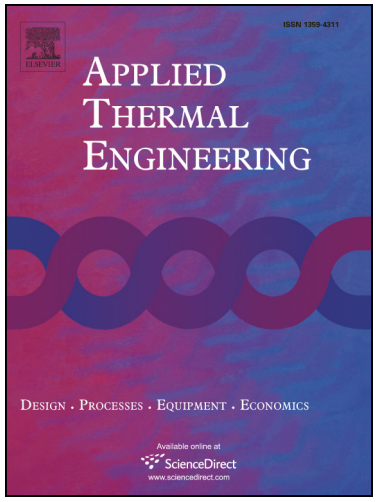

A Comparative Study on Influence of Fuel Additives with Edible and Non-Edible Vegetable Oil Based on Fuel Characterization and Engine Characteristics of Diesel Engine

Pinkesh R. Shah, Anuradda Ganesh

PII: S1359-4311(16)30436-7
DOI: http://dx.doi.org/10.1016/j.applthermaleng.2016.03.128
Reference: ATE 7996

To appear in: *Applied Thermal Engineering*

Received Date: 3 December 2015
Accepted Date: 23 March 2016

Please cite this article as: P.R. Shah, A. Ganesh, A Comparative Study on Influence of Fuel Additives with Edible and Non-Edible Vegetable Oil Based on Fuel Characterization and Engine Characteristics of Diesel Engine, *Applied Thermal Engineering* (2016), doi: http://dx.doi.org/10.1016/j.applthermaleng.2016.03.128

A Comparative Study on Influence of Fuel Additives with Edible and Non-Edible Vegetable Oil Based on Fuel Characterization and Engine Characteristics of Diesel Engine

Pinkesh R. Shah [a], Prof. Anuradda Ganesh [b]

[a], [b] Department of Energy Science and Engineering, Indian Institute of Technology Bombay, Mumbai, India.

[a] Corresponding Author mail ID: pinkeshrshah@gmail.com , Tel.: +919825472703

ABSTRACT

Use of vegetable oil as compression ignition engine fuel has been investigated by many researchers during last decade either by direct blending with diesel or converting it into bio-diesel but very few publications available regarding its direct use in engine. The direct use of straight vegetable oil leading to formation of injector deposits which in turn produces higher exhaust emissions. Fuel improvement through additive is an attractive option in existing diesel engine without any modification to meet worldwide legislative efforts to lower airborne pollution. Hence, use of locally available vegetable oil with addition of fuel additive in existing diesel engine becomes an indispensable tool in global trade to meet ever-tightening pollutant emissions regulations for heavy-duty diesel engine. This paper intends to compare the behaviour of edible and non-edible crude vegetable oil on engine characteristics of existing diesel engine under similar operating condition with cognitive elaboration. The main purpose of the present work was to investigate how commercially available fuel additives for diesel fuel, influence the edible and non-edible vegetable oil, by comparing the combustion, emission and performance characteristics under similar operating condition. A comparative study was carried out on Cummins two cylinder DI diesel engine at constant speed by varying brake load. The Sunflower oil (SF) was selected as edible oil and Karanj oil (KO) as non-edible oil whereas two commercially available fuel additives for diesel referred as 'A1' and 'A2' respectively in this study were procured for test trial. The experimentally obtained results revealed that both edible oil (SF) and non-edible oil (KO) showed longer ignition delay which in turn leading to higher cylinder pressure, HRR, higher NO_x and CO

Nomenclature

ν	Kinematic viscosity of liquid fuel, m^2/s
σ	Surface Tension of fuel, N/m
ρ_f	Density of fuel, kg/m^3
ρ_a	Density of air, kg/m^3
ΔP	Pressure drop across nozzle, bar
SG	Specific gravity
B	Bulk modulus
cst	Centi stoke