International Journal Of

Recent Scientific Research

ISSN: 0976-3031
Volume: 7(4) April -2016

INVESTIGATION AND PERFORMANCE EVALUATION OF ETHANOL BLEND WITH CAMFER OIL AS ALTERNATIVE FUELS IN DIESEL ENGINE

Hiregoudar Yerrannagoudar., Manjunatha K and Parashurama Vaddar

THE OFFICIAL PUBLICATION OF
INTERNATIONAL JOURNAL OF RECENT SCIENTIFIC RESEARCH (IJRSR)
http://www.recentscientific.com/ recentscientific@gmail.com

ISSN: 0976-3031

Available Online at http://www.recentscientific.com

International Journal of Recent Scientific Research
Vol. 7, Issue, 4, pp. 10454-10458, April, 2016

International Journal of Recent Scientific Research

Research Article

INVESTIGATION AND PERFORMANCE EVALUATION OF ETHANOL BLEND WITH CAMFER OIL AS ALTERNATIVE FUELS IN DIESEL ENGINE

Hiregoudar Yerrannagoudar[1]*., Manjunatha K[1] and Parashurama Vaddar[2]

[1,2,3]Department of Mechanical Engineering, RYM Engineering College, Karnataka State, India

ARTICLE INFO

Article History:

Received 20th January, 2016
Received in revised form
29th February, 2016
Accepted 30th March, 2016
Published online 28th April, 2016

Keywords:

Diesel, Performance, Emissions, Ethanol, Camfer oil.

ABSTRACT

In view of the existing fossil fuel deposits may come for another 30 to 40 years and Costs of these Fissile Fuels are day by day increasing. As we know that all over the world the diesel vehicle population is growing at an alarming rate. The emission will irritate skin, eyes, nose and throat and also leads to bronchitis asthma in the long run and has been led to air pollution. It is a serious concern with the pollution point of view. Developing Countries like India depends on its fossil fuel requirements on foreign countries for which spars a huge foreign currency in purchase of crude oil. The increasing pressure on crude oil reserves and environmental degradation as an outcome. Hence in view of the above drawbacks there is an urgent need to find an alternative fuels in the existing engines. Fuels like (Low Cetane Fuels) like Apricot oil blended with ethanol may promise and present a sustainable solution as it can be produced from a wide range of plants and seeds.

INTRODUCTION

Rising petroleum prices, increasing threat to the environment from vehicle exhaust emissions and fastly depleting stock of fossil fuels have generated an intense international interest in developing alternative renewable fuels for IC engines. Bio fuel is an oxygenated fuel which increases the combustion and makes reduce exhaust emission. It can be produced from crops with high sugar or starch content. Some of these crops include sugarcane, sorghum, corn, barley, cassava, linseedplants, sugar beets etc. Besides being a biomass based renewable fuel, Biofuel has cleaner burning and higher octane rating than the various vegetable oils [1-5]. Jason and Marc (2002) presented the exegetic environmental assessment of lifecycle emissions from M-85, E-85 (used for the gasoline engine) and other alternative fuels [6]. Diesel exhaust is a major contributor to various types of air pollution, including particulate matter (PM), oxides of nitrogen (NOx), and carbon monoxide (CO) [7]. It has been demonstrated that the formation of these air pollutants can be significantly reduced by incorporating or blending oxygenates into the fossil fuels matrix [8]. Diesel engines are an important part of the public and private transportation sector and their use will continue and grow into the future. But their smoke has become biggest threat to health and environment [9]. Keeping in mind the higher octane number of the ethanol, variable compression ratio engine is a good option in this direction using the ethanol diesel blend as fuel; Shaik *et al*. (2007) demonstrated VCR engine has great potential for improving part-load thermal efficiency and reducing greenhouse gas emissions [10]. There were many attempts made to use Biofuel in compression ignition (CI) engine. Huang *et al*. (2008) carried out tests to study the performance and emissions of the engine fuelled with the ethanol diesel blends [11]. They found it feasible and applicable for the blends with n-butanol to replace pure diesel as the fuel for diesel engine. Bhattacharya and Mishra (2002) evaluated the feasibility of preparing diesel-ethanol blends using 200° (anhydrous ethanol) and ethanol lower proof [12]. They found that ethanol blends indicated power producing capability of the engine similar to that of diesel. Hansen *et al*. (2001) found that the properties of ethanol-diesel blends have a significant effect on safety, engine performance, durability and emissions [13]. Wang *et al*. (2003) analyzed that the most noteworthy benefits of E-diesel use lie with petroleum fuel reductions and reductions in urban PM_{10} and CO emissions by heavy vehicle operations [11]. Ajav and Akingbehin (2002) experimentally determined some fuel properties of local ethanol blended with diesel to establish their suitability for use in compression ignition engines [14]. Eckland *et al*. (1984)

Corresponding author:* ***Hiregoudar Yerrannagoudar*
Department of Mechanical Engineering, RYM Engineering College, Karnataka State, India

presented, State-of-the-Art Report on the Use of Alcohols in Diesel Engines [15].

Techniques that have been evaluated for concurrent use of diesel and alcohols in a compression-ignition engine include (1) alcohol fumigation, (2) dual injection (3) alcohol/diesel fuel emulsions, and (4) alcohol/diesel fuel solutions. Heisey and Lestz (1981) reported significant reductions in particulate generation; however, NOx generation increases [16]. Likos *et al*. (1982) reported increased NOx and hydrocarbon emissions for diesel-ethanol emulsions [17]. Khan and Gollahalli (1981) reported decreased NOx and hydrocarbon emissions with increased particulate emissions for diesel-ethanol emulsions [18]. Lawson *et al*. (1981) reported increased NOx and decreased particulate emissions with diesel methanol emulsions [19].

Performance and Emission Characteristics of Twin Cylinder CI Engine Using Cottonseed Oil Blended With Methanol [20]. Ahmed (2001) found Diesel engines are major contributors of various types of air polluting exhaust gasses such as particulate matter (PM), carbon monoxide (CO), oxides of nitrogen (NOx), sulfur, and other harmful compounds [21]. Experimental Investigation of Twin Cylinder Diesel Engine Using Linseed oil blend with Ethanol [22]. Rao *et al*. (2008) carried out experiment in order to found out optimum compression ratio, experiments were carried out on a single cylinder four stroke variable compression ratio diesel engine [23]. Experimental Investigation of Twin Cylinder Diesel Engine Using Diesel & Methanol [24] Investigation of Methanol in Twin cylinder in line 4 Stroke liquid cooled Diesel Engine [25] Investigation of Alternative fuels in Diesel Engine [26-37]

Experimental Setup

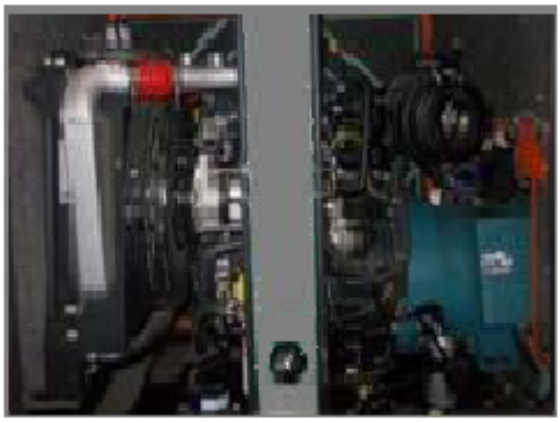

Fig 1 Test engine (Twin cylinder Diesel Engine)

Objective

Objective of the present study is to

1. It is proposed to use Bio Fuel blended with Ethanol in the diesel engine.
2. The emissions like HC, CO_2, NOx and Smoke in the exhaust gases are proposed to reduce during the combustion itself.
3. To study the performance evaluation of the using Bio fuel blended with Ethanol in the diesel engine.
4. To analyse the exhaust emissions and measurement, reduction in the exhaust gas.

Properties of Bio Fuel Blended With Alcohol

Table-1

Sl.No	Biofuel	CV KJ/Kg
1.	Diesel	44800
2.	Camfer oil blended with Ethanol	35785

Engine Specification

Table-2

Test Engine specification	
Injection Pressure	1800 bar
Engine type	Four stroke Twin cylinder diesel engine
No. of cylinders	02
Stroke	100 mm
Bore Diameter	87 mm
Engine Power	15KVA
Compression ratio	17.5:1
RPM	1500

RESULTS

Performance Graphs

Brake Specific Energy Consumption

BSEC				
%	Diesel Conventional Piston	Diesel Modified Piston	50% Camfer oil + 50% Ethanol Conventional Piston	50% Camfer oil + 50% Ethanol Modified Piston
0	23214.5	24762.23	25167.22	27199.24
10	18779.1	19822.43	20183.32	22215.05
25	14243.4	13587.15	16142.02	18241.43
50	12082.4	11406.47	14111.36	16994.45
75	11157	10758.58	13839.45	15716.97
100	11548.2	11315.11	14922.51	16656.26

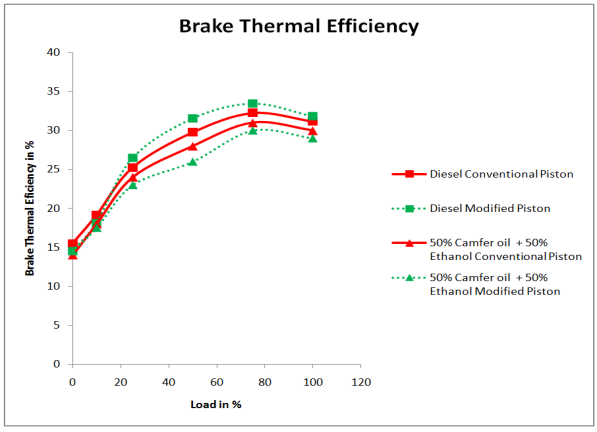

Fig-2 shows the variations of Brake Specific Energy Consumption for Diesel andCamfer blended with Ethanol in Conventional and Modified pistons

Brake Thermal Efficiency

Brake thermal efficiency				
%	Diesel Conventional Piston	Diesel Modified Piston	50% Camfer oil + 50% Ethanol Conventional Piston	50% Camfer oil + 50% Ethanol Modified Piston
0	15	14	14	14.5
10	19	18	18	17.5
25	25	26	24	23
50	29	31	28	26
75	32	33	31	30
100	31	31	30	29

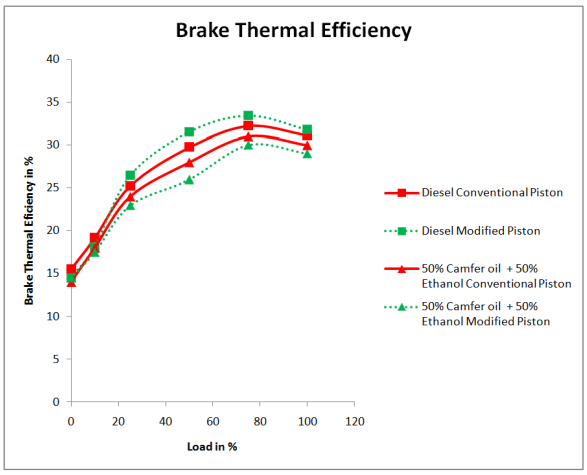

Fig-3 shows the variations of Brake Thermal Efficiency for Diesel and Camfer blended with Ethanol in Conventional and Modified pistons

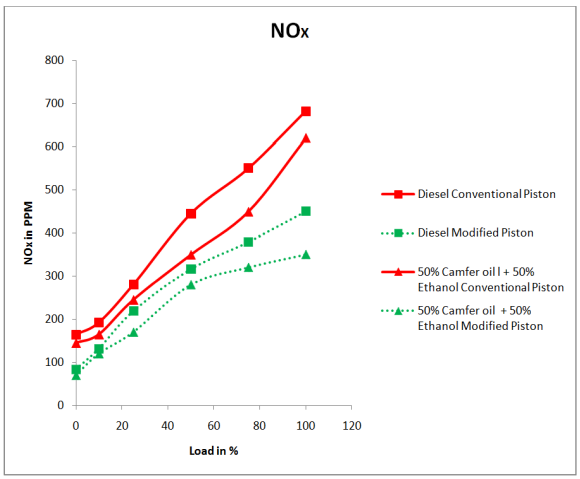

Fig-5 shows the variations of Nitrogen dioxideforDiesel and Camfer blended with Ethanol in Conventional and Modified pistons

Emission Graphs

Unburnt Hydro Carbon

	HC			
%	Diesel Conventional Piston	Diesel Modified Piston	50% Camfer oil + 50% Ethanol Conventional Piston	50% Camfer oil + 50% Ethanol Modified Piston
0	145	110	140	135
10	155	125	145	140
25	175	140	160	145
50	180	155	170	155
75	190	170	175	165
100	200	185	180	170

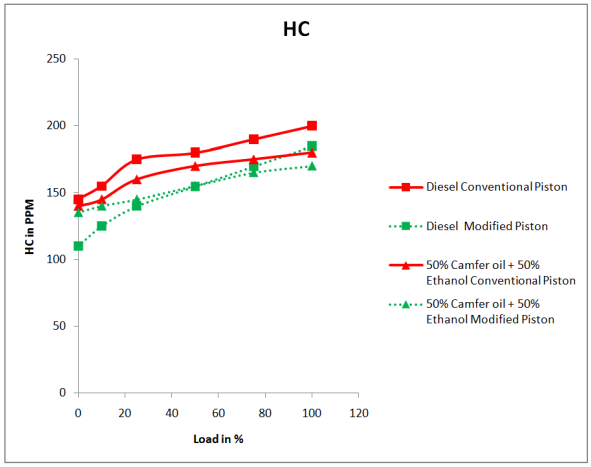

Fig-4 shows the variations of Unburnt Hydro Carbon for Diesel and Camfer blended with Ethanol in Conventional and Modified pistons

Nitrogen Dioxide

	NOX			
%	Diesel Conventional Piston	Diesel Modified Piston	50% Camfer oil l + 50% Ethanol Conventional Piston	50% Camfer oil + 50% Ethanol Modified Piston
0	164	84	145	70
10	192	132	165	120
25	280	219	245	170
50	445	317	350	280
75	550	380	450	320
100	682	450	620	350

Carbon Dioxide

	CO_2			
%	Diesel Conventional Piston	Diesel Modified Piston	50% Camfer oil + 50% Ethanol Conventional Piston	50% Camfer oil + 50% Ethanol Modified Piston
0	15	1.03	14	1
10	18	1.82	16	1.2
25	20	2.82	18	2
50	25	3.1	22	2.2
75	26	5.06	24	3.8
100	28	8.07	26	5.5

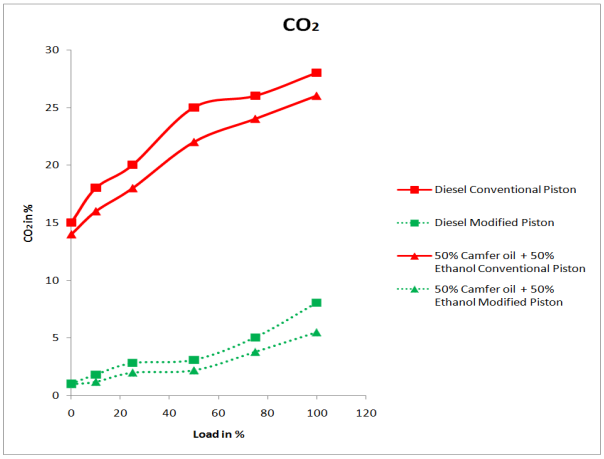

Fig-6 shows the variations of Carbon dioxide for Diesel and Camfer blended with Ethanol in Conventional and Modified pistons

Smoke

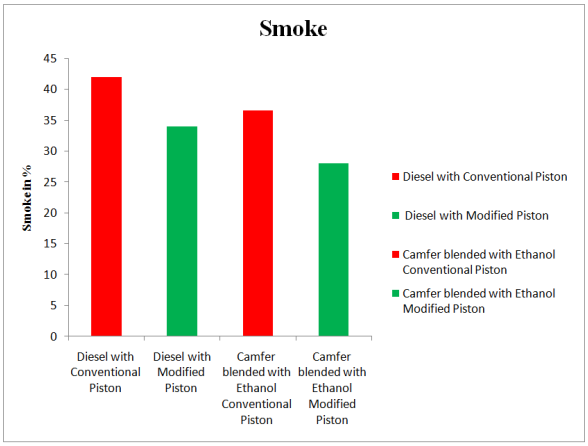

Fig-7 shows the variations of Smoke for Diesel and Camfer blended with Ethanol in Conventional and Modified pistons

CONCLUSION

From the evaluation and comparison of the various types of fuels that have been experimented with in the twin cylinder diesel engine, it is inferred that the Ethanol Blend with Camfer oil is suitable for running compression ignition engines. Ethanol Blend with Camfer oil emits less pollutant compared to diesel in Conventional as well in Modified Piston.

From this project we tried to use Ethanol Blend with vegetable oil as substitute to diesel, run the engine and succeeded, this show that Ethanol Blend with vegetable oil alternative to diesel fuel.The HC, CO_2, Nox, Smoke emissions are measured in exhaust gases using gas analyzer and it is observed that HC, CO_2,Nox, Smoke emissions in Ethanol Blend with Camfer oil are less compare to dieselin Conventional as well in Modified Piston.

References

Alan C. Hansen, Qin Zhang and Peter W. L. Lyne, "Ethanol–diesel fuel blends a review", Bioresource Technology, Volume 96, Issue 3, February 2005, Pages 277-285.

Dr.Hiregoudar Yerrennagoudar, Manjunatha K, et.al. "Performance & emission of Twin Cylinder Diesel Engine Using Ethanol" *International Journal of Engineering Science and innovative Technology* (IJESIT), (ISSN 2319 – 5967) (Online)) Volume No.3, Issue No.4, July2014)

Neven Voca, Boris Varga, Tajana Kricka, Duska Curic, Vanja Jurisic and Ana Matin, "Progress in ethanol production from corn kernel by applying cooking pre-treatment" Bioresource Technology Volume 100, Issue 10, May 2009, Pages 2712-2718.

Avinash Kumar Agarwal, "Biofuels (alcohols and biodiesel) applications as fuels for internal combustion engines" Renewable Energy, 27 November 2006.

Hakan, Bayraktar. "Experimental and theoretical investigation of using gasoline–ethanol blends in spark-ignition engines", Renewable Energy, 2005; Volume 30, Issue 11:pp1733-1747.

Jason J, Daniel Marc, Rosen A, "Exergetic Environmental Assessment of Life Cycle Emissions for various Automobiles and Fuels, Exergy 2 (2002) 283-294

Hwanam Kima, Byungchul Choi, "Effect of ethanol–diesel blend fuels on emission and particle size distribution in a common-rail direct injection diesel engine with warm-up catalytic converter", Renewable Energy 33 (2008) 2222–2228.

De-gang Li, Huang Zhen, Luˇ Xingcai, Zhang Wu-gao and Yang Jian-guang, "Physico-chemical properties of ethanol–diesel blend fuel and its effect on performance and emissions of diesel engines", Renewable Energy 30 (2005) 967–976.

Sehmus Altuna, Husamettin Bulutb and Cengiz Oner, "The comparison of engine performance and exhaust emission characteristics of sesame oil–diesel fuel mixture with diesel fuel in a direct injection diesel engine", Renewable Energy 33 (2008) 1791–1795.

Amjad Shaik, N Shenbaga Vinayaga Moorthi, and R Rudramoorthy, "Variable compression ratio engine: a future power plant for automobiles an overview," Proc. MechE Vol. 221 Part D April 2007. DOI: 10.1243/09544070JAUTO573.

Jincheng Huang, Yaodong Wang, Shuangding Li, Anthony P. Roskilly, Hongdong Yu, Huifen Li, "Experimental Investigation on the Performance and Emissions of a Diesel Engine Fuelled with Ethanol-diesel Blend," ATE 2697, 2008.

T K Bhattacharya and T N Mishra, "Studies on Feasibility of using Lower Proof Ethanol-diesel Blends as Fuel for Compression Ignition Engines", IE (I) Journal–AG 263 145, December 21, 2002

Alan C. Hansen, Peter W. L. Lyne, Qin Zhang, "Ethanol-Diesel Blends: A Step towards A Bio-Based Fuel for Diesel Engines", American Society of Agricultural and Biological Engineers (ASAE) August 1, 2001 Ajav, E. A. and O. A. Akingbehin, "A Study of some Fuel Properties of Local Ethanol Blended with Diesel Fuel", *Journal of Scientific Research and Development*

R.Kamo And W. Bryzik "Tacom/Cummins Adiabatic Engine Programm" Sae Paper No. 830314.

P.Ram Mohan, K.Ram Mohan, C.M. Varaprasad " Matching of Injection Timing In L.H.R Engines For Fuel Economy" Proc Of 3rd Asian Pacific International Symposis On Combustion Energy And Energy Utilisation December 95.

Van Sudhakar "Performance Analysis of Adiabatic Engine" Sae 840431.

C.M.Varaprasad, K.Ram Mohan "Performance of a Diesel Engine with a Semi-Adiabatic Piston on Diesel Methanol Mixtures" Dsir Seminar on Diesel Engines, Iit, Mumbai October 88.

Rangaiaii *Et Al* "Performance of Ceramic Coated Diesel Engines with Methanol Diesel Mixtures" 9th National Conference in C.I Engines and Combustion 1985.

K. Ram Mohan, C.M Varaprasad. P. Ram Hohan "Performance Evaluation of Diesel Engine with A Air-Gap Insulated Piston" Annual Paper Meeting the the Institution of Engineers.

Dr.Hiregoudar Yerrennagoudar,Manjunatha K, et.al," "Performance and Emission Characteristics of Twin Cylinder CI Engine Using Cottonseed Oil Blended With Methanol" International Organization of Science Research Community of Researcher (IOSR) IOSR *Journal of Mechanical and Civil Engineering* (IOSR-JMCE) e-ISSN: 2278-1684,p-ISSN: 2320-334X, Volume 12, Issue 1 Ver. I (Jan- Feb. 2015), PP 47-53 www.iosrjournals.org

Mather and Sharma "Internal Combustion Engines" 7th Edition 1996.

Dr.Hiregoudar Yerrennagoudar, Manjunatha K et.al "Experimental Investigation of Twin Cylinder Diesel Engine Using Linseed oil blend with Ethanol" (ICNSE-1439)" International Congress on Natural Sciences and Engineering, May 7-9, 2015, Kyoto, Japan.

Eckland, E. E.; R. L Bechtold; T. J. Timbario; and P. W. McCallum, "State-of-the-Art Report on the Use of Alcohols in Diesel Engines", SAE Paper No. 840118.

Dr.Hiregoudar Yerrennagoudar, Manjunatha K *et.al*, "Experimental Investigation of Twin Cylinder Diesel Engine Using Jatropha and Hippie Oil Blend With Ethanol" International Organization of Science Research Community of Researcher (IOSR) *Journal of Mechanical and Civil Engineering* (IOSR-JMCE) e-ISSN: 2278-1684,p-ISSN: 2320-334X, Volume 12, Issue 1 Ver. I (Jan-Feb. 2015), PP 54-60www.iosrjournals.org

Dr.Hiregoudar Yerrennagoudar, Manjunatha K et.al, "Performance and Emission Characteristics of CI Engine using Hippie oil and Cotton Seed Oil Blended with Methanol", *International Journal of Recent Development in Engineering and Technology*, Website: www.ijrdet.com (ISSN 2347 – 6435 (Online)) Volume No., Issue No., Month 2013).

Dr.Hiregoudar Yerrennagoudar, Manjunatha K et.al, "Investigation and Performance Evaluation of Rubber oil and Hippie oil Blended with diesel using the twin cylinder diesel engine", National Conference On Trends In Mechanical Engineering (TIME,15) on 23rd September,2015, Department of mechanical engineering, JNTUA College of Engineering, Ananthapuramu Andhra Pradesh-515002, Pp. No. 430-434

Dr.Hiregoudar Yerrennagoudar, Manjunatha K et.al," Performance and Emission Characteristics of Twin Cylinder CI Engine using Hippie Oil Blended with Methanol", Two- Day National Conference on Emerging Trends in Engineering Management on 6th and 7th November 2014, Department Of Industrial Engineering and Management, J.SS. Academy of Technical Education, J.S.S Campus, Utharahalli-Kengeri Main Road, Bengalore-560060, Article no.99, Pp.no.72

Dr.Hiregoudar Yerrennagoudar, Manjunatha K, et.al "Investigation of Methanol in Twin cylinder in line 4 Stroke liquid cooled Diesel Engine" International Conference on Mechanical, Aeronautics and Production Engineering (ICMAPE), II-RIETCHN-26075-1467, Beijing, China 26th July 2015

****

How to cite this article:

Hiregoudar Yerrannagoudar., Manjunatha K and Parashurama Vaddar.2016, Investigation And Performance Evaluation of Ethanol Blend With Camfer Oil As Alternative Fuels In Diesel Engine. *Int J Recent Sci Res.* 7(4), pp. 10454-10458.

TSSN 0976-3031