performance parameters of the diesel engine, such as specific fuel consumption (BSFC), power brake (BP), brake torque and thermal efficiency of the brake, must be improved to reduce emissions [1] low emissions and engine performance that can be achieved by recirculating exhaust gas [2]. Observe the diesel engine performance and exhaust emissions in a single cylinder engine fueled high free fatty acid blends Calophyllum innoxium biodiesel. CIB10 reduce CO and emission levels, although slightly higher NOx emissions were observed compared to diesel fuel. Adding some additives with CI biodiesel blends also reduce NOx emissions [3] Many researchers have investigated and compared danjatropa palm biodiesel with diesel fuel, while other studies compared the oil and Calophyllum innoxium (CI) biodiesel blended with diesel fuel [4] However, no research has been done that using C. innoxium in eastern Java. biodiesel blended with diesel fuel. The purpose of this study, to observe the diesel engine combustion emissions using east java Calophyllum innoxium oil and its comparison.

II. Materials and Methods

a. Biodiesel production



Figure 1. The plant and fruit oils biodiesel

Biodiesel is done by transesterification using ultrasonic cleaner, because faster in getting oil biodiesel Calophyllum innoxium.

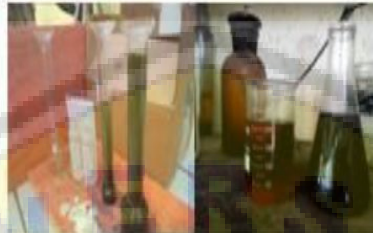


Fig.2. Examples of biodiesel oil

The process of making biodiesel in accordance *Callophylluminophyllum* can be seen in the cycle presented below.

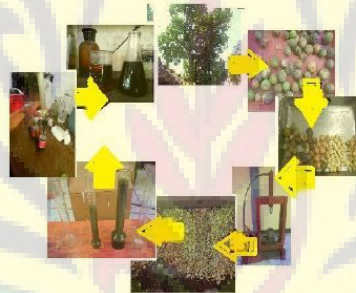


Fig.3. Biodiesel production process

Flow raw seed formation to be oil biodiesel can be made by transesterifikasi / separation.

b. characteristics of Biodiesel

Biodiesel plays an important role in helping to overcome the oil short life and environmental impact mitigation in the field of fuel worldwide [5]. Energy consumption has increased due to the common use of fossil fuels in power plants, transport vehicles, electric generators, mining equipment, and locomotives [6]. Biodiesel used as an alternative diesel fuel in transportation vehicles and manufactured from edible vegetable oils and [1]. It is biodegradable, oxygen, non-toxic, free sulfurberkelanjutan, and renewable, and can be used in diesel engines either in pure form or blended into diesel, without modifications to the engine [4].

The transesterification process used to produce oil and biodiesel CI [8], *Callophylluminophyllum* oil mixed with 25% methanol (V / V) and 1% KOH (w / w). In this process, a chemical reaction is obtained within 2 hours to maintain a constant temperature of 60°C and stirring speed of 1000 rpm. After the completion of the first step, biodiesel poured into the funnel to separate glycerin from biodiesel; whole separation process took 12 hours. Once the reaction is complete, the bottom layer was withdrawn because it contains glycerin and some dirt. Methyl esters is washed with distilled water to remove dirt Value viscosity, flash point, pour point, oxidation stability, acid value, cetane index and calorific value, measured according to ASTM standard method. Saponification and Yodium value amount needed for the calculation of cetane number.

Propertys	Units	ASTM Methode	Diesel	CIB 10	CIB 20	CIB 30	CIB 40	CIB 50
Density at 40°C	kg/m ³	D88	830,2	845,7	852,3	855,1	865,2	867,8
Kinematic Viscosity at 40°C	cst	D88	3,4532	3,6789	3,6326	3,6573	3,7053	3,7512
Flash Point	°C		69	68,5	60,5	53,4	52,3	50,9

Table 1. Characteristics of previous research and the research is done

c. Research methods

Biodiesel Callophylluminophyllum is the oil yield of the plants that process into fuel for diesel engines. BiosolarlinophyllumCallophyllum oil can not evaporate at a certain temperature and unlike other petroleum. Biodiesel inophyllumCallophyllum oil containing sulfur at high enough levels and quality of biodiesel has a cetane number which is quite high as well. Applications inophyllumCallophyllum oil biodiesel technology is in high speed diesel engines, but still experiencing problems because of this inophyllumCallophyllum oil biodiesel will have a higher viscosity and density so that the resulting detonation in diesel engines.

With all of the above then stimulated a system for direct injection diesel engine diujikarakteristik to determine the performance characteristics of Biodiesel oil atuCallophylluminophyllum to standard diesel oil. Before Callophylluminophyllum oil biodiesel used in diesel engines will first test the physical characteristics determine the composition of biodiesel fuel oils such inophyllumCallophyllum. In pengujian is make use of the two fuels, namely: Biodiesel oil Callophylluminophyllum and Diesel oil / fossil. All such fuel will be mixed in accordance with the percentage of each that B10%, B20%, B30%, B40% and B50% and diesel by pure 10-40 bar. The pressure of the test will be used as a reference forusing inophyllumCallophyllum oil biodiesel in diesel engines.

d. Test equipment

Experimental tests carried out by using a diesel engine the engine silinder.Kecepatan varies from 1000 rpm to 2000 rpm under full load. Vibration testing is done with a vibration tester V 2800 with a max range of 200 ms Figure 4 shows the schematic diagram of the test.

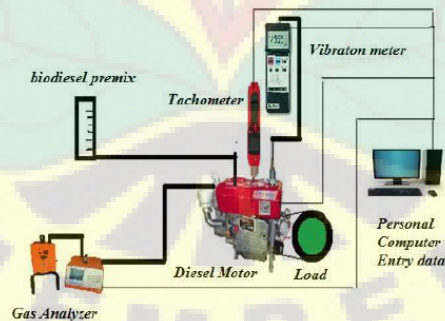


Figure 4. Schematic of testing

III. Results and Discussion

3.1. Vibration

Research conducted at the Solar Pure (B0) as shown in Table 1, a comparison with the results of research made at the B10 and B20. Round one cylinder stationary diesel used according to the SOP is 1000 rpm.

On B10 (10% bio diesel 90% diesel) vibration measurement results obtained at 1750 rpm

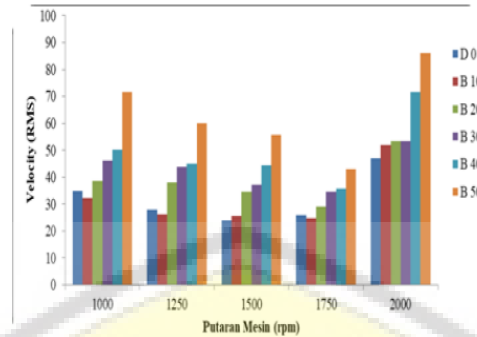


Figure 5. Graph Velocity biodiesel blending at various rounds of machine

Results of vibration measurement

The resulting vibrations that occur with the lowest value there at 1750 rpm variations diangka 24.8.

3.2. Emission measurements

Diesel exhaust emissions analyzer with readings read and Opacity coefficient which is read is the value of the concentration of light penetrate. Great numbers show the value of the high intensity which means the higher the resulting thickness of the light it hard to penetrate and vice versa.

The resulting value coefficient with the value of a concentration of less than 20% with opacity value below 40% occurred in B10 (10% Bio Diesel 90% Solar) vibrations that occur with the lowest score is on variations of 1750 rpm diangka 25 with a value of density and opacity value below 20% and close to zero.

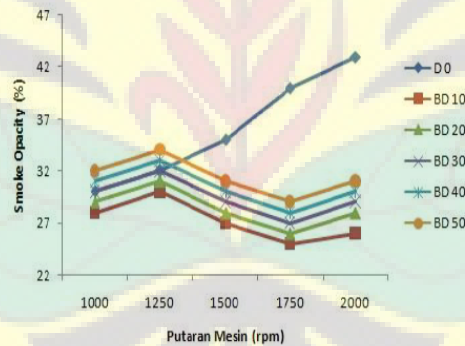


Figure 6. Opacity of exhaust with biodiesel blending at various rounds of machine

3.3. Exhaust gas emissions

3.3.1. Carbon Monoxide (CO)

CO is one of the compounds formed during the intermediate stages of fuel and was formed mainly due to incomplete combustion of fuel. If the result is complete combustion, CO is converted to CO₂. If combustion is incomplete due to lack of air or gas temperature is low, CO is formed. In the case of biodiesel, CO emissions lower than diesel, because some of the contents of supplemental oxygen, which converts CO into CO₂ dan result in complete combustion of the fuel [9]. In another study, it has been reported that the higher cetanenumbers of biodiesel mixture; Results at a lower likelihood of the formation of a rich fuel and thus reduce CO emissions [10]

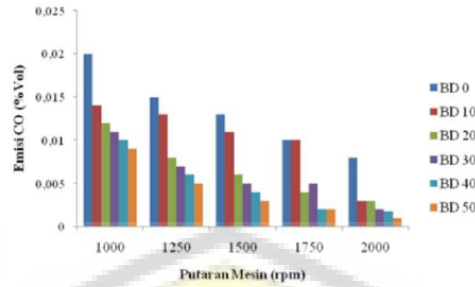


Figure 7. CO Emissionson some mixture of biodiesel and diesel.

CO emissions at 2000 rpm, is presented in Fig. 6. The lowest value obtained in the BD 50 in this condition trhotle state of 80% with a value of 1%.

3.3.2. Hydrocarbons(HC)

When the oxygen content of the fuel mixture increases, it requires less oxygen for combustion. However, the oxygen content of fuel is the main reason for more complete combustion and a reduction in HC emissions. Furthermore, a higher cetane number of biodiesel fuel mixture reduces the combustion delay, and such reduction has also been associated with a decrease in HC emissions [12-13]; has been reported that oxygen compounds provided dicampuran improve fuel oxidation and thus reduces HC emissions [14]

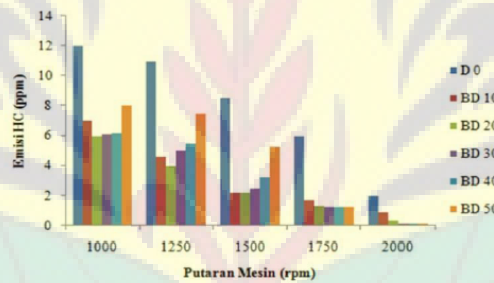


Figure 8. HC Emissions on some mixture of biodiesel and diesel.

HC emissions for diesel fuel and biodiesel fuel mixture at 2000 rpm at 80% throttle position is shown in Gambar.7. Compared with diesel fuel, HC reduction at 2000 rpm and 100% throttle position obtains the figure 13.7% to BD 50 and 20% for BD 10.

3.3.3.Nitrogenokside (NOx)

Nitrogen oxides .Emissions to mix found to be higher than diesel fuel. The formation of NOx emissions greatly depend on the equivalence ratio, oxygen concentration and temperature burned gas.MenurutBeatriceetal, [15] and Songetal. [16] increased oxygen levels increases the maximum temperature during combustion, and thus increases the formation of NOx.

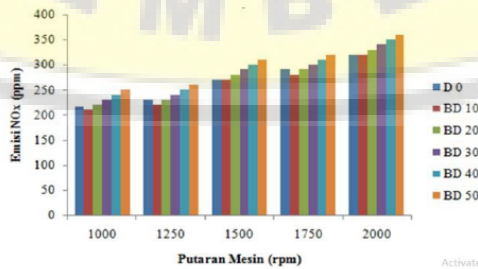


Figure 9. Increased NOx emissions at some of the mixture of biodiesel and diesel

3.4. Specific fuel consumption

Good engine performance in terms of fuel economy is reflected by bsfc parameter. To a mixture of biodiesel fuel, the heating value is found sedikit high ore to fuel diesel. This is due to the lower heating value and a higher density of the mixture. It jugadiketahui that biodiesel contains oxygen, which results in a lower heating value [17].

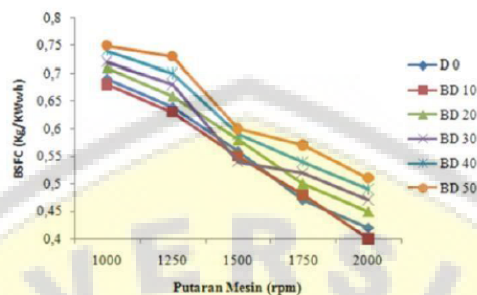


Figure 10. Consumption of fuel on some mixture of biodiesel and diesel.

Figure 10. Presenting the specific fuel consumption (bsfc) for clean diesel fuel and biodiesel mixtures as a function of engine speed. So for the energy output samadari machine, requiring fuel flow greater mass, which increases bsfc to compensate for the reduced chemical energy in the fuel [18,19]. The average increase in bsfc compared with diesel fuel was found at 0.50% in the BD 50 and 0.4% in the BD 10 with trotle position 100%.

IV. Conclusions

This experimental is a research engine performance and emissions that use diesel fuel as a base and a biodiesel mixture of BD 10, BD 20, BD 30, BD 40 and BD 50. The experimental results of this research work can be summarized as follows. The values bsfc for higher biodiesel mixtures in comparison with diesel fuel for heating the values of the lower and higher density. In terms of engine exhaust gas emissions, while Decreased HC and CO, CO₂ and NO_x emissions Increased to SW 10 and SW 20 when Compared with diesel fuel in the engine operating conditions.

Result showed that with the increase of biodiesel in the blends, the HC emissions decrease due to the higher oxygen content of biodiesel that provided more complete combustion in combustion region.

The CO emissions decreased with biodiesel usage. Reduced CO emissions were maintained, probably, thanks to the oxygen inherently present in biodiesel.

References:

- [1] Mosarof, MH, Kalam MA, Masjuki HH, Al abdul karem A, Habibullah M, Arslan A, et al. Assessment of friction and wear characteristics of Calophyllum inophyllum and palm biodiesel. *Ind Crops Prod* 2016;83:470–83.
- [2] Monirul I, Masjuki H, Kalam M, Zulkifli N, Rashedul H, Rashed M, et al. A comprehensive review on biodiesel cold flow properties and oxidation stability along with their improvement processes. *RSC Adv* 2015;5:86631–55.
- [3] Ruhul A, Kalam M, Masjuki H, Al abdul karem A, Atabani A, Fattah IR, et al. Production, characterization, engine performance and emission characteristics of Croton megalocarpus and Ceiba pentandra complementary blends in a single-cylinder diesel engine. *RSC Adv* 2016;6:24584–95.
- [4] Masjuki HH, Ashraf AM, Rashed MM, Imdadul HK, et al. Implementation of palm biodiesel based on economic aspects, performance, emission, and wear characteristics. *Energy Convers Manage* 2015;105:617–29.
- [5] Sahoo P, Das L, Babu M, Naik S. Biodiesel development from high acid value pongamia seed oil and performance evaluation in a CI engine. *Fuel* 2007;86:448–54. (6) Kalam M, Masjuki H. Testing palm biodiesel and NPAA additives to control NO_x and CO while improving efficiency in diesel engines. *Biomass Bioenergy* 2008;32:1116–22.



- [6] Kalam M, Masjuki H. Testing palm biodiesel and NPAA additive to control NO_x and CO while improving efficiency in diesel engines. *Biomass Bio energy* 2008;32:1116–22.
- [7] Mosarof MH, Kalam M A, Masjuki HH, Ashraf AM, Rashed MM, Imdadul HK, et al. Implementation of palm biodiesel based on economic aspects, performance, emission, and wear characteristics. *Energy Convers Manage* 2015;105:617–29.
- [8] Rizwanul Fattah IM, Masjuki HH, Kalam MA, Mofijur M, Abedin MJ. Effect of anti-oxidant on the performance and emission characteristics of a diesel engine fueled with palm biodiesel blends. *Energy Convers Manage* 2014;79:265–72.
- [9] M. Gümüs, C. Sayin, M. Çanakcı, Effect of fuel injection timing on the injection combustion and performance characteristics of a DI diesel engine fueled with canola oil methyl ester diesel fuel blends, *Energy Fuels* 24 (2010) 3199–3213.
- [10] Xue J. Combustion characteristics, engine performances and emissions of waste edible oil biodiesel in diesel engine. *Renew Sustain Energy Rev* 2013;23:350–65.
- [11] Agarwal AK. Biofuels (alcohol dan biodiesel) application as fuels for internal combustion engine. *Progress in Energy science* 2007;33:233-71.
- [12] Monyem A, Van Gerpen JH, Canakci M. Effect of timing and oxidation on emissions from biodiesel-fueled engines. *Trans ASAE* 2001;44:35-42.
- [13] Abd-Alla GH, Soliman HA, Badr OA, Abd-Rabbo MF. Effect of diluent admixtures and intake air temperature in exhaust gas recirculation on the emissions. *Energy Convers Manage* 2004;42:1033-1045.
- [15] Beatrice C, Bertoli C, D'Alessio J, DelGiacomo N, Lazzaro M, Massoli P. Experimental characterization of combustion behavior of new diesel fuel. *Sci Technol* 1996 combust; 120 (1-6): 335-55.
- [16] Song J, Cheenachorn K, Wang J, Perez J, Boehman AL, Young PJ, et al. Effect of oxygenated fuel on combustion and emissions. *Energy Fuel* 2002; 16 (2): 294-301.
- [17] Huang J, Wang Y, Lis, Roskilly AP, Yuh, Li H. Experimental investigation on the performance and emissions of a diesel engine fueled with ethanol-diesel blends. *Appl Therm Eng* 2009; 29: 2484-90.
- [18] Ndayishimiye P, Tazerout M. Use of palm oil - based biofuels in the internal combustion engines: performance and emissions characteristics. *Energy* 2011; 36: 1790-6.