Dedication

To my colleagues, students and researchers.

Acknowledgement

First of all, giving thanks to Allah,

And a special thanks to supervisor

DR. ALI MOHAMMED HAMDAN ADAM.

I can’t forget giving thanks to everyone who helped me and gave me a new hope for successful.

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Abstract

The rapid depletion in world petroleum reserves and uncertainty in petroleum supply due to political and economical reasons, as well as, the sharp escalation in petroleum prices, have stimulated the search for alternatives to petroleum based fuels specifically diesel and gasoline.

The internal combustion engines field researcher's attention focus on two important factors; performance characteristics and exhaust emissions level, the researchers tended to add vegetable oil to fuel in order to improve the above-mentioned factors.

Experiments were conducted on four cylinders, four stroke, compression ignition engine, at five different speeds and five different fuel samples.

According to the results obtained it was found that the blend 30BJ70D gives the highest brake power at engine speed of 2000 rpm and lowest brake specific fuel consumption at speed of 1500 rpm, as for the blend 50BJ50D it gives lowest CO and SO_2 emissions level for all engine speeds.

تجريـــــــد

الإستنزاف السريع لإحتياطيات العالم النفطية وعدم اليقين في إمدادات النفط لأسباب سياسية واقتصادية، وكذلك التصعيد حاد في أسعار النفط، قد شجعت على البحث عن بدائل لأنواع الوقود القائمة على البترول الديزل والبنزين على وجه التحديد.

الباحثين في مجال محركات الاحتراق الداخلي ينصب تركيزهم على عاملين مهمين؛ هما خصائص الأداء للمحرك ومستوى انبعاثات العادم، لذلك اتجه الباحثين إلى إضافة الزيت النباتي إلى الوقود من أجل تحسين العوامل المذكورة أعلاه.

تم إجراء التجارب على محرك إشعال بالضغط رباعي الأشواط رباعي الأسطوانات عند خمس سرعات مختلفة وخمس عينات مختلفة من الوقود.

وفقاً للنتائج التي تم الحصول عليها تبين أن المزيج 30BJ70D يعطي أعلى قدرة فرملية عند سرعة 2000 دورة في الدقيقة وأدنى إستهلاك وقود نوعي فرملي عند سرعة 1500 دورة في الدقيقة، أما بالنسبة للمزيج 50BJ50D فأنه يعطي أدنى مستوى إنبعاثات لأول أوكسيد الكربون وثاني أوكسيد الكبريت لجميع سرعات المحرك.

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Abbreviations & Symbols

A/ Abbreviations:

BDF	Biodiesel Fuel
BJ	Jatropha Bio-fuel
BP	Brake Power
BSFC	Brake Specific Fuel Consumption
BTE	Brake Thermal Efficiency
CI	Compression Ignition
CO	Carbon monoxide
CO_2	Carbon dioxide
C.V	Calorific Value
D	Diesel
DI	Direct Injection
HC	Hydrocarbons
J	Jatropha Oil
NO_X	Oxides of Nitrogen
ppm	Parts Per Million
UBHC	Unburned Hydrocarbons

B/ List of symbols:

Symbol	Function	Unit
BP	Brake power	kW
BSFC	Brake specific fuel	kg/kW.h
C.V	Calorific Value	kJ/kg
F	Frictional force in dynamometer	N
L	Dynamometer arm length	m
m_1	Initial mass of fuel tank	kg
m_2	final mass of fuel tank	kg
N	Engine speed	rpm
R	Dynamometer disk radius	m
S	Dynamometer scale reading	N
T	Torque	N.m
t	Fuel consumption time	sec
$\dot{m}_f$	Fuel mass flow rate	kg/s
$\eta_{th.B}$	Brake thermal efficiency	%

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