Fuel of diesel-olive seed oil mixtures

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Abstract: - Some of the consequences of crude oil dependence are the increasing price of crude oil, the important changes in oil market, the finite of reserves as well as the environmental pollution. Therefore, there is a big need to produce appropriate fuels, which will have minimal environmental and social degradation. This led to the revaluation of the importance of the rural and forestall factor as a renewable resources supplier. This essay testes the use of diesel-olive seed oil mixtures in diesel four-stroke engine. The mixtures used are the following: diesel-5% olive seed oil, diesel-10% olive seed oil, diesel-20% olive seed oil, diesel-30% olive seed oil, diesel-40% olive seed oil, diesel-50% olive seed oil. For those mixtures the gas emissions of carbon monoxide (CO), hydrocarbons (HC), nitrogen monoxide (NO) are being measured and the fuel consumption is also examined.

Key-Words: - Gas emissions, olive seed oil fuel, Biofuels

I. INTRODUCTION

There is little doubt that human being has a profoundly negative effect on the environment. Concretely, most of the people look to satisfy their needs, without taking into consideration what effect this might have on the environment. Unless a significant change occurs, it is very possible that in the following future, most of the countries will run out of the existing fuel sources [1]. Besides that, we need to take under consideration the interpretation of well publicized meteorological data, which indicates that the earth is warning with a distinct correlation between the underlying pattern of global temperature change, the carbon dioxide concentration in our atmosphere and the carbon dioxide emissions from burnt fossil fuels [2,3,4,5].

In 2004 a survey took place in Australia by engineers, who demonstrated that the best solution for reducing the greenhouse gas emissions was the use of alternative fuels. Therefore, there is a big need to mainstream alternative, sustainable eco friendly energy sources in order to protect our environment and the possibility of running out of fuel sources [6,7,8,9,10,11,12].

Biomass refers to living and recently dead biological material that can be used as fuel or for industrial production. It is one of the renewable energy sources, as we can always grow more trees and crops and waste will always exist. Some examples of biomass fuels are wood, crops, manure and some garbage. Another sustainable fuel is Biodiesel[13,14,15,16].

Biodiesel is the name for a variety of ester-based oxygenated fuels made from soybean oil or other vegetable oils or animal fats. It contains no sulphur or aromatics, it is biodegradable and non toxic, and it is more oxygenated than regular diesel and produces far less particulates [[17,18,19]]. Biodiesel is a renewable fuel, which is safe biodegradable and reduces the emissions of most air pollutants. Consequently, biodiesel is much less polluting than petroleum diesel[20,21,22].

Biofuels are the fuels that are being produced from biomass. Furthermore, biofuel is defined as solid, liquid or gas fuel derived from relatively recently dead biological material. They can replace conventional fuels, completely or partially, in the internal combustion engines [23]. There are a number of parameters that effect the vehicle exhaust emissions, such as the fuel and air mixing, the temperature of combustion and the time available for combustion in the engine. Also the fuel that is used to power the engine influences emissions [24]. When alternative fuels are used instead of the usual petroleum-based fuels, the vehicular emissions are reduced. Using renewable fuels, such as biofuels, there is also a reduction of carbon dioxide (CO_2) in the atmosphere. Carbon dioxide is non-toxic but contributes to the greenhouse effect [25]. One of the advantages of biofuel is that it can produce energy without causing a net increase of atmospheric carbon. As a result biofuel is friendly to the environment when it is used as a fuel instead of petroleum [25].

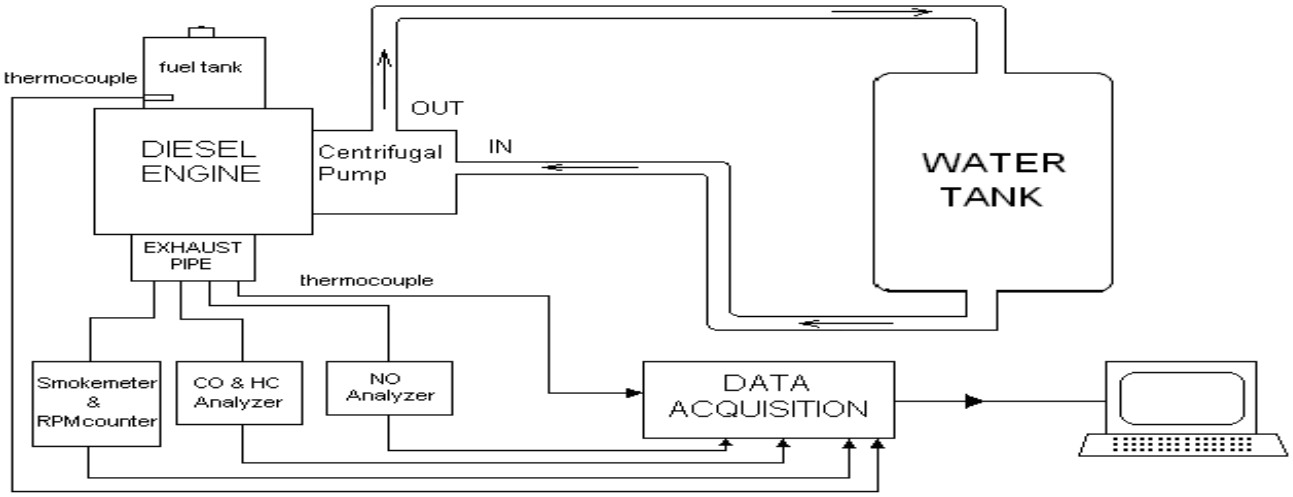
The major issue is how a four-stroke diesel engine behaves on the side of pollutants and operation, when it uses mixed fuel of diesel –maize oil.

II. INSTRUMENTATION AND EXPERIMENTAL RESULTS

In the experiment stage has been used directly cotton oil in the mixture of diesel in to a four – stroke Diesel engine. Specifically it has been used diesel, mixture diesel-5% olive seed oil (Pyrin5%), diesel-10% olive seed oil (Pyrin10%), diesel-20% olive seed oil (Pyrin20%), diesel-30% olive seed oil (Pyrin30%), diesel-40% olive seed oil (Pyrin40%), diesel-50% olive seed oil (Pyrin50%) in a four-stroke diesel engine named Ruggerini type RD-80, volume 377cc, and power 8.2hp/3000rpm, who was connected with a pump of water centrifugal. Measurements were made when the engine was function on 1000, 1500, and 2000rpm.

During the experiments, it has been counted:

- The percent of (%) (CO)
- To ppm(parts per million) HC
- To ppm(parts per million) NO
- The percent of smoke



Picture1. Experimental layout

The measurement of rounds/min of the engine was made by a portable tachometer (Digital photo/contact tachometer) named LTLutron DT-2236. Smoke was measured by a specifically measurement device named SMOKE MODULE EXHAUST GAS ANALYSER MOD 9010/M, which has been connected to a PC unit.

The CO and HC emissions have been measured by HORIBA Analyzer MEXA-324 GE. The NO emissions were measured by a Single GAS Analyser SGA92-NO. The experimental results are shown at the following tables and figures:

	CO %						
rpm	**diesel**	**Pyrin5%**	**Pyrin 10%**	**Pyrin 20%**	**Pyrin 30%**	**Pyrin 40%**	**Pyrin 50%**
1000	0,056	0,056	0,054	0,060	0,053	0,053	0,048
1500	0,055	0,044	0,038	0,055	0,040	0,041	0,036
2000	0,043	0,038	0,031	0,050	0,031	0,036	0,030

Table 1. The CO average value variation on different rpm regarding to the mixture.

	HC(ppm)						
rpm	**diesel**	**Pyrin5%**	**Pyrin 10%**	**Pyrin 20%**	**Pyrin 30%**	**Pyrin 40%**	**Pyrin 50%**
1000	31,783	35,237	77,922	152,830	13,023	16,799	12,508
1500	38,001	48,434	79,198	165,479	22,954	24,870	22,860
2000	38,338	71,585	97,513	208,166	60,209	37,725	47

Table 2. The HC average value variation on different rpm regarding to the mixture.

rpm	NO(ppm)						
	diesel	Pyrin5%	Pyrin 10%	Pyrin 20%	Pyrin 30%	Pyrin 40%	Pyrin 50%
1000	518,210	415,212	375,075	392,478	372,681	473,620	362,663
1500	739,366	730,361	677,793	703,549	673,198	729,462	758,413
2000	762,155	790,676	738,929	805,702	825,376	938,210	880,990

Table 3. The NO average value variation on different rpm regarding to the mixture.

rpm	%smoke						
	diesel	Pyrin5%	Pyrin 10%	Pyrin 20%	Pyrin 30%	Pyrin 40%	Pyrin 50%
1000	9,990	12,605	14,787	12,717	11,018	9,932	16,278
1500	7,363	11,967	10,594	13,715	12,575	13,285	19,673
2000	6,634	14,212	12,201	14,131	14,098	17,528	23,359

Table 4. The %smoke average value variation on different rpm regarding to the mixture.

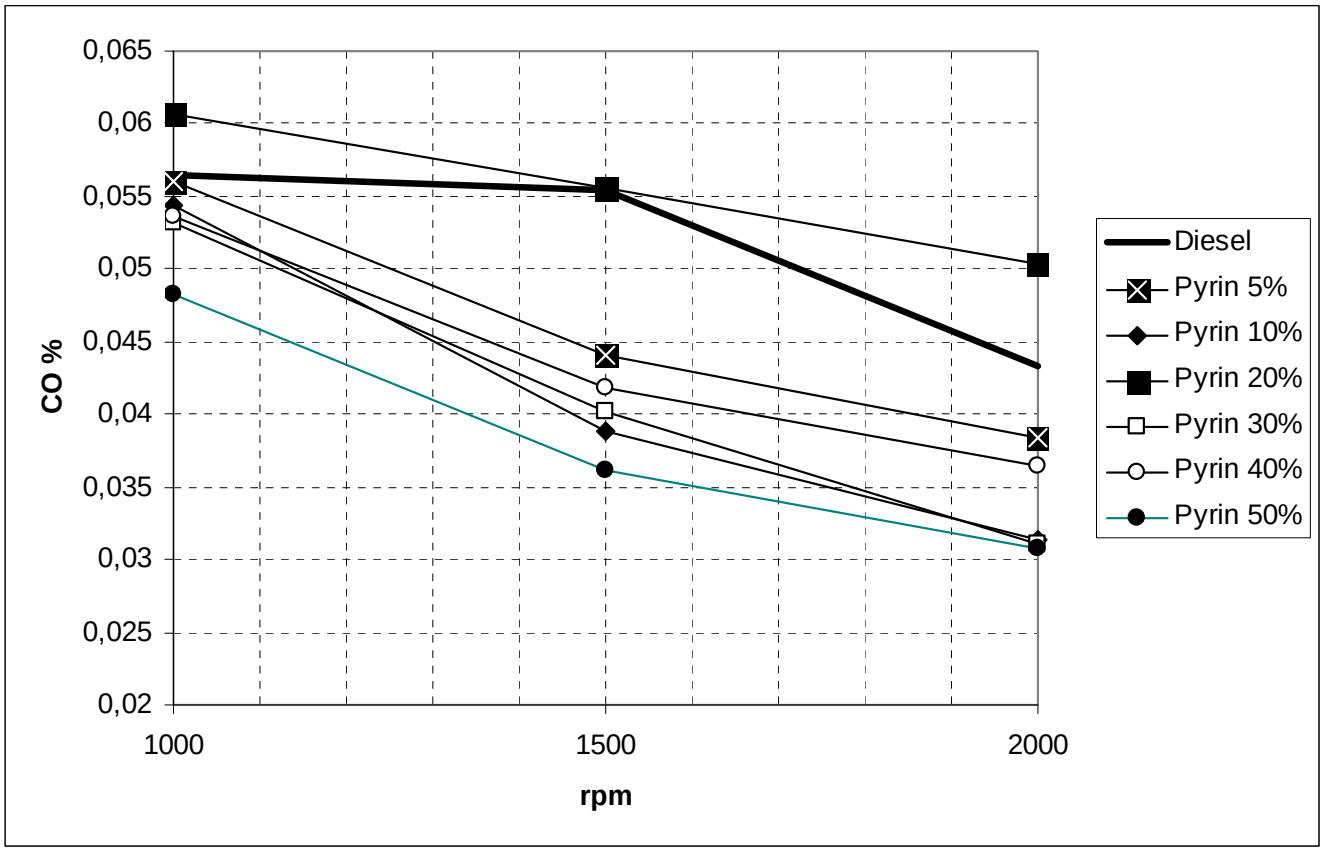


Figure 1. The CO variation on different rpm regarding to the mixture

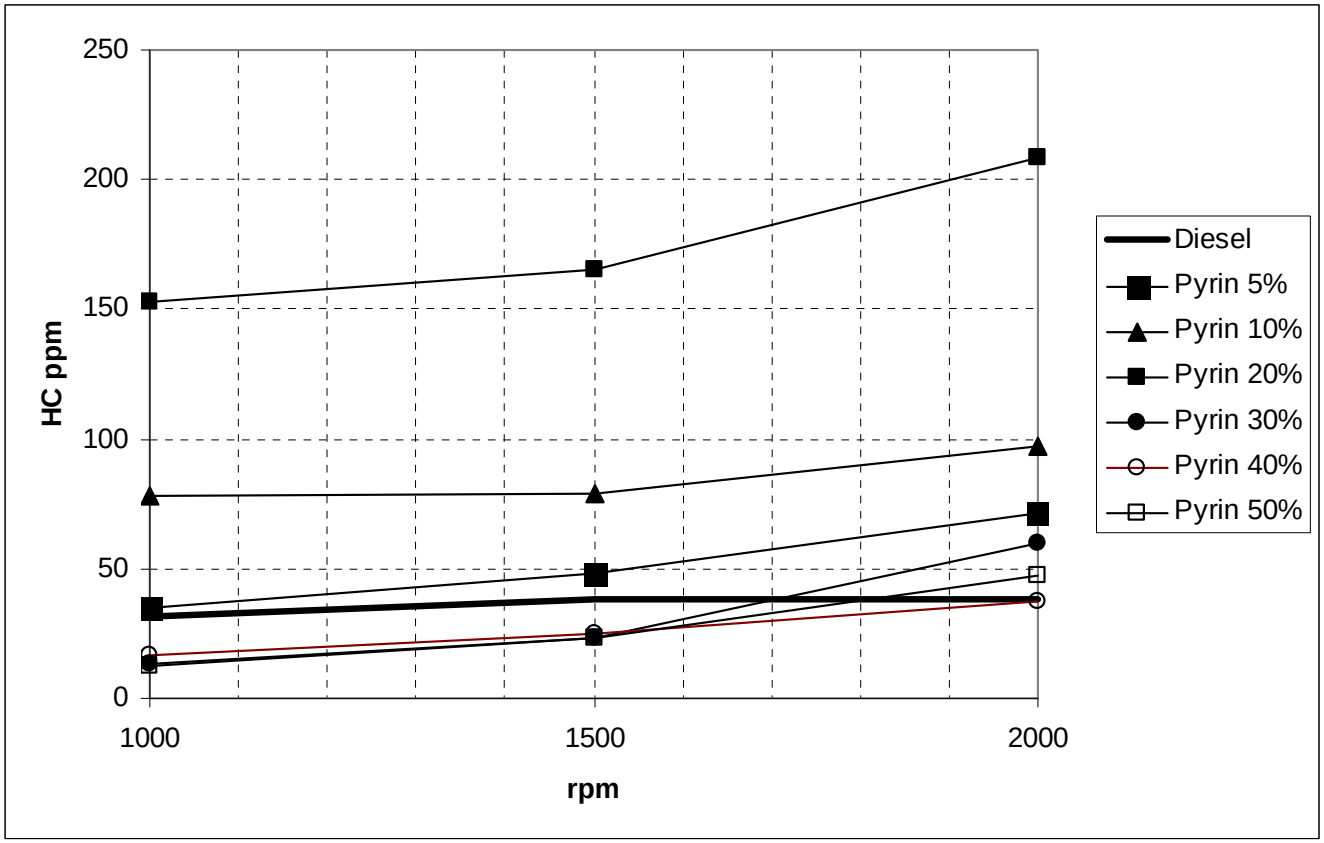


Figure 2. The HC variation on different rpm regarding to the mixture

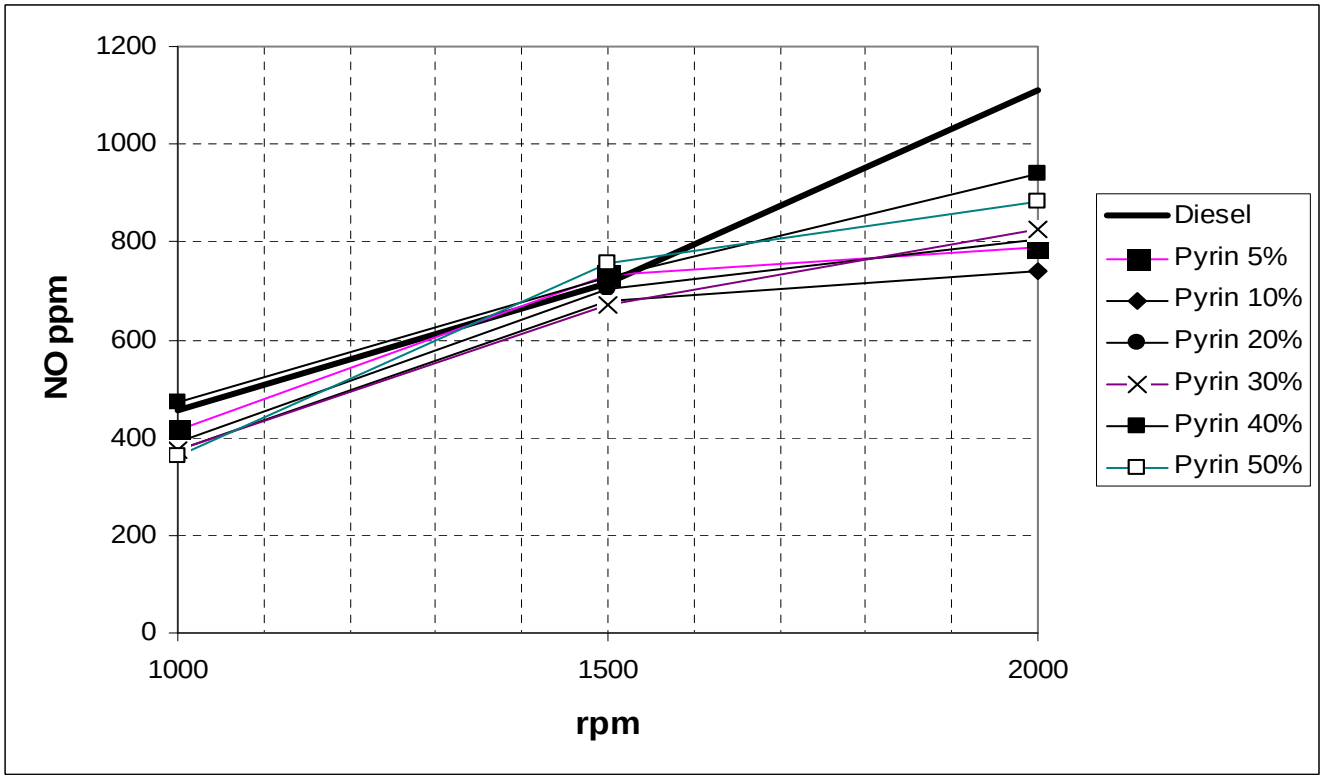


Figure 3. The NO variation on different rpm regarding to the mixture

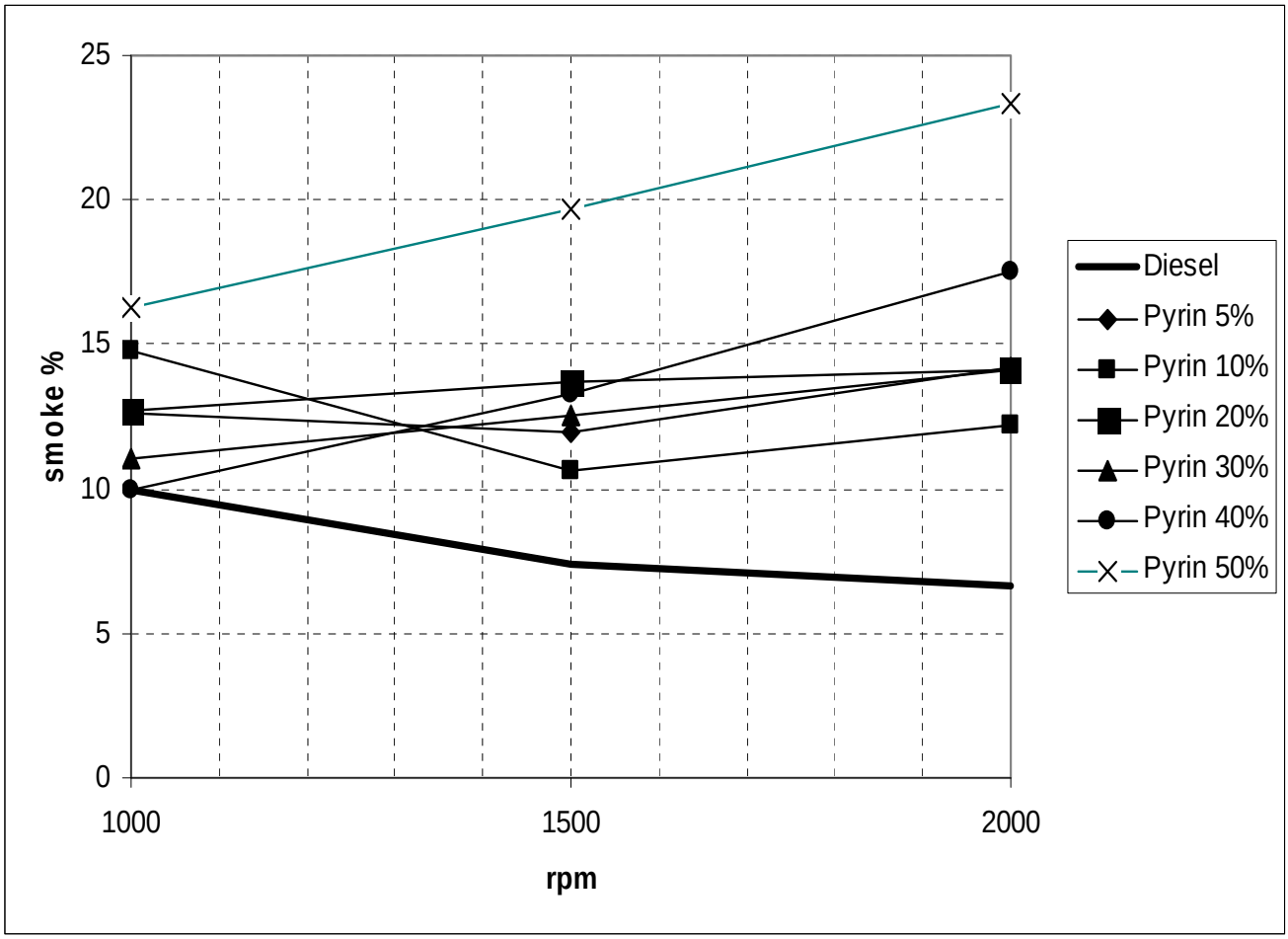


Figure 4. The smoke variation on different rpm regarding to the mixture

	Exhaust gas temperature						
rpm	**diesel**	**Pyrin5%**	**Pyrin 10%**	**Pyrin 20%**	**Pyrin 30%**	**Pyrin 40%**	**Pyrin 50%**
1000	102,2631	102,5465	97,68247	100,9324	82,10776	84,97996	89,5851
1500	133,4814	128,3216	122,0901	125,1257	119,0511	120,1735	131,0535
2000	180,4922	176,2328	172,7229	171,2406	171,2454	174,4881	180,5564

Table 5. The exhaust gas temperature variation on different rpm regarding to the mixture.

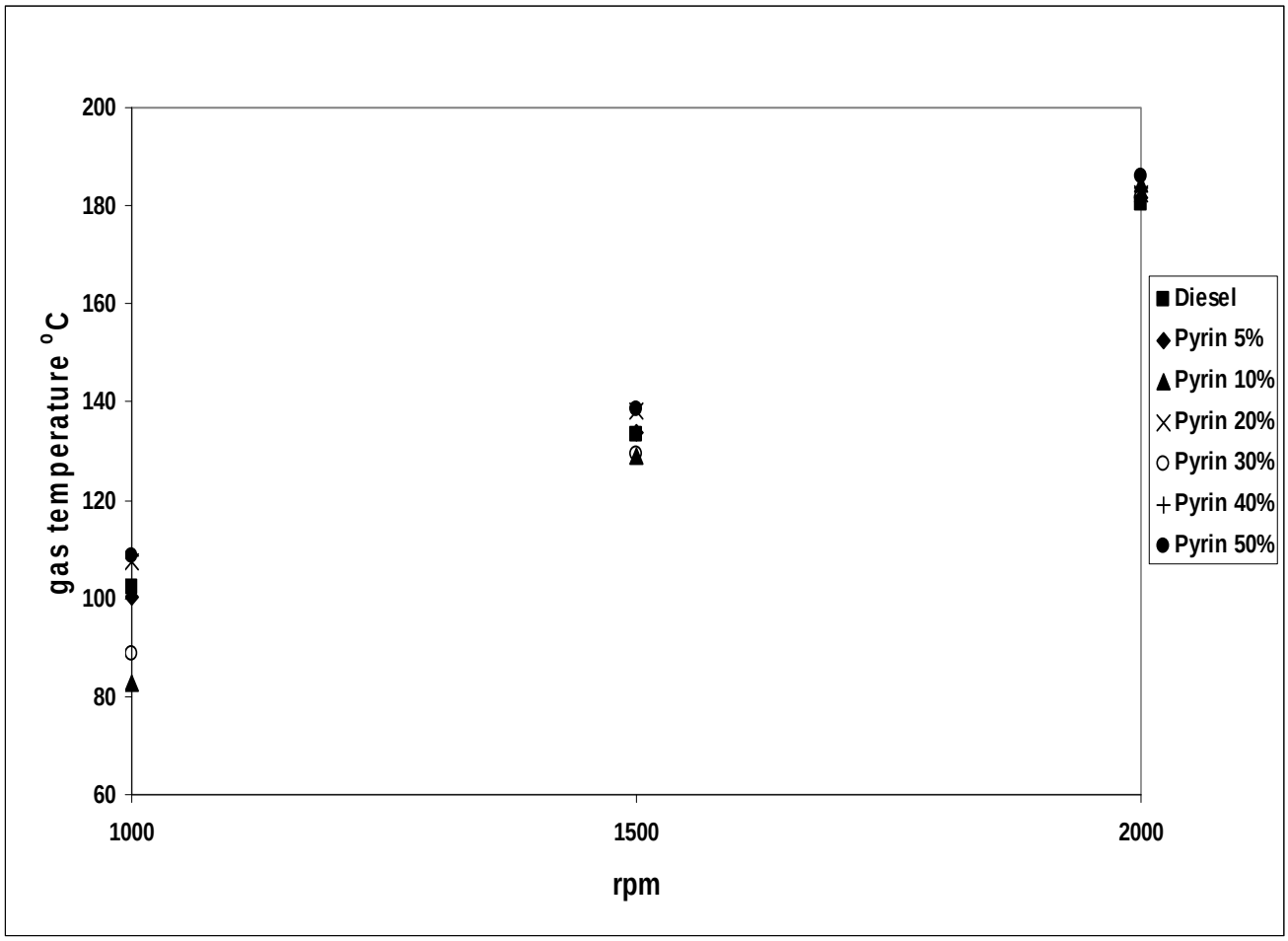


Figure 5. The exhaust gas temperature variation on different rpm regarding to the mixture.

From figure 1 it is clear that when the olive seed oil is increased on the fuel regarding to diesel, it appears a decrease of CO. From figure 2 it can be noticed the biggest reduction of HC regarding to diesel in case of pyrin50% .From figure 3 it can be noticed the biggest reduction of NO regarding to diesel in the case of pyrin10%/2000rpm. From figure 4 it can be noticed that the best behaviour appears on diesel. From the above figures it is clear that the use of different mixtures can constitute changes to CO, HC, NO and smoke too. It is also important the fact that there was no changes in the rounds of the engine, as well as in the supply of water at the use of mixtures. Finally as far as the consumption is concerned, did not observed changes with the use of different mixtures.

III. CONCLUSION

The use of mixture of diesel and olive seed oil has the following impacts:

- About CO it can be noticed when the olive seed oil is increased on the fuel regarding to diesel, it appears a decrease of CO
- About HC it can be noticed the biggest reduction of HC regarding to diesel in case of pyrin50%
- The biggest reduction of NO regarding to diesel in the case of pyrin10%/2000rpm.
- The smoke it can be noticed that the best behaviour appears on diesel.
- There were no alteration in the temperature of exhaust gases with the use of different fuel mixtures.

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