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COST OF OILSEED PROCESSING INTO BIODIESEL KULTURDLYA

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The method of determining the cost of growing oilseed crops for biofuel production. The functional dependence of cost of cultivation of oilseeds on their productivity.

Oilseeds, winter rapeseed, soybean, sunflower, biodiesel, biofuel, cost, productivity.

Problem. The raw material for the production of bio-diesel oil can be obtained from oilseeds (sunflower, soybean, castor, flax, family svyrip'yanyh plants, which include rape, mustard, false flax, oil radish, cole), fats obtained from microscopic algae worked vegetable oil food production [1], technical animal fats [2].

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The main problem of recycling waste vegetable oils and animal fats engineering is that they contain many free fatty acids that can not be transformed into biodiesel using traditional alkaline catalyst based on potassium hydroxide [2]. Because technology and process used substandard vegetable and animal fats to biodiesel is more complicated compared to the technical processing of vegetable oils and biodiesel yield lower. In this regard, Ukraine biodiesel from waste and substandard vegetable and animal fats produced relatively few.

Production of biodiesel from algae in the world only goes from laboratory research phase to commissioning experimental productions. In Ukraine there are only a few experimental production of biodiesel from algae low power, because at this stage the algae do not play essential feedstock for biodiesel production in our country.

Thus, the main raw material for biodiesel production in Ukraine is vegetable oil.

Analysis of recent research. In some of the literature shows the results of studies of the cost of cultivation of oilseeds in Ukraine. According to [3], the cost of cultivation of winter rape seed in 2010 at an average yield of 18.5 c / ha was 232 USD / t in 2011 with an average yield of 17.7 c / ha – 315 USD / t, sunflower in 2010 at an average yield of 15.0 c / ha – 184 USD / t in 2011 at an average yield of 18.4 c / ha – 205 USD / t, soybeans in 2010 at an average yield of 16.1 c / ha – 224 USD / t in 2011 with an average yield

of 20.4 c / ha – 235 USD / t. In [4] presented the cost of cultivation of oilseeds for several years in the Luhansk region, which is: for winter rape in 2006. – 93 USD / kg, in 2007. – 191 USD / t, in 2008. – 188 USD / t; for sunflower in 2006. – 82 USD / kg, in 2007. – 92 USD / kg, in 2008. – 127 USD / t; for soybeans in 2006. – 107 USD / t, in 2007. – 178 USD / t, in 2008. – 263 USD / t. However no crop yield or other factors that could affect the cost of growing these crops, the work is missing. In [5, 6] calculations of the cost of cultivation of winter rape. In [5] yields at 30 kg / ha it is 160 USD / kg, whereas in [6] yields at 25 kg / ha and lower the cost of something is 102 kg / ha. The cost of soybean was studied in [7] and in the yield of 30 kg / ha is 224 USD / t. Cost of cultivation of sunflower in Ukraine in 2006-2011. Studied in [8] and is as follows: in 2006 with yields 38 kg / ha – 94 USD / t in 2007 with yields 43 kg / ha – 106 USD / t in 2008 with yields 47 kg / ha – 114 USD / t in 2009 with yields of 30 t / ha – 168 USD / t in 2010 with yields 41 kg / ha – 174 USD / t in 2011 with yields 48 kg / ha – 196 USD / t.

However, from these studies it is difficult to establish the dependence of cost of cultivation of oilseeds on factors affecting it (costs for the purchase of seeds, fertilizers, pesticides, lubricants, wages, depreciation and equipment repairs). Most costs in certain production technologies (intensive, rational) zones (Woodlands, steppe, steppe) did not differ significantly. However, intensification of the use of fertilizers, especially mineral, which is part of intensive cultivation technology, leading to an increase in the yield of oilseeds. This figure is crucial, for it introduces most of the growth costs of cultivation. Therefore, the yield of oilseeds is the factor that unites all cost components. The purpose of our research is to establish the functional dependence of cost of cultivation of oilseeds on their productivity.

Results. The basis of the research process maps placed on cultivation of sunflower, soybean and winter rape [9], advanced to the specific growing sunflowers and soybeans set forth in [10], winter rape – in [11, 12]. Flowsheet growing oilseeds shown in Fig. 1.

Whereas, for the formation of 1 kg of sunflower crop should make of soil 6.5 kg nitrogen, phosphorus and 2.7 15.5 kg potassium, 1 kg of soybean seed yield – 8.8 kg nitrogen, 2.8 kg phosphorus and 3.6 kg potassium [10] 1 kg seed yield of winter rape – 8.5 kg nitrogen, phosphorus, 3.2, 8 kg potassium by the method given in [13] determined the need for fertilizers to form a given yield.

Cost of cultivation of oilseeds determined by methods [14]. Rate of fuel consumption per unit of volume and number normozmin machine and manual labor workers by type defined collections of fuel standards for certain types of [15-22], and the rules and standards of performance car fuel consumption during transportation – with [23-24]. The hourly wage rate of

workers and machine operators manual labor in charge and their salary is determined according to [25]. The price of fuel and lubricants, tractors, cars, agricultural machinery, fertilizers, pesticides, etc. were taken from Praca lists. Depreciation determined by the method of [26], taking into account the fact that the machines and equipment belonging to 4 groups for which the minimum acceptable useful lives are 5 years old, and the building - up to 3 groups with the minimum useful life of 20 years. Provision for major repairs and maintenance of most agricultural machinery specified in [27].

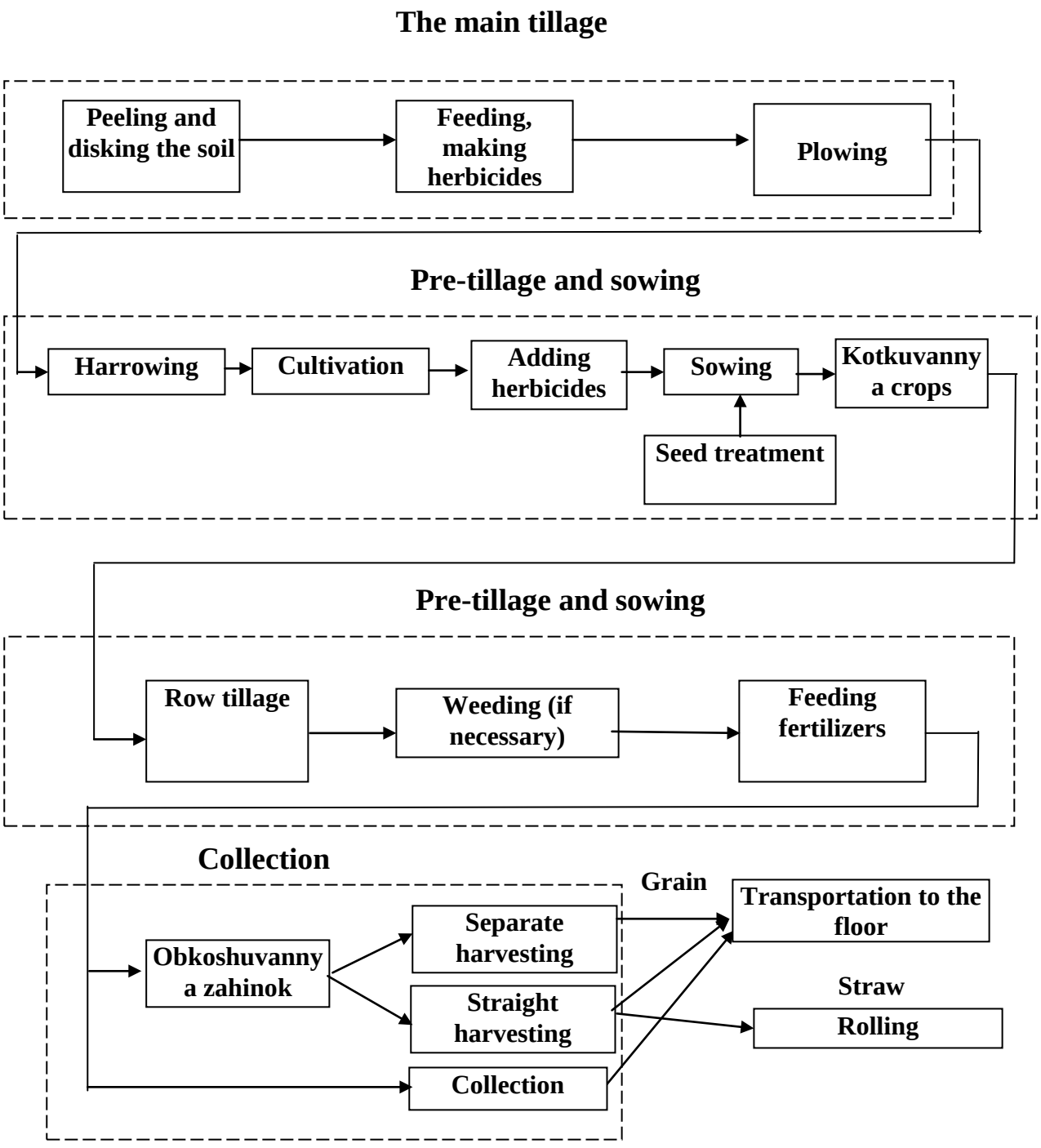

Fig. 1. Flowsheet growing oilseeds.

As a result of accounts based graphical dependence of cost of cultivation of oilseeds on their productivity, are presented in Fig. 2. As can be seen from the graphs, the cost of cultivation of oilseeds decreases with increasing their productivity. Expenses for growing winter rapeseed and soybean and close to 12-20% higher than the cost of growing sunflowers.

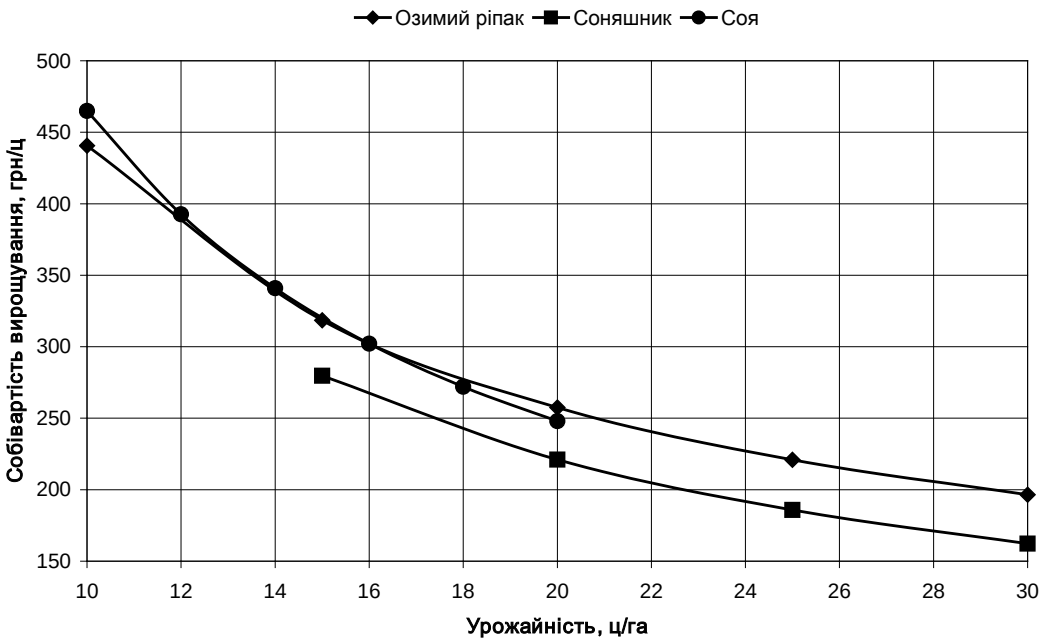

Fig. 2. The cost of cultivation of oilseeds.

Charts cost depending growing oilseeds on their productivity approximated by the following power function.

Cost of cultivation of oilseeds:

– winter rape:

$$C_{вир.сир} = 2370{,}5 \cdot Y^{-0{,}7366} \text{ with R2 = 0,9982; (1)}$$

– Sunflower:

$$C_{вир.сир} = 3747 \cdot Y^{-0{,}9074} \text{ with R2 = 0,9999; (2)}$$

– Soybean:

$$C_{вир.сир} = 2342{,}2 \cdot Y^{-0{,}7862} \text{ with R2 = 0,9995, (3)}$$

where Svir. cheese. – the cost of cultivation of oilseeds, hr. / kg; In the – yield, kg / ha.

Conclusion. Cost of cultivation of oilseeds functionally dependent on their productivity by power law. Expenses for growing winter rapeseed

and soybean and close to 12-20% higher than the cost of growing sunflowers.

References

1. V. Polishchuk Animal and vegetable oils as feedstock for biodiesel production (Generalization of experience) / VM Polishchuk // Scientific Bulletin of National University of Life and Environmental Sciences: Coll. Science. works. – K., 2010. – Vol. 144. – Part 3 – S. 198–218.
2. *Horokhov* DG Byodyzelnoe fuel IZ animal fats [Text] / DG Horokhov, MI Baburyna, AN Yvankyn // Myasnaya industry. – 2008. – Number 11. – S. 60–63.
3. VI Aranci Current state and prospects of development of production and processing of oilseeds in Ukraine / VI Aranci, IV Peretiatko // Economic Bulletin Donbass. - 2013. - № 2 (32). - P. 145–151.
4. *Starchenko A.* Status and trends of production and sales of oilseeds in Lugansk region / AU Starchenko // Scientific Bulletin of National University of Life and Environmental Sciences of Ukraine. Series: economy, business and farm management. - K., 2010. - Vol. 154, p. 1. - P. 315-320.
5. AV Ftoma Evaluation of the production of energy crops and biofuels / AV Ftoma // Journal of Kharkov National Technical University of Agriculture Petro Vasilenko: Economics. Vol. 127 - H .: KNTUA. - 2010. - P. 246–256.
6. Voytov VA The cost of biodiesel based on ethyl esters of fatty acids of vegetable oils / VA Voytov, MS Datsenko, NV Karnaukh PM Klimov // Journal of Kharkov National Technical University of Agriculture Petro Vasilenko. - H .: KNTUA, 2010. - Vol. 94 "Problems of maintenance of machines. Systems engineering and technology Forestry ". - P. 270-277.
7. Derev'yanskyy VP Economic and energy technology assessment soybean / VP Derev'yanskyy // Chemistry. Agronomy. Service. - 2012. - № 2. - C. 14-17.
8. Runcheva AS The economic efficiency of sunflower in Ukraine / AS Runcheva // Proceedings of Poltava State Agrarian Academy: Economics. - Poltava: PDAA. - 2012 - Vol. 2 (5). - T. 3. - P. 262-268.
9. Technological maps and the cost of growing crops / Ed. PT Sabluk, DI Mazorenko, GE Maznyeva. - By: NSC "Institute of Agrarian Economics", 2004. - 244 p.
10. O. Zinchenko Crop: [textbook. Student HI. teach. bookmark.] / AI Zinchenko VN Salatenko, MA Bilonozhko.– K .: Agricultural Education, 2001. – 591 pp.
11. S. Wicker Increased winter and frost of winter rape [Text] / S. Wicker, B. Rožkovany, A. Polyakov // offer. – 2010. – Number 9. – P. 42–44.
12. A. Polyakov Care Winter rape [Text] / A. Polyakov, S. Wicker, S. // Tomaszow offer. – 2010. – Number 2. – P. 56.
13. Methods of rationing resources for crop production / [V. Vitvitskyy, MF Kyslyachenko, IV Lobastov, AA Nechyporuk]. – K .: Institute "Ukrahropromproduktyvnist", 2006. – 106 pp.
14. V. Polishchuk Modeling the cost of cultivation of crops / VM Polishchuk, IV Lobastov, AI Frost // Scientific Bulletin of National University of Life and Environmental Sciences. – K., 2009. – Vol. 134. – Part 2 – P. 59–69.
15. Handling. The method of calculation and norms, time and fuel consumption for handling / [ed. VV Vitvitskoho]. - K .: Complex Vita, 1999. – Bk. 5, p. 2. – 352 pp.
16. *Method* rationing resources for crop production / [V. Vitvitskyy, MF Kyslyachenko, IV Lobastov, AA Nechyporuk]. – K .: Institute "Ukrahropromproduktyvnist", 2006. – 106 pp. – (Library of specialist agribusiness. Prudential regulations).

17. Method development and production quotas and fuel consumption by applying fertilizers, chemical crop protection (new equipment) / [UY Luzan, AP Savytska V. Vitvytskyy et al.]. – K .: Centre "Ahropromprats ya", 2001. – 176 pp. – (Library of specialist agribusiness. Prudential regulations).
18. Common standards of performance and fuel consumption for sowing, planting and caring for posivmy / [V. Vitvytskyy, IN Demchak, VS Pivovar et al.]. - K .: Institute "Ukrahropromproduktyvnist", 2005. – 544 pp. – (Library of specialist agribusiness. Prudential regulations).
19. Common standards of performance and fuel consumption of cars for gathering crops / [V. Vitvytskyy, IN Demchak, VS Pivovar et al.]. - K .: Institute "Ukrahropromproduktyvnist", 2005. – 544 pp. – (Library of specialist agribusiness. Prudential regulations).
20. Common standards of performance cars and fuel for preplant tillage / [V. Vitvytskyy, IV Lobastov, MF Kyslyachenko et al.]. - K .: Institute "Ukrahropromproduktyvnist", 2005. – 672 pp. – (Library of specialist agribusiness. Prudential regulations).
21. Typical performance standards for equestrian handmade in crop / [V. Vitvytskyy, IV Lobastov, MF Kyslyachenko et al.]. - K .: Ukrahropromproduktyvnist Research Institute, 2005. – 736 pp. – (Library of specialist agribusiness. Prudential regulations).
22. The tractor transport work. The method of calculation and production quotas and fuel consumption / [ed. VV Vitvitskoho]. - K .: Complex Vita, 1995. – Bk. 5. – 488 pp. – (Library of specialist agribusiness. Prudential regulations).
23. Standards of fuel and lubricants for road transport. Approved by the Ministry of Transport of Ukraine on February 10, 1998 p. № 43 as amended and supplemented by the orders of the Ministry of Transport of Ukraine of 17 December 2002 № 893, dated 16 February 2004, the number 99, dated August 5, 2008 № 973 – 96 sec.
24. the rules of time and work trucks idle. Utverzhdenno a resolution Ministry of Labor and socio development of the Russian Federation № 76 from 17.10.2000.
25. Sectoral Agreement between the Ministry of Agrarian Policy of Ukraine, industry associations and enterprises Workers Union agriculture Ukraine for 2011-2013. – [Registered Ministry of Labour and Social Policy of Ukraine on February 8, 2011 № 10]. – K. 2011. – 34 sec.
26. Depreciation osnovnyx means. Metodychni instructions to implement laboratornyx work for studentiv the directions 6.070101 – "Transport texnolohiyi (by mode)" and 6.100102 – "Protsesy, machinery and equipment agro kompleksu" / VI Melnyk, Y. Revenko, SS Karabynosh. – C .: LLC "TONAR" 2012. – 26 sec.
27. Legislation to calculate the cost of funds for the maintenance of machinery / [VD Hrechkosiy, Y. Gumenyuk, MP Kononenko and others] // Economic agrarian guide / [Drobot VI, Tooth GI, Kononenko MP et al.], ed. UY Luzan, PT Sabluk. – K .: Ukraine Press, 2003. – S. 457–496.

The design procedure for determining sebestoymosty vыraschyvanyya maslychnыh plants for the production byotoplyva. Ustanovlennы funktsyonalnыe dependence sebestoymosty vыraschyvanyya semyan maslychnыh crop yield from s

Maslychnыe culture, ozymыy rapeseed, soybean, sunflower, Biodiesel engine, byotoplyvo, sebestoymost, yield

Design procedure for determining cost cultivation oil seed plants for production biofuels. Set functional suspension cost cultivation oil seed plants its productivity.

Oil seed, winter rape, soybean, sunflower, biodiesel engine, biofuel, cost, yield.

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MOTION DYNAMICS RESEARCH threshing Drums combine harvesters

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The presented study dynamics of combine harvester threshing drum. Research conducted for two cases change the drive point: the time constant of the drive mechanism; Parabolic change the date. The dependence of the oscillation amplitude speed beater on the hardness of the drive.

Threshing drum drive, rigidity, speed, dynamics.

Problem. Drive beater combine harvester is a complex system. Combine during harvesting threshing selects optimal speed depending on the type of culture, Moisture, relief field, the biological characteristics of culture. During start-up, and the transition to a different speed thrashing there are significant vibration beater and his drive. These vibrations are also transmitted to the bearings and the entire structure threshing-separating device itself processor and combiner. This is undesirable, since lead to a decrease in the reliability of the beater and increase energy expenditure.

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Therefore, in this paper as the basis of theoretical research be to solve problems related to the study of the effects of fluctuations in work beater.

Analysis of recent research. In [1] V. Radino, SV Kuruchuk and MS Hnutov obtained equations of nonholonomic connection of the second order, which shows its properties when you turn leniksnoyi to a combine harvester thresher drive. The authors identified three phases of leniksnoyi transmission when you switch on, and for each phase of the