UDC 657.1 http://doi.org//10.31548/bioeconomy2020.04.015

SPECIFICS OF ORGANIC CROP PRODUCTION AND ITS IMPACT ON ACCOUNTING

H. V. UMEROVA, *postgraduate student of the Department of Accounting and Taxation**
https://orcid.org/0000-0001-9532-7265
National University of Life and Environmental Sciences of Ukraine
E-mail: ann.umerova@nubip.edu.ua

Abstract. *In recent years, there has been a tendency for a rapid growth in organic crop production both in Ukraine and in the world. Due to the dynamic increase in organic production, crop production provides food security of the state, as well as becomes the template for creating new jobs in rural areas and remains a key budget-forming factor for the Ukraine's gross domestic product's growth.*

The article systematizes information on the development trends in organic crop production, compares the state of organic crop production in Ukraine with the world's major economies, and forecasts the prospects for the organic production development in Ukraine until 2030. It has been established that organic crop production has the following organizational and technological characteristics: the production process is associated with biotransformation; the production cycle lasts for a year; the main production tool is agricultural land with organic status. It has been proven that these organizational and technological characteristics of organic crop production impact on accounting at agricultural enterprises.

The study has analyzed the cost structure for organic crop production at agricultural enterprises in Kyiv region. It has been determined that the largest percentage in the crop production cost structure is occupied by the costs of fertilizers. It has been proven that this cost item needs to be breakdown when keeping records of costs for growing organic crop production in order to control them and obtain economic benefits for agricultural enterprises. The offered cost breakdown for organic fertilizers provides the information flows to control costs taking into account their worthiness, physical and chemical characteristics, analytical accounting, economic efficiency of organic crop production at agricultural enterprises.

Keywords: *organic production, organic crop production, agricultural land with organic (biological) status, costs of organic crop production, organic fertilizers.*

Introduction.

Agriculture is one of the systematically important sectors of Ukrainian economy, that provides for public food requirement, and raw materials for processing and food industries. Crop production covers about 60 % of the population's

*Academic adviser – Doctor of Economic Science, Professor Ye. V. Kaliuha

consumption fund; it ranks second among economy sectors in the export commodity structure and practically remains the only industry, maintaining a positive foreign trade balance over many years.

Presently, conventional and organic crop products are produced in Ukraine. The volume of conventional production as of 01.01.2020 is 142,276,800,000 UAH [1], and organic production is about 575 million UAH [12], which amounts 0.4% of the total agricultural products. However, Ukraine's agricultural enterprises are gradually switching to organic crop production.

Organic production in Ukraine is at the stage of its forming, strategizing the development and identifying ways to solve complex challenges. Agricultural enterprises for organic crop production operate in the context of riskiness and uncertainty: seasonality and instability of production due to natural environmental and climatic factors, lack of organic planting material and effective means to control diseases, weeds and pests, problems on compliance with the requirements of approved public control over organic production, etc.

Organic production has both advantages and disadvantages. The advantages include:

– economic (reducing costs due to rejection of using mineral fertilizers and synthetic plant protection products, increasing the organic products' competitiveness);
– ecologic (minimizing the impact of production process on the environment, using environmentally friendly technologies, eliminating the use of synthetic materials, promoting the soil fertility's preservation and reproduction as well);
– social (providing food safety through the good-quality organic production).

Along with the advantages of organic production, there are also disadvantages: an increase in the volume of manual labor, especially when growing organic crops; the organic crop productivity is lower than with conventional land husbandry, which means an increase in production costs; accordingly, the price of organic crop production is higher than that of conventional products, which restrains the demand for it.

Taking into account both advantages and disadvantages we can state that organic crop production is the competitive organic production industry, which is rapidly developing. At the same time, organic crop production has its own specifics, organizational and technological characteristics compared to other industries that affect the accounting treatment at agricultural enterprises.

Analysis of recent researches and publications.

Urgency of the research confirms the interest of researchers from different economy sectors, in particular, such as Artysh V.I., Zaichuk T.O., Kaliuha Ye.V., Sabluk P.T., Tanchyk S.M., Fedorov M.M., Tsentylo L.V., Shkuratov O.I. and others. These researchers have elucidated organic crop production on many sides. Researchers' approaches can be divided into two groups.

The experimental results of the first group of researchers (Artysh V.I., Zaichuk T.O., Sabluk P.T., Fedorov M.M., Shkuratov O.I. [2; 4; 6; 10]) have become the presentation of organizational and technological characteristics of organic crop production, the competitiveness security instruments of such production and its growth prospects both in Ukraine and the world.

The second group of researchers includes Tanchyk S.M., Tsentylo L.V. [3; 11], they elucidated the system effectiveness

of organic land husbandry using organic fertilizers in the soil. According to the research results, the influence of organic materials on increasing soil quality and the productivity of crops has been proved.

Despite a significant number of publications, there are still controversial issues regarding the organic production's developmental challenges and its impact on accounting at agricultural enterprises.

The purpose of the article is to research the state of organic crop production, its specifics in order to effectively form accounting at agricultural enterprises in terms of reasonable cost breakdown for organic fertilizers.

Materials and methods of research.

The theoretical and methodological background to the study is the dialectical method of perceiving the current status and specifics of organic crop production in Ukraine and the world, its impact on accounting. To achieve the stated aim, a system of the following research methods were used: monographical – to process scientific publications, professional literature; economic and statistical – to analyze the current status of organic production and forecast the prospects for its development in Ukraine; graphical – to interpret research results; system-based – to consider the cost breakdown for organic fertilizers in a scientific way; logical – aimed at summarizing the research results and drawing conclusions.

Results of the research and their discussion.

The principal means of organic crop production is land; therefore, the result of economic activity directly depends on land productivity. With rational use, there won't be any depletion of soil fertility, but on the contrary, soil becomes more fertile. However, to maintain the fertility of soil, additional costs are required for its cultivating and organic fertilizing, which necessitates analytical control over the observance of technology, the usage norms for fertilizing agents.

Land resources for agriculture in the Ukraine's state unified land fund occupy 70% of all agriculturally used areas. The agriculturally used areas' figure per capita is the highest among European countries and is 0.9 hectares (the average of European countries is 0.44 hectares). The level of land ploughness in Ukraine is 54% (when in developed countries of Europe – it does not exceed 35%) [1; 5]. However, the share of agricultural land with organic status is only 1.1% of the total area of agricultural land [9]. At the same time, the analysis of organic production has shown that Ukraine has the significant development potential for organic production, the export of organic agricultural products and their consumption in the domestic market (Table 1).

The area of land used for organic production in Ukraine is insignificant, but it has increased by 61.94% in 2017-2019. The number of organic production operators has also increased by 16.64%, whereof the number of agricultural producers – by 54.61%. The upward trend is explained by the reason that Ukraine has taken a course towards green production while receiving environmental, social and economic benefits both by producers and organic consumers.

According to the National Economic Strategy for the period up to 2030, it is envisaged to increase the area of land with organic status by at least 3% of the total area of agricultural designation, which amounts 1,260,000 hectares, and a growth in exports of organic products by

Table 1. **Land area with organic status and the number of organic production operators in Ukraine**

Figure	2017	2018	2019	Growth rate, %
Land area occupied by organic production, thousand hectares	289	309	468	61,94
Share of agricultural land, %	0,7	0,7	1,1	–
Total number of operators:	529	635	617	16,64
Among them are agricultural producers	304	501	470	54,61
Share of agricultural producers in the total number of operators, %	57	79	76	–

Source: summarized based on [9].

US $ 1 billion [7]. That is, until 2030, it is planned that the area of land for organic production will be at least 4.1% (or more than 1400 thousand hectares) of the total area of agricultural designation, and the export of domestic organic products of agricultural origin will increase 5.3 times compared to figures of 2019.

In addition, the studies conducted on the area of agricultural land used for organic production compared to the world's major economies (Fig. 1).

In terms of the land area used for organic production, Ukraine ranks 20th in the world, in Europe – 12th. As far back as 2019, Ukraine became one of the five largest suppliers of organic products in the European Union [12]. The total exports of organic products in 2019 were 469 thousand tons (US $189 million) [9]. Ukraine exports organic products to 35 countries of the world, in particular, European countries (85%), North America (12%), Asian countries (3%), African countries (1%). The main importers of domestic organic products in Europe are the Netherlands (141 thousand tons), Lithuania (47 thousand tons), Germany (42 thousand tons), Great Britain (36.8 thousand tons) and Austria (17 thousand tons) [9].

Another essential specific of organic crop production is the fact that the

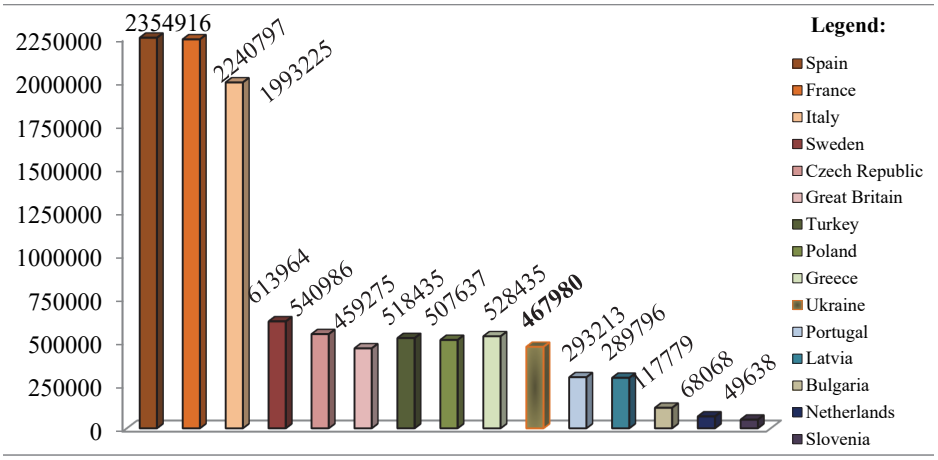

Fig. 1. The area of agricultural land used for organic production of the world's major economies in 2019

Source: summarized based on [5; 12].

production process is associated with biotransformation processes. Therefore, the manifest of economic laws is closely connected with the nature's way of developing organic crop production. This leads to an individual approach regarding forming production costs influenced by technical, economic and biological factors. In addition, growing current biological assets in organic crop production is carried out not only due to the use of mechanical facilities and labor resources, but also under the influence of natural and climatic conditions. Production methods, terms and process of their implementation, the level of material and other resources' use, the output of products depend on meteorologic conditions. All this complicates planning and cost accounting, calculating the costs of organic crop production.

In the context of the production process, one of its main characteristics is the production lead time; it generates the presence of work in progress, the allocation of costs between related years and the seasonality of production. The latter stipulates the unequal balance of material and labor resources' use during the year and, as a result, the determination of the organic agricultural products' actual costs is carried out only at the end of the calendar year.

Thus, the above-mentioned organizational and technological specifics of organic crop production impact on cost pooling, accounting methods and cost accounting, keeping records in general at agricultural enterprises.

Agricultural enterprises independently make decisions on cost items in accounting. However, when allocating costs to cost items, it is necessary to take into account the allocation feasibility in order to control production costs. Allocating costs according to cost items involves the program budgeting disclosure and its relationship with the enterprise's operational procedures.

The study of the crop production cost structure at agricultural enterprises in Kyiv region is shown in Fig. 2.

The input-mix analysis to cultivate crop production shows that the most

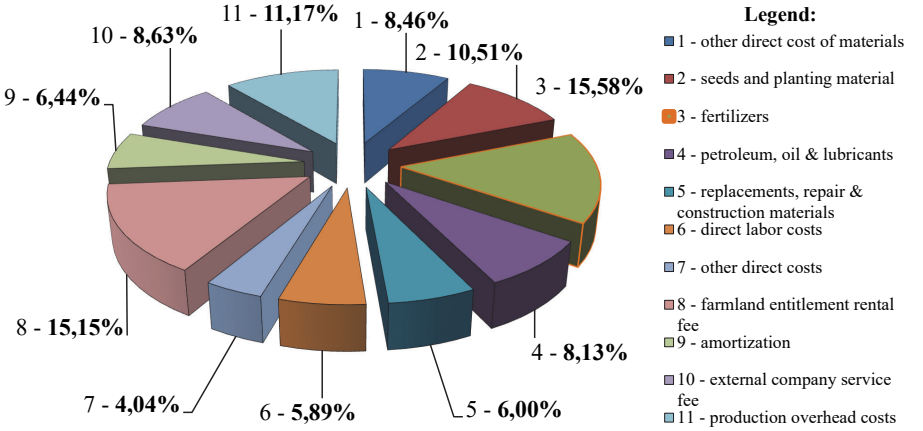

Fig. 2. Cost structure of crop production at agricultural enterprises in Kyiv region in 2019

Source: calculated on the basis of the Report on leading economic performance figures of an agricultural enterprise in Kyiv region (f. № 50-s) for 2019.

significant cost items (its percentage in the production cost exceeds 5%) need to be breakdown (detailed) when cost accounting of growing crop production in order to control. So, with regard to the costs of current biological assets in organic crop production, fertilizers take the largest share (15.58%) in cost structure. The unjustified use of mineral fertilizers, their improper transportation and storage leads to the secondary products' accumulation of agriculture chemization in soils and crop production.

According to the Ukraine's organic map, there are 83 agricultural organic growers in Kyiv region, and agricultural lands with organic status occupy the largest area of 59505 hectares (or 12.71% of the total land area with organic status) [12].

The study of the Kyiv region's agriculturally used areas' fertilization has shown that the share of the fertilized area with organic fertilizers stands at 8.1%, the crop production area has increased by 15.2 thousand hectares during the study period (Fig. 3).

In recent years, there have been threatening trends towards balancing humus substance in soils in Ukraine; the agricultural yield is decreasing by an average of 15-20%. To provide a deficit-free balance of humus substance in soils and their deoxidation, an urgent task is to change mineralization system with a reorientation to the organic fertilizers' share gains [13].

It has been scientifically proven that the methods of attributing the organic and mineral fertilizers' costs to crop production costs differ. The organic fertilizers' costs must be charged in the first year – 0% of their cost, in the second – 30%, in the third – 10%; other types of mineral fertilizers – 100% of their cost in the first year of application due to the fact that their effect in the soil lasts one year. Long-term use of organic fertilizers increases the humus substance balance in soils, helps to increase crop yields and prevents soil acidification.

In our opinion, the analyzed statistical data on positive trends towards developing organic production in Ukraine indicate the priority to separate mineral and organic fertilizers in accounting.

Monitoring study on the use of organic fertilizers in cultivating crop production is shown in Table. 2.

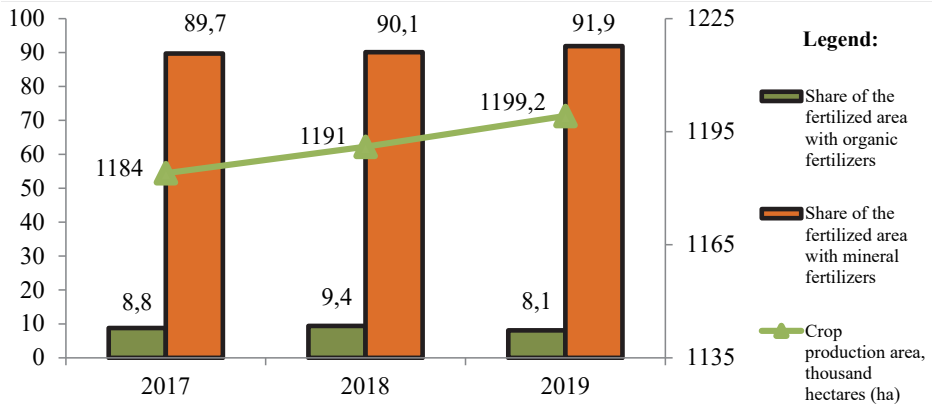

Fig. 3. Agriculturally used areas in Kyiv region for 2017 – 2019

Source: summarized based on [14].

Table 2. **Use of organic fertilizers at agricultural enterprises of Kyiv region**

List of organic fertilizers	Agricultural enterprises of Kyiv region			
	Agroholding "Myronivsky Hliboproduct"	LLC "Astarta – Kyiv"	Agricultural company "Kolos"	PJSC "EthnoProduct"
Animal waste				
Dairy sludge		+	+	+
Poultry manure	+			+
Phytogenic waste				
Straw	+			
Plant sapropel			+	
Green manure			+	+
Other phytogenic wastes	+	+	+	+
Production waste				
Process waste		+		
Digestate	+			
Derivative organic fertilizers				
Compost			+	
Other types of organic fertilizers				
Defective black liquid			+	
Peat			+	

Source: summarized based on [13].

According to the results of the study, it has been found that agricultural enterprises use various types of organic fertilizers when growing crop production in accordance with the focus of their activities and crop species. The researched agricultural enterprises use dairy sludge and poultry manure as organic fertilizer. The reduction of cattle number by 16.03%, the pigs' number – by 14.12% in Ukraine in 2017-2020 [8] causes the organic fertilizers' deficit. Therefore, agricultural enterprises use phytogenic waste and organic production waste materials to produce organic fertilizers effectively.

Agroholding "Myronivsky Hliboproduct", LLC "Astarta – Kyiv", agricultural company "Kolos" and PJSC "EthnoProduct" use organic fertilizers of vegetable origin (straw, plant sapropel, green manure and other waste of agricultural crops) in their activities. It should be noted that agricultural company "Kolos" annually produces about 40 thousand tons of compost based on cattle manure, sapropel, defective black liquid and peat, which are introduced as fertilizers into the soil. This helps not only to maintain the fecal organic matter level, but also to increase its amount. The humus substance content on the enterprise territory is 3.53 – 4.22%, which is a fairly high figure of soil fertility [13].

In addition to phytogenic waste, Agroholding "Myronivsky Hliboproduct", LLC "Astarta – Kyiv", efficiently utilize production waste in order to obtain highly efficient organic fertilizers. Recent studies of soil cultivation with liquid digestate

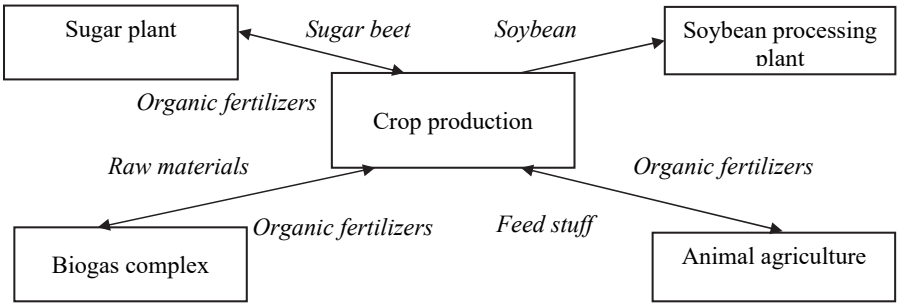

Fig. 4. Vertically integrated business model exemplified by LLC "Astarta – Kyiv"

Source: summarized based on [13].

from the biogas complex of Agroholding "Myronivsky Hliboproduct" have shown an increase in winter wheat yield by 22% compared to mineral fertilizers, and also made it possible to increase the yield class from 4th to 3rd [13].

The agricultural enterprises' experience in Kyiv region has been analyzed; it shows that there is a vertically integrated business model (Fig. 4).

According to this model, each of business segments provides raw materials, organic fertilizers, foodstuffs to another segment. In this regard, the costs of purchasing organic fertilizers from external companies are reduced.

Studies conducted have shown that the use of organic fertilizers has a positive effect on total costs of growing organic crop production. Therefore, it is necessary to note the economic benefits for agricultural enterprises.

Firstly, this economic effect is manifested due to the rejection of use mineral

Table 3. Components of organic fertilizers for accounting at agricultural enterprises

Cost item	Cost breakdown
Organic fertilizers	Animal waste: cattle manure; pig manure; poultry manure. Phytogenic waste: straw; sawdust; green manure; others. Organic production waste DDJS (Dried Distillers Grains with Solubles); digestate; defecate; others. Derivative organic fertilizers: compost; worm compost. Other types of organic fertilizers.

Source: author's contribution.

fertilizers, occupying the largest share in the crop production cost structure. Long-term use of organic fertilizers in the cultivation of crops is effective and less costly compared to mineral fertilizers. Secondly, in the process of organic fertilizing, the land becomes fertile and the agricultural crops' yield and class increase. Accordingly, an increase in yield affects a decrease in the organic crop production's cost, and an increase in the crop's class affects an increase of such products' market value. Thirdly, the costs of organic crop production are 25-50% higher than conventional production. Therefore, the organic production profit is larger.

In the crop production cost structure, the costs of fertilizers are quite weighty. According to expert estimates, the costs of organic fertilizers are up to 40%. Having conducted the research, we deem convenient for accounting to breakdown this cost item (Table 3).

In our opinion, this system implementation provides information flows to control costs, develop analytical accounting, organize rational cost accounting and increase the organic crop production's economic efficiency at agricultural enterprises. In addition, it provides control over the organic fertilizers' cost, taking into account their worthiness, physical and chemical characteristics and the impact both on the environment as a whole, and directly on agricultural land and the organic crop production yield.

Conclusions and future perspectives.

Thus, a detailed analysis and the development of organic crop production in Ukraine have showed that it is a competitive branch of organic production, which is gradually developing. Its specifics are that the production process is associated with the biotransformation processes; the production cycle lasts for a year; the main means of production is agricultural land with organic status. It has been proven that these organizational and technological specifics of organic crop production have impact on accounting at agricultural enterprises.

The monitoring study has showed that the fertilizers' costs occupy the largest share in the cost structure of the organic crop production. For effective accounting at agricultural enterprises, it has been offered to breakdown the organic fertilizers' costs for animal waste, phytogenic waste, organic production waste, derivative organic waste and other types of organic wastes. The offered breakdown of organic fertilizers makes it possible to determine the influence of each organic fertilizers' component on the costs of crop production in general, analyze the cost overcharge, identify the influence of factors on these deviations, develop measures to reduce costs, increase the agricultural enterprises' profitability and competitiveness.

References:

1. Agriculture of Ukraine for 2019: statistical collection. The official site of the State Statistics Service of Ukraine. Available at: http://www.ukrstat.gov.ua/druk/publicat/kat_u/2020/zb/09/zb_sg_Ukr_2019.pdf.
2. Artysh, V. I. (2017). Vyrobnytstvo ta realizatsiya organichnoyi produktsiyi v sviti [Production and sales of organic products in the world]. Ekonomika APK - Economy of the agroindustrial complex, 3, 82-86. Available at: http://nbuv.gov.ua/UJRN/E_apk_2017_3_14 (in Ukrainian).
3. Centilo, L. V. (2017). Orhanichni dobryva dlia suchasnykh system zemlerobstva [Organic fertilizers for modern farming systems] – monograph. Symphony Forte Publishing House, 260 (in Ukrainian).

4. Chudovska, V. A., Shkuratov, O. I., Kyporenko, V. V. (2016). Ekoloho-ekonomichnyj mekhanizm rozvytku orhanichnoho silskoho hospodarstva: teoriia i praktyka [Ecological and economic mechanism of organic agriculture development: theory and practice] – monograph. Kyiv : DIA, 332 (in Ukrainian).
5. Eurostat. The official site of European Statistics. Available at: https://ec.europa.eu/eurostat/databrowser/view/tag00098/default/table?lang=en.
6. Fedorov, M. M., Khodakivska, O. V., Korchynska, S. H. (2011). Rozvytok orhanichnoho vyrobnytstva [Development of organic production]. Kyiv : NNTs IAE, 146 (in Ukrainian).
7. National economic strategy 2030. Available at: https://nes2030.org.ua/?fbclid=IwAR2n7HwFWa2nptw7alD__If-6j8neTGLRaMJOXyV1OQcmCf34NHsjAXiw9YM#rec246061582.
8. Number of farm animals for 2017–2020. The official site of the State Statistics Service of Ukraine. Available at: http://www.ukrstat.gov.ua/operativ/operativ2018/sg/ph/ph_u/ph2018_u.html.
9. Organic production in Ukraine: information and reference materials. The official site of the Ministry for Development of Economy, Trade and Agriculture of Ukraine. Available at: https://www.me.gov.ua/Documents/Detail?lang=uk-UA&id=ed6463ce-f338-4ef0-a8a8-e778d3d0ffd1&title=OrganichneVirobnitstvo VUkraini.
10. Sabluk, P. T., Mesel-Veselyak, V. Y., Malik, M. Y. (2008). Tsinoutvorennia ta normatyvni vytraty v silskomu hospodarstvi: (teoriia, metodolohiia, praktyka) [Pricing and regulatory costs in agriculture: theory, methodology, practice]. Vol. 1. Kyiv : NNTs IAE, 698 (in Ukrainian).
11. Tanchik, S. P, Manko, Yu. P. (2017). Efektyvnist system ekolohichnoho zemlerobstva v lisostepu Ukrainy [Efficiency of ecological farming systems in the forest-steppe of Ukraine]. Ahrobiolohiia - Agrobiology, 2, 30–38. Available at: http://agrobiologiya.btsau.edu.ua/sites/default/files/visnyky/agrobiologiya/tanchik_2_2017.pdf (in Ukrainian).
12. The official site of OrganicInfo. Available at: https://organicinfo.ua/infographics/.
13. The official sites of the: Agricultural company "Kolos". Available at: https://www.agrokolos.com.ua/; Agroholding "Myronivsky Hliboproduct". Available at: https://mhp.com.ua/uk/home; PJSC "EthnoProduct". Available at: http://www.ethnoproduct.com/; LLC "Astarta – Kyiv". Available at: https://astartaholding.com/.
14. Use of fertilizers and pesticides for crop yields. The official site of the State Statistics Service of Ukraine. Available at: http://kyivobl.ukrstat.gov.ua/content/p.php3?c=1127&lang=1.

Г. В. Умерова (2020). ОСОБЛИВОСТІ ВИРОБНИЦТВА ОРГАНІЧНОЇ ПРОДУКЦІЇ РОСЛИННИЦТВА ТА ЇХНІЙ ВПЛИВ НА ПОБУДОВУ ОБЛІКУ. *БІОЕКОНОНОМІКА ТА АГРАРНИЙ БІЗНЕС, 11(4): 130-140. http://doi.org//10.31548/bioeconomy2020.04.015*

Анотація. *За останні роки спостерігається тенденція стрімкого зростання виробництва органічної продукції рослинництва як в Україні, так і у світі. Завдяки динамічному нарощенню виробництва органічної продукції рослинництво забезпечує продовольчу безпеку держави, стає основою для створення нових робочих місць у сільській місцевості та залишається ключовим бюджетоутворюючим чинником для зростання валового внутрішнього продукту України.*

У статті систематизовано інформацію щодо тенденцій розвитку органічного виробництва продукції рослинництва в Україні, здійснено порівняння стану органічного рослинництва з провідними країнами світу, проведене прогнозування перспектив розвитку

органічного виробництва в Україні до 2030 року. Встановлено, що органічне рослинництво має такі організаційно-технологічні особливості: виробничий процес пов'язаний із процесами біологічних перетворень; виробничий цикл триває впродовж року; головним засобом виробництва є земля сільськогосподарського призначення з органічним статусом. Доведено, що ці організаційно-технологічні особливості органічного рослинництва впливають на побудову обліку в сільськогосподарських підприємствах.

Під час проведеного дослідження проаналізовано структуру витрат сільськогосподарських підприємств Київської області на виробництво продукції рослинництва. Визначено, що найбільшу питому вагу в структурі собівартості продукції рослинництва займають витрати на добрива. Доведено, що ця стаття витрат потребує деталізації під час ведення обліку витрат на вирощування органічної продукції рослинництва для їхнього управління та отримання економічних вигод сільськогосподарськими підприємствами. Запропонована деталізація витрат на органічні добрива забезпечує організацію інформаційних потоків для управління витратами з урахуванням їхньої вартості, фізико-хімічних характеристик; розвиток аналітичного обліку; підвищення економічної ефективності виробництва органічної продукції рослинництва на сільськогосподарських підприємствах.

Ключові слова: *органічне виробництво, органічне рослинництво, землі сільськогосподарського призначення, витрати на виробництво органічної продукції рослинництва, органічні добрива*