

Comparative Analysis of Load Test Hydraulic Oils and Various Non Edible Oil

M.Prakash¹, Sokkarpandi.A², Selvapandi.M², Niranjana.G², Vimalkingsley.V²

Assistant Professor, Department of Mechanical Engineering, Dhanalakshmi Srinivasan College of Engineering,
Perambalur, Tamil Nadu, India¹

UG Scholar, Department of Mechanical Engineering, Dhanalakshmi Srinivasan College of Engineering, Perambalur,
Tamil Nadu, India²

ABSTRACT: In recent years, there has been a steadily increasing in the amount of solid wastes because of the increasing human population and urbanization. Solids are includes industrial waste, agricultural waste, forest waste and waste bio-products. Bio-energy has been produced total 10% participation of energy of global energy production, energy produced from the source of biomass: plants, animal, and organic waste. In some seed like Neem, juliflora, ziziphus and pongamia seed oil prepared and produce the non edible oil and to compare with hydraulic oils. The study also includes examination of physical and chemical properties test.

KEYWORDS: Neem, juliflora, ziziphus and pongamia

I. INTRODUCTION

Since the Roman era, many liquids, including water, have been used as lubricants to minimize the friction, heat, and wear between mechanical parts in contact with each other. Today, lubricating oil, or lube oil, is the most commonly used lubricant because of its wide range of possible applications. The two basic categories of lube oil are mineral and synthetic. Mineral oils are refined from naturally occurring petroleum, or crude oil. Synthetic oils are manufactured polyalphaolefins, which are hydrocarbon-based polyglycols or ester oils.

Although there are many types of lube oils to choose from, mineral oils are the most commonly used because the supply of crude oil has rendered them inexpensive; moreover, a large body of data on their properties and use already exists. Another advantage of mineral-based lube oils is that they can be produced in a wide range of viscosities viscosity refers to the substance's resistance to flow for diverse applications. They range from low-viscosity oils, which consist of hydrogen-carbon chains with molecular weights of around 200 atomic mass units (amu), to highly viscous lubricants with molecular weights as high as 1000 amu. Mineral-based oils with different viscosities can even be blended together to improve their performance in a given application. The common 10W-30 motor oil, for example, is a blend of low viscous oil (for easy starting at low temperatures) and highly viscous oil (for better motor protection at normal running temperatures). First used in the aerospace industry, synthetic lubricants are usually formulated for a specific application to which mineral oils are ill-suited. For example, synthetics are used where extremely high operating temperatures are encountered or where the lube oil must be fire resistant. This article will focus on mineral-based lube oil.

II. LUBRICATION

Lubrication is a word that's often used in regards to machinery reliability and maintenance, but what is lubrication?

The dictionary defines lubrication as the application of some oily or greasy substance in order to diminish friction. Although this is a valid definition, it fails to realize all that lubrication actually achieves. Many different substances can be used to lubricate a surface. Oil and grease are the most common. Grease is composed of oil and a

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thickening agent to obtain its consistency, while the oil is what actually lubricates. Oils can be synthetic, vegetable or mineral-based as well as a combination of these. The application determines which oil, commonly referred to as the base oil, should be used. In extreme conditions, synthetic oils can be beneficial. Where the environment is of concern, vegetable base oils may be utilized. Lubricants containing oil have additives that enhance, add or suppress properties within the base oil. The amount of additives depends on the type of oil and the application for which it will be used.

PREPERATION OF LUBRICATION OIL

Raw materials

Lube oils are just one of many fractions, or components, that can be derived from raw petroleum, which emerges from an oil well as a yellow-to-black, flammable, liquid mixture of thousands of hydrocarbons (organic compounds containing only carbon and hydrogen atoms, these occur in all fossil fuels). Petroleum deposits were formed by the decomposition of tiny plants and animals that lived about 400 million years ago. Due to climatic and geographical changes occurring at that time in the Earth's history, the breakdown of these organisms varied from region to region. Because of the different rates at which organic material decomposed in various places, the nature and percentage of the resulting hydrocarbons vary widely. Consequently, so do the physical and chemical characteristics of the crude oils extracted from different sites. For example, while California crude has a specific gravity of 0.92 grams/milliliter, the lighter Pennsylvania crude has a specific gravity of 0.81 grams/milliliter. (Specific gravity, which refers to the ratio of a substance's weight to that of an equal volume of water, is an important aspect of crude oil.) Overall, the specific gravity of crudes ranges between 0.80 and 0.97 grams/millilitre

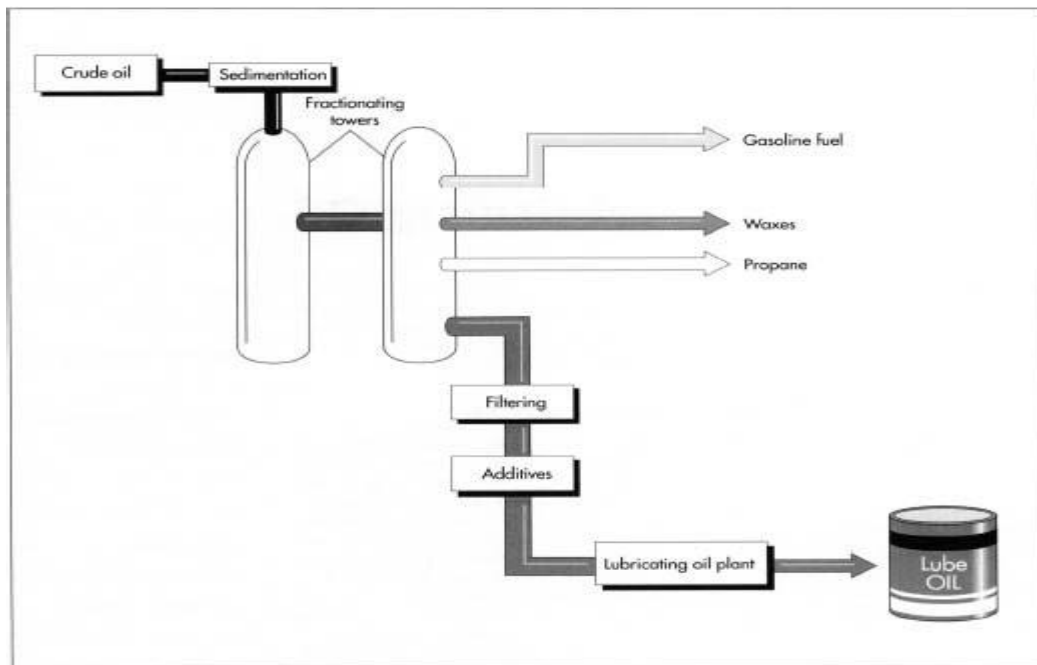


FIG 1: PREPERATION OF LUBRICATION OIL

III. TYPES OF HYDRAULIC OILS

Main hydraulic oil is broadly classified into following 3 types.

General hydraulic oil

Hydraulic oil specially used in general hydraulic machines. Antifriction characteristics, shear stability of viscosity, oxidation stability etc. suitable for hydraulic machines.

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Wear-resistant hydraulic oil

Hydraulic oil specially suitable for use in hydraulic machines used at high pressure and high temperature. Equipped with a grill so as to prevent wear.

Flame retardant hydraulic oil

General petroleum-based hydraulic oil used in hydraulic system having risk of ignition or fire. Phosphoric acid ester system, water - glycol system etc. known for use in aircraft is available. Special material, seal packing, paints etc. are used depending upon type of hydraulic oil.

Types and features of flame retardant hydraulic oils

Lubricant oil comes with a problem of “burning”. In case of using mineral oil based hydraulic oil at work places where heat source of high temperature is present, it has the risk of causing fire due to this “burning”. Flame retardant hydraulic fluid that prevents burning of hydraulic oil is used in such situation. Use of different types of fluids that prevent burning from inside the liquid (synthetic type) and use of water in hydraulic base oil (hydrous type) can be given as examples of method of preventing burning of hydraulic oil.

PROPERTIES OF OILS

- Viscosity
- pour point
- flash point
- fire point,
- auto-ignition point,
- demulsibility,
- neutralization number, and
- Precipitation number. Standard test methods are used for each test. The properties of lube oil are briefly explained.

IV. NON EDIBLE OILS

Non-edible vegetable oils are not suitable for human food due to the presence of some toxic components in the oils. The selection of non-edible vegetable oils as feed stocks for biodiesel production requires reviewing the existing works. Recent comprehensive reviews on biodiesel production from various feed stocks show the advantages of non-edible oils over edible oils. Production of biodiesel from non-edible oils feed stocks can overcome the problems of food versus fuel, environmental and economic issues related to edible vegetable.

Moreover, Non-edible biodiesel crops are expected to use lands that are largely unproductive and those that are located in poverty stricken areas and in degraded forests. They can also be planted on cultivators' field boundaries, fallow lands, and in public land such as along railways, roads and irrigation canals. Non-edible biodiesel development could become a major poverty alleviation program for the rural poor apart from providing energy security in general and to rural areas in particular and upgrading the rural non-farm sector.

SELECTION OF NON EDIBLE OILS

- Neem oil
- Juliflora oil
- Ziziphus oil
- Pongamia oil

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NEEM OIL PROPERTIES

PHYSICO-CHEMICAL CHARACTERISTICS OF THE NEEM SEEDS OIL

CHARACTERISTICS	VALUE	METHODS
Iodine value (g.100g ⁻¹)	72.82	AFNOR T60-203
Cetane number	38	NF 07013
Density at 25°C	938	AFNOR T60-214
Viscosity at 37,8°C (mm ² .s ⁻¹)	72.4	NF ISO 30104
Calorific value (MJ.kg ⁻¹)	39.61	-
Flash point (°C)	252	NF EN ISO 2719
Freezing point (°C)	10	ASTM D 97
Pour point (°C)	12	ASTM D 97
Water content (%v)	0.2	ASTM D95-90

TABLE 1: NEEM OIL PROPERTIES

JULIFLORA SEED OIL PROPERTIES

Properties	Value
Density (kg/m ³)	1060
Flash Point (°C)	272
Fire Point (°C)	282
Calorific Value (MJ/kg)	22.6
Viscosity (cst)	38
Water Content (%)	27.5
PH Value	4.9

TABLE 2: JULIFLORA SEED OIL PROPERTIES

JULIFLORA SEED OIL PROPERTIES

Properties	Value
Density 30 C(kg/m ³)	877
Flash Point (°C)	182
pour Point (°C)	-2
Calorific Value (kJ/kg)	38233
Kinematic Viscosity 40 °C (Cst)	4.2

TABLE 3: JULIFLORA SEED OIL PROPERTIES

PONGAMIA SEEDS OIL PROPERTIES

Properties	Value
Calorific value (kcal/kg)	8742
Flash Point (°C)	272
pour Point (°C)	-3.0
Density (kg/m ³)	924
Viscosity (mm ² /sec)	40.2

TABLE 4: PONGAMA SEEDS OILS PROPERTIES

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V. HYDRAULIC OILS

Description

The Castrol Hydraulic Oil range is based upon mineral oil enhanced with a stabilised zinc additive system.

Advantages

- Good anti-wear performance – prevents wear of internal components reducing downtime
- Resistant to oxidation – extends service life
- Good water separation – reduces downtime and prolongs lubricant life

Application

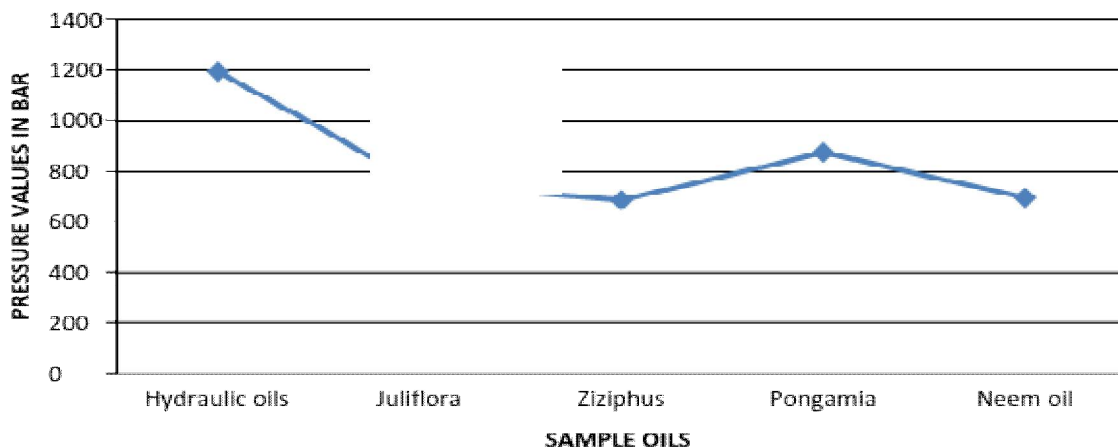
Castrol Hydraulic is primarily for use in hydraulic equipment, but is suitable for other duties in which lubricants with good oxidation stability and lubrication performance are required. The quality of its base oils and additives permits the application of the Castrol Hydraulic range in lightly loaded gears and for use as circulating oil in applications where a rust and oxidation inhibited oil is required.

VI. LOAD TEST

COMPARISON OF HYDRAULIC OILS AND NON EDIBLE OILS

S.NO	OILS	RATIO	PRESSURE VALUE
01	Hydraulic oils	-	1196.7
02	Juliflora	-	752
03	Ziziphus	-	685
04	Pongamia	-	876
05	Neem oil	-	695
06	Juliflora, ziziphus	50%, 50%	736
07	Pongamia, neem	50%, 50%	962
08	Juliflora, Pongamia	50%, 50%	818
09	Ziziphus, neem	50%, 50%	724
10	Juliflora, Ziziphus, pongamia, Neem oil	25%, 25%, 25%, 25%	840

TABLE 5: COMPARISON OF HYDRAULIC OILS AND NON EDIBLE OILS

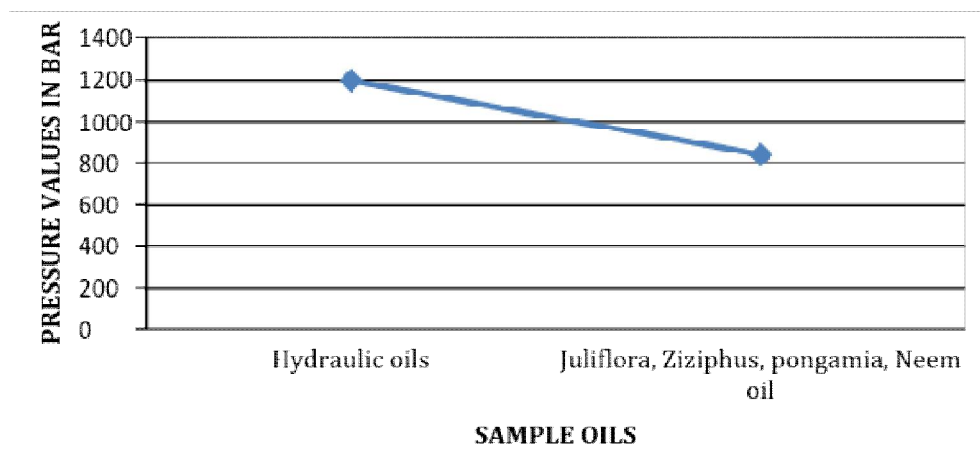
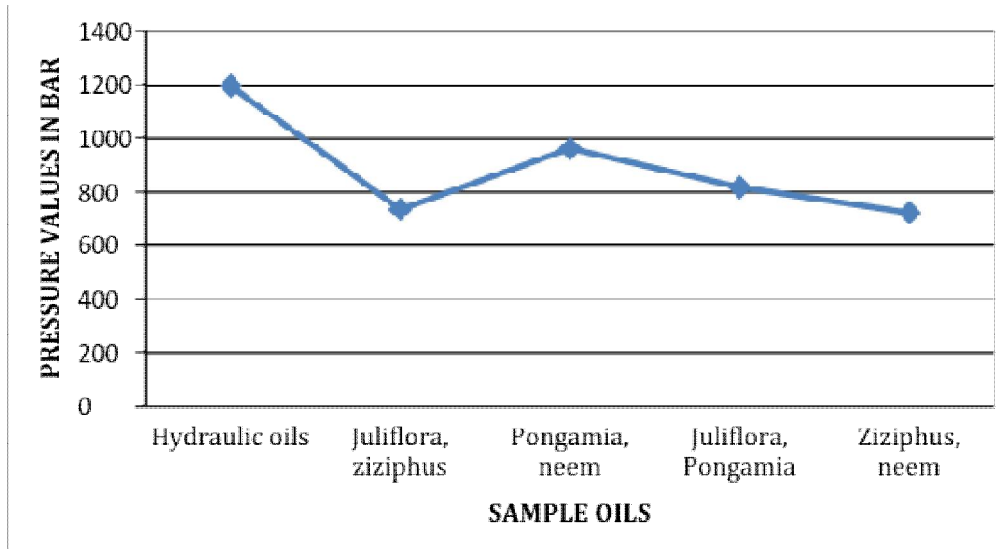


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VII. CONCLUSION

Since the manufacturing of the hydraulic oil is a very complex process and the cost estimation is also very high.vegetable seeds can available in nature and their production is also very easy process.Here the every individuals seeds we determined can able to use in any one kind of practical application.From this we can conclude that our analysis can reduce the cost and easy availability of the alternative hydraulic oils. From the conclusion of individual load test for various seed oil, pongamia seed oil makes the best performance for lower load test in the replacement of hydraulic oil.Above all the result the mixtures of pongamia and neem seed oil best suited for the alternatives.To overcome the use of petrol, diesel there are many analysis in kind of alternative fuel exists in our nature.But it is the first time of doing the analysis in order to overcome the use of hydraulic oil with vegetable seeds which can be used as the kind of alternative.

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