OIL AND KEROSENE AS AN ALTERNATIVE FUEL FOR TRACTOR DIESEL

M. Nikitin, I. Logush, I. Chvartatskyy, I. Flonts, Ph.D.

Separated subdivision NUBiP of Ukraine «Berezhany Agrotechnical Institute»

In recent years in developed countries, studies on the search for alternative sources of energy, including alternative sources of fuel for non-oil origin of internal combustion engines. This should be considered as economic evaluation criteria such fuel and environmental performance during use. A large spread in Europe came into biodiesel, which is made on the basis of vegetable oil by processing. However, when using biodiesel have additional work to replace or improve diesel fuel equipment, which reduces its cost-effectiveness. When used as a fuel crude oil should be changed fuel equipment and other elements of the fuel system, requiring significant costs.

One of the decrease in cetane number of vegetable oil is adding to it some of diesel fuel. However, this mixture has serious flaws because of the negative impact on diesel fuel equipment paraffins vegetable oil. To reduce their concentration in the fuel mixture solvent can be used, but the cost of such solvents is much greater cost of the oil, making them ineffective use. Kerosene use in diesel engines impractical because cetane kerosene type TC-1 is 37-38, which negatively affects the quality of diesel and starting their power.

When mixing oil and kerosene can get fuel mixture of methane number, which will be in the desired range - 43-50.

The purpose of research - identifying the main physical parameters of the fuel mixture based on vegetable oils and kerosene for the purpose of replacing its diesel fuel for automotive engines.

Materials and methods research. The study changes in the properties of the fuel mixture of rapeseed oil and kerosene were conducted to mix kerosene / oil composition 70/30; 60/40; 50/50; 40/60; 30/70. Density, viscosity and methanogenic number determined in the laboratory of fuels and lubricants by the method according to the standards of the fuel mixture at temperatures ≈ 0; 10; 20; 40 and 60 °C.

In studies were identified cyclic supply high pressure fuel pump engine D-21T with its nozzles for different composition of the fuel mixture. Tests were conducted in the laboratory of the Department of fuel equipment on stand-type КИ 22205 by the standard method.

With the increase in the share of oil in the mixture of density and viscosity increase while improving cetane number to about 50, and the lower calorific value decreases. This can affect the amount of fuel supplied to the engine cylinders per cycle, changing the excess air ratio and the amount of heat released during combustion.

In order to determine the impact on the performance of the engine changes in viscosity and density of the mixture and its calorific held thermal calculation engine type D-21A at work on the fuel mixture of 70/30; 50/50; 30/70; and diesel fuel.

Results. The calculations and laboratory studies on the rational part of the fuel mixture based on vegetable oils and kerosene have shown that the next performance to that of diesel fuel is a mixture of kerosene / oil 60/40. Cetane number mix changes in the opposite direction - the lowest for a mixture of 70/30 - 43.1, and most of all - to mix 30/70 - 49.9. Given the importance of investigating these compounds outside this range - 70/30 ... 30/70 is impractical

The calculation results show that the change of engine power when dealing with the fuel mixture 70/30 is about 1%, which is within the accuracy of the calculation. Reducing power at work on a 50/50 mixture composition may be about 4%; and when running at 30/70 mixture of reducing capacity may be 10-12%.

According to the study it can be argued that the use of fuels from vegetable oils cold pressed from kerosene will in future replace diesel fuel for automotive engines. Use investigated fuel will be most effective in spring and autumn, when its consumption by agricultural producers will be maximized and weather conditions limit its use.

We believe that the fuel mixture based on vegetable oil cold pressed and kerosene in proportions 70/30 is effective because most meets diesel and practically does not change the engine power during use.

Advantages of fuel from vegetable oil cold pressed and kerosene:

higher cetane number compared to the mineralized diesel fuel, which improves engine start;

use of this fuel will reduce emissions because it is made from renewable raw materials and all hazardous substances completely absorbed by plants;

higher the lubricating ability of the fuel compared to traditional help increase the life of the fuel system;

fever outbreak promotes better pozhezhobezpechnosti;

for strict adherence to the recommendations of this fuel can be produced on farms of their own raw materials.