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EVALUATION OF RAW MATERIAL BASE FOR PRODUCTION OF DIESEL BIO-FUEL IN TWO-STAGE EXTRACTION OF VEGETABLE OIL

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The resource base biodiesel production assessment in two-step pressing vegetable oil is given.

Vegetable oil, biodiesel, cold pressing, hot pressing.

On the threshold of 21st century humanity counts world's reserves of oil and predicts mineral resources of fossil fuels for about 50 years, thereby recognizing that it is necessary to find a replacement habitual oil products, in particular diesel fuel. For replacement of diesel fuel, use of fuels of biological origin, namely: and vegetable oil methyl ester. A real alternative to traditional diesel fuel in its properties is diesel biofuel in the form of methyl ether.

The main raw material for production of biodiesel is Rus Lynn oil, namely: rape, sunflower, soybean, flax, regiona and others. Any of these oils can be used for production of biodiesel, only you need to choose the concentration of chemical ingredients that are used in its production. However there is a problem when using vegetable oil as feedstock for biodiesel production, as farmers are not always interested in direct grain and oil for the production of biodiesel. It is therefore necessary to seek ways for the interest of manufacturers of oil refining under diesel biofuel.

Problems in the manufacture of diesel biofuel lot. For example, you want to buy grain almost at cost, to improve the technological process of production of diesel biofuel, increasing its economic efficiency, without compromising product quality.

The decision of these problems in the production of biodiesel in terms of agriculture practiced I. Dubrovin. [1]V.V. Chub [3], S.V. Dragnev [6], I.P. Oil, V.P. Zaborski and M.I. Rope [4, 5]. For years they developed and improved equipment

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for production of biodiesel by improving technological lines, equipment for esterification of vegetable oil in a diesel biofuel and simplification of certain technological processes.

Us in the papers [2, 7] analyzed and relatively industrial and agro-industrial technology for the production of biodiesel. Agro-industrial technology of production of biodiesel is a simplified technologically industrial technology, which is adapted for small-scale production of biodiesel for its own use. At the same time, the question of increasing the economic efficiency of production of biodiesel from vegetable oils remains open.

The aim of the research evaluation of raw material base for production of biodiesel in two-stage extraction of vegetable oil.

Materials and methods of research. The study was conducted with the use of methods of mass balance and definition of technical and economic indicators.

The research results. The production of vegetable oil by the press-tion should include the first (cold) pushups and second (hotly) pushups, in accordance with the scheme shown in Fig. 1.

Technological scheme of agroindustrial production of biodiesel is: the obtained grain clear from the various impurities, are dried up to the given norm of the moisture, then served on the press, which is under pressure without heating receive crude oil first (cold) pushups and cake with high oil content, which is subjected to the second (hot) spin.

Thus receive crude oil and meal with low oil content.

Cold pressed oil is cleaned by filtering or wasp-of, subjected vintersol, refiltered or precipitated and used for human consumption. Thus receive crude oil and meal with low oil connt.

Cold pressed oil is cleaned by filtering or wasp-of, subjected vintersol, refiltered or precipitated and used for human consumption. The oil is hot-pressed clear by sedimentation, subjected vintersol to remove wax. Then it repeatedly clear by deposition and used as raw material for production of biodiesel. Namely, when adding potassium methylate spend the esterification process, separated into frac-

tions. Received methyl ether clear by deposition and pumped into a storage tank for diesel biofuel.

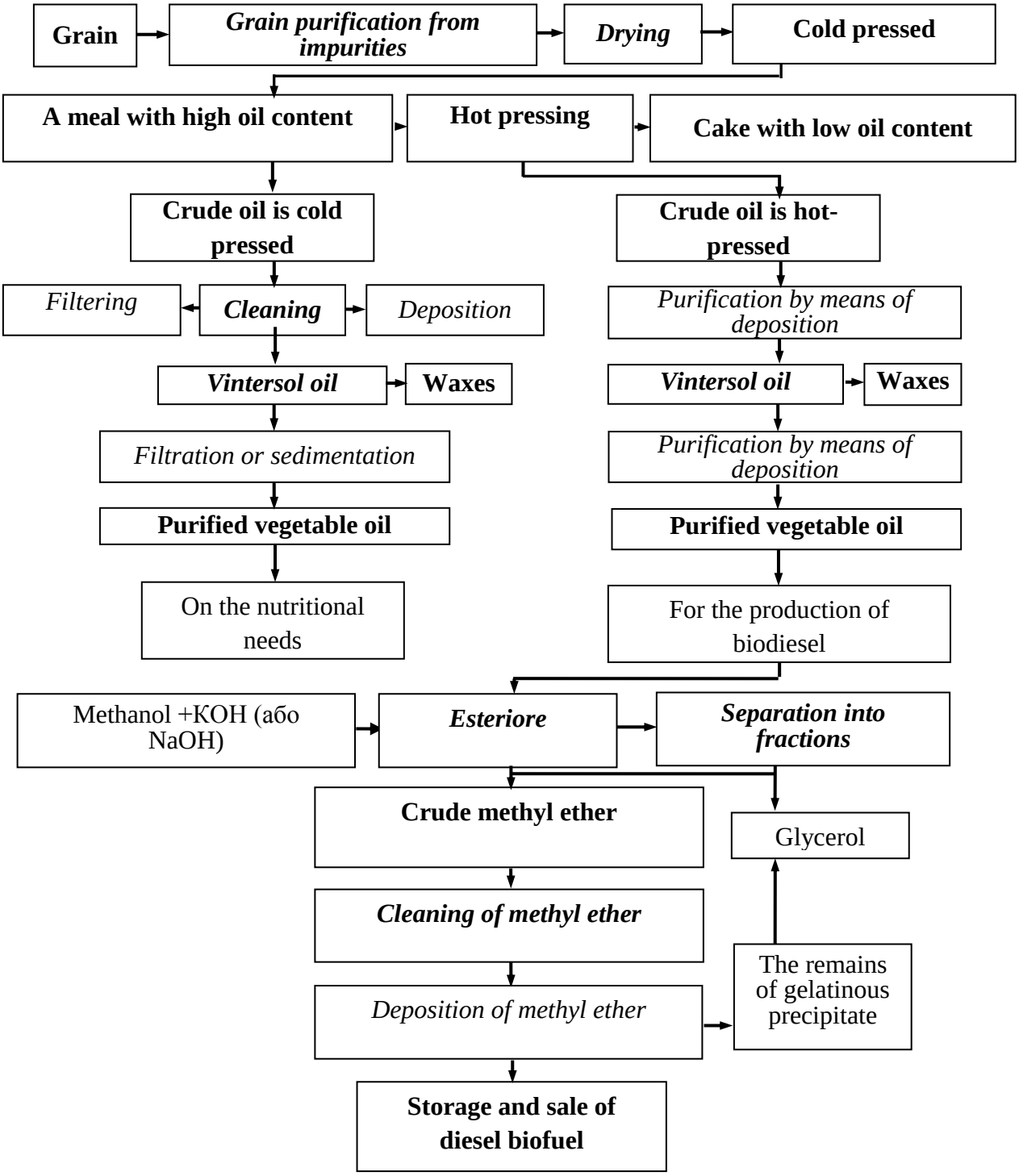

Fig. 1. Scheme of agricultural production oil of cold VI-Jimena and biodiesel from oil hot pressing

In the process of pressing, have the equation of mass balance oils:

$$M_O = M_{OX} + M_{OГ}, \quad (1)$$

where M_O – the total mass of oil that can be obtained by pressing the grain and oil crops, kg; M_{OX} mass of the first oil (cold) pushups, kg; $M_{OГ}$ – oil weight of the second (hot) pushups, kg

Multiplying the equation of mass balance oil price for each component, we obtain:

$$M_O Ц_O = M_{OX} Ц_{OX} + M_{OГ} Ц_{OГ}, \quad (2)$$

where $Ц_O$ is the oil price, UAH./L.; $Ц_{OX}$ – price of the first oil (cold) VDI deposits, UAH/L.; $Ц_{OГ}$ – the oil price of the second (hot) pushups, UAH/L.

Dividing the weight of grains oilseeds, will receive:

$$\frac{M_O}{M} Ц_O = \frac{M_{OX}}{M} Ц_{OX} + \frac{M_{OГ}}{M} Ц_{OГ} \quad \text{або} \quad k_O Ц_O = k_{OX} Ц_{OX} + k_{OГ} Ц_{OГ}, \quad (3)$$

where k_O – is the overall coefficient of oil yield, %; k_{OX} – the ratio of the output of the first oil (cold) push-UPS, %; $k_{OГ}$ – the ratio of the output of the second oil (hot) push-UPS, %.

Considering that, $k_{OГ} = k_O - k_{OX}$ in equation (3) we can write:

$$k_O Ц_O - k_{OX} Ц_{OX} = (k_O - k_{OX}) Ц_{OГ}. \quad (4)$$

Where the price of oil, the second (hot) push-UPS will be:

$$Ц_{OГ} = \frac{k_O Ц_O - k_{OX} Ц_{OX}}{k_O - k_{OX}}. \quad (5)$$

Dependence (5) to determine the price of oil, the second (hot) wringing graphically shown in Fig. 2. The analysis shows that the price of oil, the second (hot) pushups decreases with increase in the price of the first (cold) pushups and the higher the gain of the output of the oil of cold pressing. In the graph is a zone of zero rates of the second oil (hot) push-UPS in the price of oil is cold pressed from 12 UAH/l UAH to 16 UAH./l and if the coefficient of the output of the first oil (cold) push-UPS in the range of 20 to 26 %.

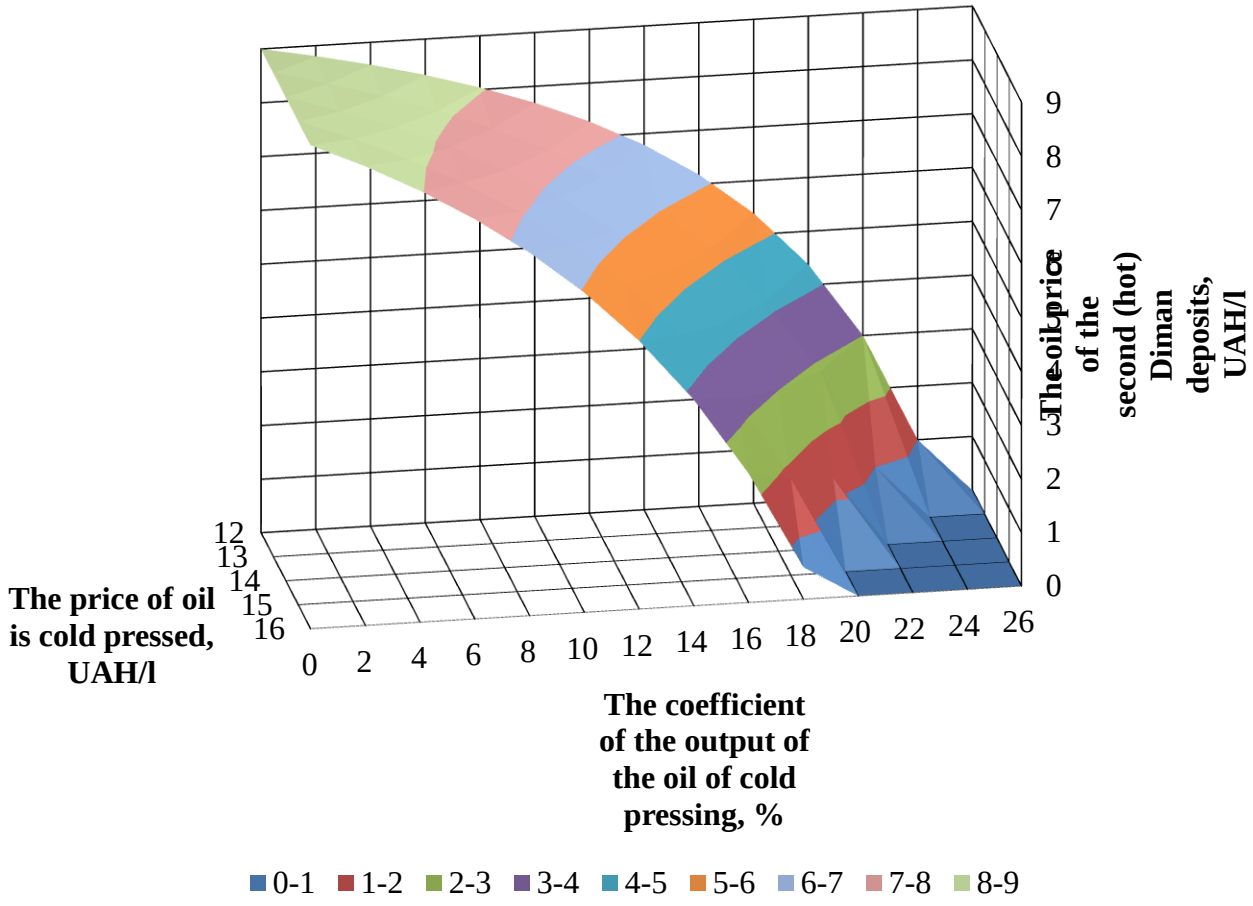

Fig. 2. The dependence of the price of oil, the second (hot) push-UPS on the prices of oil in the first (cold) pushups and yield factor oil cold pressed

Zero cost of oil of the second (hot) push-UPS can be determined from equation (5):

$$\text{if } Ц_{OT} = 0 \text{ then } k_O Ц_O - k_{OX} Ц_{OX} = 0 \text{ or } k_{OX} = k_O \frac{Ц_O}{Ц_{OX}}. \qquad (6)$$

According to rice. 3 derived from the zero rates of the second oil (hot) push-UPS. It is established that with the increase in the price of oil in the first (cold) pushups, a zero price of oil, the second (hot) push-UPS can be achieved at lower values of the coefficient of the output of the first oil (cold) push-UPS and large values of the coefficient of the output of the second oil (hot) push-UPS.

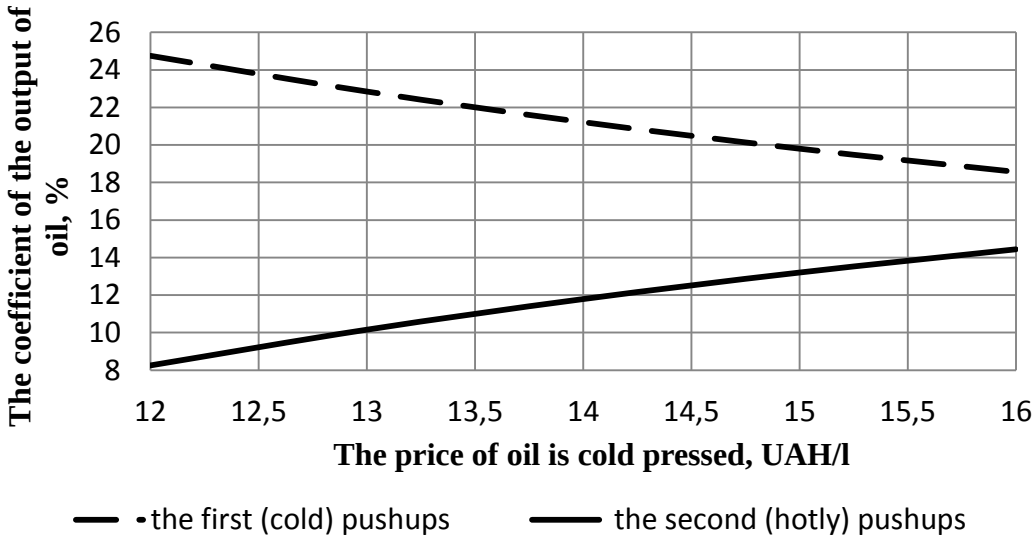

Fig. 3. The dependence of the values of the coefficients of the output of the first oil (cold) and second (hot) push-UPS on the prices of oil in the first (cold) push-UPS at the zero value of oil prices in the second (hot) pushups

Thus, at the increase of oil prices in the first (cold) pushups, zero price of oil, the second (hot) push-UPS can be obtained at lower zmensena yield factor of first oil (cold) push-UPS and large zmensena yield factor of second oil (hot) push-UPS. So, if the price of oil in the first (cold) pushups 12 UAH./l, the oil price of the second (hot) push-UPS will be zero if the coefficient of the output of the first oil (cold) pushups 25 % and the coefficient of oil outlet second (hot) pushups 8 %. When the price of oil in the first (cold) pushups 16 UAH./l, a similar situation will occur if the coefficient of the output of the first oil (cold) pushups 19 % and the coefficient of oil outlet second (hot) pushups 14.5 %.

In the case when the coefficients of the output of the first oil (cold) and second (hot) push-UPS and the same amount $k_{OX} = k_{OГ} = \frac{k_O}{2}$, the price of oil, the second (hot) push-UPS depending on the oil prices in the first (cold) extraction will be:

$$Ц_{OГ} = 2Ц_O - Ц_{OX}. \quad (7)$$

Thus, the price of oil hot pressing is defined as twice the cost of oil minus the price of oil of cold pressing.

Conclusions

To obtain vegetable oil it is necessary to apply the two-wringing, and high quality oil of the first (cold) pushups are expedient to use for food needs and budget, compared with the first oil (cold) push-UPS, the second oil (hot) push-UPS - for the production of biodiesel.

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Приведена оценка сырьевой базы производства дизельного биотоплива при двухступенчатом отжиме растительного масла.

Растительное масло, дизельное биотопливо, холодный отжим, горячий отжим.