Potential of biodiesel development in Ukraine

Introduction

The increase of the prices for natural mineral oil is a general world tendency. In Europe and Northern America distribution is got with fuel mixes which contain up to 30-35% of components of processing of vegetative production. In particular, the European countries widely use a methyl ether from rape seeds. In Ukraine this process is objectively caused by constant disparity increase of prices for power, industrial and agricultural kinds of production (Figure 1).

Biofuel significantly improves parameters of issue of exhaust gases of diesel engines, assists reduction man-caused loadings on ecology of an environment. Under forecasts of experts the covering up to 10% of needs for diesel fuel in the near future is supposed due to the vegetative resources received in agriculture. Agrarian manufacture from the consumer of traditional kinds of energy turns at their manufacturer with significant potential in the future. There is a gradual replacement of mineral oil by corresponding vegetable analogues.

Nevertheless, technical maintenance of these technologies does not meet modern requirements of the differentiated approach to each culture in the certain soil-climatic conditions and demands corresponding scientific-practical development.


This is one of necessary preconditions of agricultural technology
development, processing and use of the agricultural raw material, produced not for food, including the power purposes.

The condition of raw-material base, technologies and means of mechanization of rape cultivation

The basic raw material for manufacture of a biodiesel engine in the world today is rape. In Ukraine it annually raise on the area of 200-300 thousand hectares, mainly for the fodder purposes. Regular increase of the prices for traditional diesel fuel stimulates increase of interest to a biodiesel engine from rape oils. In the long term, for power use under the given culture in Ukraine it is possible to occupy from 2 up to 3 mln. ha.

Factors which influence quality of biofuel, their influence on an environment are caused by three phases which there passes bioraw material. These phases are:

- Phase I - cultivation;
- Phase II - cleaning and processing;
- Phase III - power use (Jevic et al. 2001).

Influences connected to phase I, it is possible to relate a choice of a grade of a cultural plant, a condition of its maturity, soil - climatic conditions, technology and means of cultivation, presence and structure of fertilizers, means of protection of plants. In a phase of II influence are defined by character of previous preparation of bioraw material that causes physical characteristics of biofuel. III phase defines complex interaction of biofuel and the engine. For reception of powerful effect it is necessary to improve technical maintenance on all three phases of change of quality of bioraw material, with optimisation of set of adjacent technological processes and accompanying products of processing.

Cultivation of raw material and manufacture of a biodiesel engine and accompanying products are involved in the complex decision of problems of efficiency experts of Scientific research institutes of plant cultivations, agrotechnologies, agricultural engineering, quality and safety agricultural production, technologies of animal industries and economy National Agrarian University of Ukraine (NAUU). Today in NAUU the corresponding potential of development on selection of olive cultures, systems of fertilizer, chemical and biological protection of plants rape is saved up during vegetation, to application highly effective aluminous oilcake in diets of animals, birds etc. Works above creation of complexes of machines and the equipment for cultivation and processing rape on the power purposes are conducted. In particular, a significant particle of expenses (up to 50 %) in technology of cultivation rape operations of preparation to a ground, application of fertilizers and seeding (Figure 2).

In National Agrarian University together with manufacturers of agricultural machinery "Klen" and "Galeschina" are developed the multipurpose tillage-sowing unit which allows to carry out 5-6 operations for one pass. At sowing rape its productivity the general economy of resources - makes up to 3 Ha/Hrs, and
Experience of the European countries from manufacture of a biodiesel engine (FARME)

Methyl ethers of fat acids from rape oil (FARME) are the first kind of biodiesel fuel which develop in the world since 1988. Last year have caused significant progress in development of manufacture of a biodiesel engine in the Czech Republic and other countries of Europe (Table 1 and 2). Quotas of the European Community on manufacture FARME start to operate.

TABLE 1. Dynamics of manufacture and use of a biodiesel engine (FARME) in the Czech Republic, VUZT, 2003

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Unit</th>
<th>1997</th>
<th>1998</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production in CR</td>
<td>10^3</td>
<td>27.6</td>
<td>15.7</td>
<td>30.6</td>
<td>67.2</td>
<td>71.4</td>
<td>104.4</td>
</tr>
<tr>
<td>Export from CR</td>
<td>10^3</td>
<td>1.5</td>
<td>0.08</td>
<td>0.03</td>
<td>0.07</td>
<td>22.4</td>
<td>31.3</td>
</tr>
<tr>
<td>Import to CR</td>
<td>10^3</td>
<td>11.4</td>
<td>25.8</td>
<td>20.2</td>
<td>3.2</td>
<td>2.9</td>
<td>0.04</td>
</tr>
<tr>
<td>Total consumption in CR</td>
<td>10^3</td>
<td>37.5</td>
<td>41.4</td>
<td>50.7</td>
<td>70.4</td>
<td>51.6</td>
<td>73.06</td>
</tr>
</tbody>
</table>

By results of the researches of ecological and fuel properties of biodiesel mixes of the different structure which has been carried out in the world leading countries, it is established, that FARME is the most suitable fuel for diesel engines. Methyl ethers are used as pure fuel (necessarily with an additive) in Germany, Austria, and as 30, 20 and 5 % of a mix with diesel fuel in France, Sweden, the USA, the Czech Republic. It is possible to note, that the modern diesel engine...
works on the mentioned mixes more effectively. At their use it is reduced exhaust opacity, issues of firm particles, hydrocarbons, aldehydes and sulphur. Influence on an environment of special biodiesel mixes is less, than pure diesel fuel.


<table>
<thead>
<tr>
<th>EU countries producing methyl esters</th>
<th>Austria</th>
<th>Italy</th>
<th>Denmark</th>
<th>France</th>
<th>England</th>
<th>Sweden</th>
<th>Germany</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production</td>
<td>24</td>
<td>210</td>
<td>10</td>
<td>364</td>
<td>4</td>
<td>450</td>
<td></td>
</tr>
<tr>
<td>Production quota</td>
<td>-</td>
<td>300</td>
<td>-</td>
<td>317,5</td>
<td>-</td>
<td>without quota</td>
<td></td>
</tr>
</tbody>
</table>

Guaranteed selling FARME is its use for manufacture of the mixed fuel for diesel engines from shares FARME of 30...36 %. The necessary condition of its selling is competitiveness concerning traditional diesel fuel. Price FARME should not exceed 85 % of the price of diesel fuel. Objectively, acceleration of development of manufacture of a biodiesel engine in Czech and Ukraine depends on the cost price of cultivation rape and from the price of oil in the world market.

National agrarian university (NAUU, Kiev) together with Institute of agricultural machinery (VUZT, Prague) is prepared the pilot project of a factory on manufacture of the methyl ether from seeds rape by capacity of 1000 tons in one year of educational-scientific purpose. Its realization will assist in Ukraine to popularisation of a perspective direction of development of agroindustrial manufacture, preparation of corresponding experts, will begin expansion of the given branch in the Kiev region. The specified capacity of a factory allows to involve effectively a source of raw materials rape at a level of area.

Use of the EU of pilot production of a biodiesel engine got in the countries will allow Ukraine to expand significally opportunities of own agrarian sector by development of perspective branch of alternative power, and preparation of experts in NAUU will add to this process of stability and irreversibility.

Conclusions

The important precondition of development of manufacture of a biodiesel engine in Ukraine is complex development of modern technologies and means of cultivation, processing and power use rape which is based on the experts-practical prepared in appropriate way in the given sphere of activity.

Target state support in Ukraine technology and means of mechanization of cultivation and processing rape in a biodiesel engine demand a raw-material base.

Experience of the countries of EU on manufacture of a biodiesel engine is expedient for using with sufficient application of domestic technologies and means.
Summary

Energy resource production is a new way in agrarian sphere. Potentials of technologies development of renewed energy sources in agroindustrial complex of Ukraine are shown. Some researches results of biofuel elaboration are given.

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