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BIOLOGICAL ASSETS OF ORGANIC PRODUCTION IN THE SYSTEM OF ACCOUNTING CATEGORIES AND CONCEPTS

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Abstract. The present article is dedicated to the pertinent issue of accounting for biological assets in the context of organic production. A critical analysis of extant theoretical approaches to the definition, recognition and valuation of biological assets has been conducted. The research revealed the absence of a proper accounting system for organic production objects, particularly biological assets, both in Ukraine and in international accounting practice. The primary issue identified pertains to the inconsistency of terminology and the definitions of categories employed in accounting, along with their ambiguous interpretation in regulatory acts. The *purpose of the present article* is to define key terms for the accounting of biological assets, taking into account the specifics of organic agricultural production. The *object of research* is land and biological assets of organic production. The *subject of the study* is the theoretical, methodological and practical aspects of accounting for biological assets in organic production. The following *methodological approaches* were utilised in the study: theoretical analysis (for systematisation of literary and regulatory sources), comparative analysis (for identifying discrepancies and comparing methodologies), systems approach (for identifying biological assets in the accounting system), and generalisation method (for drawing conclusions and defining terminology). An analysis has been conducted of the state and trends of organic production development on a global, European, and Ukrainian scale. It has been established that the positive impact of organic production on the ecosystem is not taken into account by traditional accounting methods. The foundation of the agroecosystem is agricultural land, which is a strategic resource for Ukraine and an indispensable tool for agricultural producers. The specific characteristics of this asset include biological processes and transformations that occur with it and affect its fertility, as well as the absence of a defined useful life and depreciation. Agricultural land constitutes an element of natural capital with the capacity for biological assimilation. The article under discussion herein justifies the necessity to integrate agricultural land into the category of biological assets. The integration of agricultural land into the category of biological assets will facilitate the development of a comprehensive methodology for assessing this type of asset, considering both economic and environmental aspects, including its positive impact on the agroecosystem and the environment. The *main results of the study:* in order to ensure a unified approach to accounting in organic production, the necessity of developing a separate accounting standard is substantiated. The authors' own definition of the category "biological assets of organic production" is proposed, which takes into account both economic and environmental aspects. The criteria for recognising biological assets of organic production in accounting are determined.

Keywords: biological assets, organic production, biological transformations, land, valuation, accounting.

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1. Introduction

The development of organic production in Ukraine and worldwide can be considered as a market reaction to the growing consumer demand for high-quality food products. Furthermore, it can be viewed as a societal realisation of its responsibility for environmental safety and the preservation of soil fertility, biosystems, and biodiversity. Favourable soil and climatic conditions, in conjunction with long-standing agricultural traditions, have contributed to a positive trend in Ukraine prior to the full-scale invasion. This trend is characterised by an increase in the number of certified organic operators, the expansion of organic areas of agricultural land, and an increase in the variety of organic products. The domestic and foreign markets for Ukrainian organic products were expanding; a legal framework for regulating the certification, production, labelling, and circulation of such products was actively being formed.

The cornerstone of organic agricultural production is constituted by biological assets (plants and animals) cultivated under conditions that comply with the stipulations of Ukrainian legislation and EU standards in the domain of organic production. However, it should be noted that Ukraine currently lacks a methodology for the systematic accounting of organic production objects. The paucity of accounting information has been shown to have a number of consequences for stakeholders (entrepreneurs, government bodies, public organisations, scientists). These include the deprivation of effective tools for management, the development of development programmes and support for organic production strategies, as well as organic product markets. Furthermore, the monitoring of the impact of these measures and scientific research are also impeded.

State of the research. The absence of both coherence and systematicity in the scientific progress made in the accounting of economic activity within organic production contexts poses a significant challenge in the establishment of a domestic accounting system for such entities. Consequently, ecologically oriented activities of agricultural business entities and the organisation of organic agricultural production have become the focus of scientific research by leading domestic scientists. Notable scholars in this field include: H. Kaletnik, S. Lutkovska (2022), V. Mazur, O. Alieksieieva, K. Mazur, O. Alieksieiev (2023), I. Honcharuk, T. Yemchyk, D. Tokarchuk (2024), N. Syrotenko, N. Pravdiuk, Y. Slobodyanik, S. Holovatska, T. Skrypko (2021), V. Petrychenko, O. Petrychenko, L. Fedoryshyna, O. Kravchuk, O. Korniichuk, V. Nitsenko (2022). The present study investigates certain issues of organisation and accounting methodology in organic production as set out in the works of Y.S. Tsal-Tsalko and Y.Yu. Moroz, L.S. Markevich, in previous studies of the authors, as well as in the works of other scientists. However, the majority of researchers' studies concern the establishment of a cost accounting system in organic production conditions. There is a paucity of research focusing on the accounting of biological assets in organic production, which are a fundamental component of the agroecosystem.

Today, the value of organic production assets (land, biological assets) in the financial statements of Ukrainian enterprises does not adequately reflect their real value. Among domestic scientists who have drawn the attention of the scientific community to the need to develop a separate approach to accounting for water, land and biological assets are V.M. Zhuk (2019), G.G. Kireitsev (2015), N.M. Malyuga and I.V. Zamula (2010), S.M. Ostapchuk, N.G. Tsaruk and others. Scientists posit that agricultural land constitutes a distinct biological asset, predicated on both its natural and economic essence. Consequently, conventional valuation and accounting methodologies employed for fixed assets are inadequate in ascertaining the true value of this strategic asset. Moreover, these methods result in significant economic and environmental losses. This assertion is particularly salient in the context of organic farming, where the value of land and associated biological assets, by definition, should exceed their valuation in conventional agricultural production.

Purpose of the study. Definitions of terms and categories related to the concept of 'biological assets' in organic production conditions must, on the one hand, correspond to the economic essence of this concept, and on the other hand, take into account the specifics of conducting this type of activity. The present publication aims to critically evaluate domestic and international legal acts with regard to the interpretation of the conceptual apparatus related to the accounting of biological assets. In addition, it proposes a definition of the main terms, taking into account the specifics of organic production and legal requirements.

The methodological basis of the study is constituted by a number of methods, including: theoretical analysis (to study and summarise scientific literature and accounting legislative acts; to systematise existing approaches to defining concepts and categories used in the accounting of biological assets); comparative analysis (to compare regulations of normative and legal acts in order to identify discrepancies and determine directions for their harmonisation; to compare methodological approaches to accounting for biological assets used in organic and conventional agriculture); a systematic approach (to identify biological assets as part of the part of the enterprise's property and as part of the agroecosystem); and the method of generalisation (to draw conclusions and proposals

based on the conducted analysis and comparison; to develop own definitions of key terms reflecting the specifics of organic production).

2. Presentation of the Main Provisions

2.1. Analysis of the State of Organic Production in Europe and Ukraine

According to the World Economic Forum and the European Union (EU) Biodiversity Strategy to 2030, biodiversity loss and ecosystem collapse are the primary challenges confronting humanity in the forthcoming decade. The extensive utilisation of chemical pesticides in agricultural contexts is a salient contributing factor (Zhuk, Bezdushna, 2019).

Consequently, the global scientific community and practitioners in the field of organic production are collaborating to generate new knowledge and achieve maximum positive impact on the environment, food security and public health.

Organic agriculture can be defined as a comprehensive production model that preserves soils and ecosystems while ensuring safe food and adequate nutrition. This system is characterised by its commitment to achieving a balanced output, with consideration given to environmental, social and economic factors. Recent years have witnessed a positive trend in global organic production, as evidenced by the data presented in Table 1.

According to the data presented by IFOAM, Europe is the region with the highest concentration of countries engaged in organic agricultural production. Key indicators characterising the state of organic production in Europe and the EU are presented in Table 2.

In 2022, 18.5 million hectares of agricultural land in Europe were under organic production (16.9 million hectares in the EU). France leads in terms of organic area with 2.9 million hectares, followed by Spain (2.7 million hectares), Italy (2.3 million hectares) and Germany (1.9 million hectares) (Figure 1).

Table 1
Dynamics of key indicators of global organic production

Indicator	Year					2022 to 2018	
	2018	2019	2020	2021	2022	+/-	%
Number of countries with organic production	186	187	190	191	188	+2	101
Area of agricultural lands with organic status, million hectares	71,5	72,3	74,9	76,4	96,4	+24,9	135
Share of organic lands in the total area of agricultural lands, %	1,5	1,5	1,6	1,6	2,0	+0,5	x
Number of operators of organic production, million units	2,8	3,1	3,4	3,7	4,5	+1,7	161
Organic market, billion EUR	96,7	106,4	120,6	124,8	134,8	+38,1	139
Per capita consumption, EUR	12,8	14,0	15,8	15,7	17,0	+4,2	133

Source: IFOAM Consolidated Annual Report, 2010, 2021, 2022, 2023, 2024

Table 2
Dynamics of key indicators of organic production in Europe and the European Union

Indicator	Year									
	2018		2019		2020		2021		2022	
	Europe	EU	Europe	EU	Europe	EU	Europe	EU	Europe	EU
Area of agricultural lands with organic status, million hectares	15,6	13,8	16,5	14,6	17,1	14,9	17,8	15,6	18,5	16,9
Growth rates of agricultural land areas with organic status, %	x	x	106	106	104	102	104	105	104	108
Share of organic lands in the total area of agricultural lands, %	3,1	7,7	3,3	8,1	3,4	9,2	3,6	9,6	3,7	10,4
Number of operators of organic production, thousand units	418,6	327,2	430,8	343,9	418,0	349,5	442,3	378,2	480,1	419,1
Growth rates of the number of organic production operators, %	x	x	103	105	97	102	106	108	109	111
Organic market, billion EUR	40,7	37,4	45,0	41,4	52,0	44,8	54,5	46,7	53,1	45,1
Growth rates of organic product sales, %	x	x	110	111	116	110	105	104	97	96
Consumption of organic products per capita, EUR	50	76	56	84	63	102	66	104	64	102
Growth rates of organic consumption per capita, %	x	x	112	111	113	121	105	102	97	98

Source: IFOAM Consolidated Annual Report, 2020, 2021, 2022, 2023, 2024

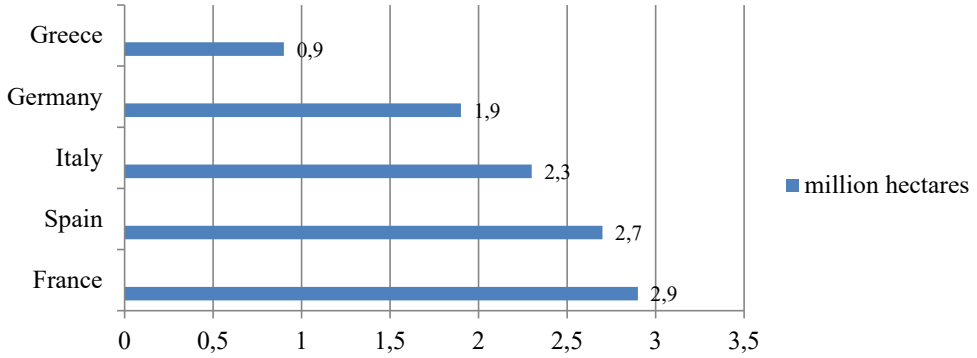

Figure 1. European countries with the largest areas of organic agricultural land in 2022, million hectares

Source: The World of Organic Agriculture Statistics and Emerging Trends 2024

The area under organic production increased by more than 0.8 million hectares compared to 2021, an increase of 5.1% in the EU and 1.0% in Europe. Compared to 2021, the largest increase in organic area occurred in Greece and Italy (by 0.4 million hectares and 0.2 million hectares, respectively) (The World of Organic Agriculture Statistics and Emerging Trends 2024).

In 2022, organic agricultural area in Europe represented 3.7% of the total agricultural area. The share of such area in the EU was 10.4%. Among European countries and in general, the world leader in terms of the specific weight of organic agricultural area is Liechtenstein – 43.0% of the total area. In total, fifteen European countries have more than 10% of their agricultural area in organic status (Figure 2).

A comparison of the present data with that from 2021 reveals an increase of almost 11% in the number of organic producers in the EU, resulting in a total of 419,112 entities.

In 2022, the total value of retail sales of organic products in Europe amounted to €53.1 billion (45.1 billion EUR within the European Union). Germany was identified as the largest market, with sales of 15.3 billion EUR. On a global scale, the EU occupies the second position in terms of the single market for organic products, surpassed only by the United States, which recorded sales of €58.6 billion (Kireitsev, 2015). The European organic market demonstrated a 2% contraction in 2022, while the EU market experienced a 3% decline. The EU organic market is characterised by considerable dynamism, with the rate of change exhibiting variation across different countries. For instance, while a number of European countries have experienced a decline in organic sales, countries such as Estonia and the Netherlands have witnessed a substantial increase (by 6% and 4%, respectively). In 2022, Germany (12.0%), Austria (11.5%) and Switzerland (11.2%) accounted for the highest shares of organic food products in the European market (Figure 3).

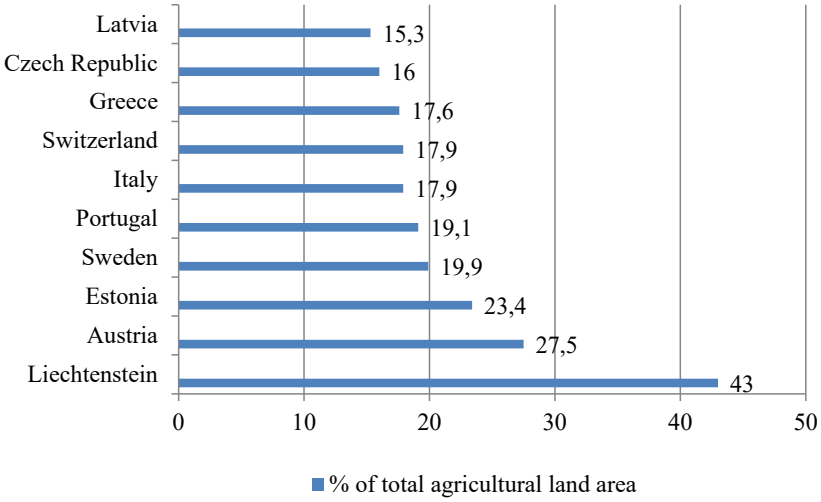

Figure 2. European countries with the highest share of organic agricultural land in 2022, % of total agricultural land area

Source: The World of Organic Agriculture Statistics and Emerging Trends 2024

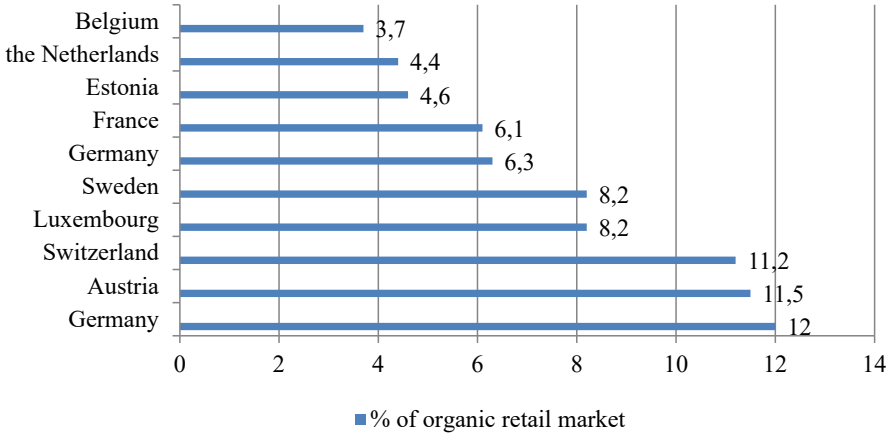

Figure 3. European countries with the highest organic retail market share in 2022, % of organic retail market

Source: The World of Organic Agriculture Statistics and Emerging Trends 2024

European countries account for the highest global sales of organic food. Denmark has been identified as the global leader in 2022, with a 12% share of the country's total food market. This is followed by Austria with 11.5% and Switzerland with 11.2%.

In recent years, prior to the full-scale invasion, Ukraine witnessed a consistent positive trajectory in two key areas: the expansion of agricultural land dedicated to organic farming and the growth in the number of organic producers, as well as the escalation in organic consumption. However, with the onset of Russia's full-scale invasion, there was a significant decrease in agricultural land under organic production, reaching 263,619 hectares. Concurrently, the number of organic producers and the domestic market for organic products underwent a substantial decline (Figure 4).

Despite the difficulties caused by military aggression, Ukraine remains a promising country for organic production, thanks to favourable natural and climatic conditions, exceptional availability of land resources and centuries-old agricultural traditions.

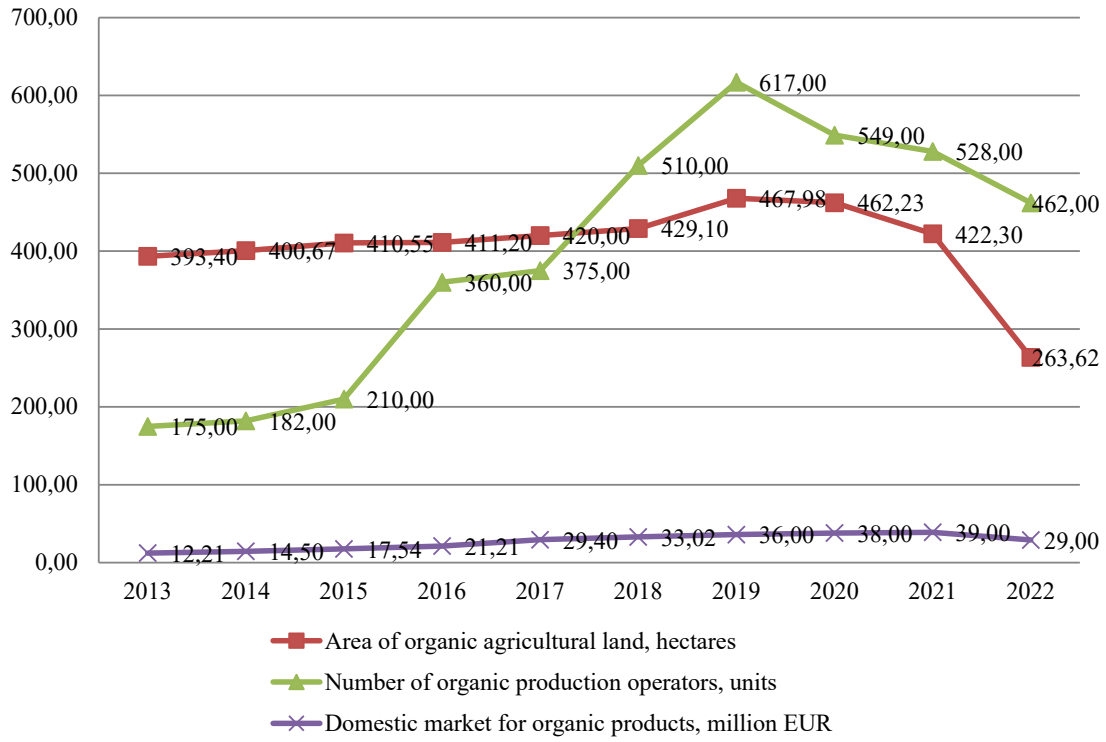

Figure 4. Dynamics of key indicators of organic production in Ukraine, 2013-2022

Source: Organic in Ukraine (2023)

2.2. Comparative Analysis of Regulations on Accounting for Biological Assets

The importance of information about natural resources, which are becoming increasingly limited, is recognised by the domestic scientific community and society in general, as evidenced by the adoption in 2005 of the National Accounting Regulations (Standards) 30 "Biological Assets" (hereinafter – NR(S) AU 30). The specified regulatory act introduced into national accounting practice such concepts as "biological asset" and "biological transformations". Prior to this development, biological assets were not distinguished as a distinct accounting entity necessitating the creation of bespoke methodological techniques for valuation and the establishment of systematic information for management purposes. They were incorporated within the broader categories of non-current and current assets, which hindered the capacity to accurately appraise their real value as integral components of the property complex and to ascertain their role and influence within the agroecosystem.

The development of NR(S)AU 30 was informed by International Accounting Standard 41 "Agriculture" (hereinafter – IAS 41) (2000), with the objective of harmonising the national accounting system with the conceptual provisions of international accounting standards. However, a divergence in the interpretation of the fundamental concepts enshrined within these regulatory acts is evident (see Table 3).

These differences are significant and affect not only the understanding and application of legal norms in practice, which creates potential opportunities for different interpretations and accounting conflicts, but also have much deeper consequences. Discrepancies in interpretation give rise to divergent approaches to the recognition of accounting objects and the valuation of assets.

The definition of a biological asset as set out in IAS 41 is considered to be excessively general and imprecise, as it does not fully reflect the essence of the term. The definition of the general concept of "asset" in the National Regulation (Standard) of Accounting 1 "General Requirements for Financial Reporting" (2013) elucidates that an asset is a resource whose utilisation is governed by the enterprise and which is anticipated to generate economic benefits for the owner in the future. The interpretation of the concept under discussion is almost identical in the international accounting standards. In accordance with International Accounting Standard 38, entitled "Intangible Assets" (1998), an asset is defined as a resource that meets the following criteria:

a) It is controlled by the entity;

b) it is expected to generate economic benefits.

Consequently, the definition of biological assets in NR(S)AU 30 is more accurate, as it encompasses all the characteristics provided for the category of "asset".

2.3. Justification of the Classification of Agricultural Land as Biological Assets

The key feature for classifying property as a biological asset is the biological transformation associated with it (in accordance with IAS 41). The result of the natural biological processes that occur with biological assets and the influence of the economic entity on them in the course of agricultural activity is the receipt of agricultural produce and additional biological assets. Accounting standards recognise the process of managing biological transformation as an agricultural activity. The prerequisite and natural basis for this type of activity is land. It is the main factor of production that forms the basis of the national wealth and natural

Table 3

Definition of key concepts for accounting for biological assets in NR(S)AU 30 and IAS 41

Concept	Definition by	
	NR(S)AU 30	IAS 41
Biological asset	A living animal or plant that is capable of producing agricultural products and/or additional biological assets through biological transformations.	A living animal or plant.
Biological transformations (transformation)	The processes of growth, degeneration, production and reproduction that cause qualitative and/or quantitative changes in biological assets.	The processes of growth, degeneration, production and reproduction that cause qualitative and quantitative changes in biological assets.
Agricultural activity	The process of managing biological transformations to produce agricultural products and/or additional biological assets.	An entity's management of biological transformation and harvesting of biological assets for sale or for processing into agricultural products or additional biological assets.
Change management	No definition	Management that promotes biological transformation by improving or at least stabilising the conditions necessary for this process (e.g., maintaining nutrient levels, moisture, temperature, fertility and light). Such management distinguishes agricultural activities from other activities.

Source: National Accounting Regulations (Standards) 30 "Biological Assets" (2005), International Accounting Standard 41 "Agriculture" (2000)

capital of Ukraine country. At the same time, this strategic resource is in most cases excluded from the economic circulation of economic entities. The real value of agricultural land is not reflected in the value of companies' assets.

On the one hand, this situation is due to the system of land ownership and land use established at the time of Ukraine's independence. Despite the fact that the agricultural land market has been operating for more than three years, the majority of agricultural land is still owned by individuals and is leased to legal entities for their use. Thus, the possibility of capitalisation of this type of property by business entities is excluded. As V. Zhuk noted: "What is not reflected in the balance sheet is not valued." (2019)

Conversely, even in the event of a business entity acquiring land, the accounting standard stipulates that its valuation is to be conducted in accordance with the methodology provided for fixed assets. This methodology does not take into account the value of agricultural land as the main component of the agroecosystem; as property that does not have a useful life and which, unlike other fixed assets, does not wear out; as a specific asset in which biological processes and transformations occur, on which its fertility depends. It is hypothesised that agricultural land, as an asset, has much more in common with long-term biological assets than with fixed assets. The aforementioned features of land were emphasised by G. Kireitsev (2015), who considered it the main biological environment and biological asset. The scientist emphasised the fallacy of using the traditional approach to recognising and assessing land resources, which leads to their depreciation and the formation of a public attitude towards land as an ordinary means of labour.

Scientists posit that land constitutes a component of natural capital, which, under conditions of its rational utilisation, exhibits the capacity for self-renewal. N. Malyuga and I. Zamula (2010) propose to consider this ability to self-regulate and self-renewal as natural growth, or "percentages" of capital. The utilisation of these "percentages" is said to ensure a balance between human economic activity and the ecosystem within which this activity is carried out. However, a disruption of this balance, resulting from the violation of the aforementioned principles, gives rise to an increase in anthropogenic pressure, a disruption of ecosystems and biodiversity, and consequently, a decrease in natural capital for future generations.

In consideration of the aforementioned factors, it is this institution's position that agricultural land resources, in their natural and economic characteristics and in accordance with the established criteria for recognition, are to be regarded as biological assets. This assertion is particularly salient in the context of land engaged in organic production.

It is important to note that IAS 41 is more categorical than the national regulation with regard to the possibility of classifying agricultural land as biological assets. Paragraph 2 of the international standard explicitly states that its norms do not apply to lands engaged in agricultural activity. Conversely, paragraph 3 of (NR(S)AU) stipulates that its norms do not apply to agricultural products after their initial recognition, to products of processing of agricultural products, and to biological assets that are not agricultural.

2.4. Proposed Definitions of Key Terms and Procedures for Recognition of Biological Assets in Organic Production

Organic production, as a complex production system, reduces the anthropogenic impact on the ecosystem, ensures the rational use of natural capital, protects the environment and contributes to the creation of sustainable agricultural production systems. The positive effects of such interactions in the agro-ecosystem are not reflected in the value of the business by traditional accounting methods.

In order to provide a comprehensive overview of the concept of "asset" in accounting standards, it is first necessary to consider the condition for its recognition, which is to ensure the receipt of economic benefits in the future. It is acknowledged that biological assets of organic production have the capacity to yield not only economic benefits, but also other forms of benefits that are not subject to accounting valuation and are not reflected in the accounting and reporting system. It is important to note that the benefits of minimising or avoiding losses that society currently or will incur as a result of the adverse environmental impact of traditional industrial agriculture have not been considered. These benefits are associated with preserving the environment and its capacity for self-renewal.

The study concluded that the definition of the concept of "biological asset", the procedure for recognizing them, and the composition of this type of asset, as well as the methodology for their evaluation in the conditions of organic production, do not correspond to their natural and economic essence. This discrepancy leads to negative economic, environmental and social consequences.

It is the contention of the present study that, in the contemporary era, there exists an objective necessity to standardise accounting for organic production. It is recommended that a distinct accounting standard, entitled "Organic Production", be formulated and endorsed at the level of state institutions.

Table 4
Key theoretical definitions for accounting for biological assets in organic production

Definition	Characteristic
Biological assets of organic production	A set of biological elements of an agro-ecosystem (land, plants, animals) that are controlled by an organic production operator and, in the process of biological transformations, are capable of producing finished agricultural products and/or additional biological assets that meet the principles and requirements of organic production.
Recognition of biological assets of organic production	They are recognised if - the organic production operator controls them as a result of past events - their biological transformation takes place using technologies that meet the requirements of the legislation on organic production - it is probable that future economic or other benefits associated with the use of the resource will flow to the operator; - their value can be reliably determined.

Source: authors' development

With regard to the accounting of biological assets, the specified standard should define the main terms, the procedure for recognizing biological assets of organic production, and develop a methodology for their valuation and accounting. In this context, the following is offered (see Table 4).

The proposed theoretical definitions of accounting for biological assets of organic production should mark the beginning of the formation of a comprehensive accounting system for information support for the management of organic production processes at all levels in Ukraine.

3. Conclusions

Domestic and international accounting practices provide limited accounting for biological assets. The prevailing methodology does not facilitate the identification of land resources as biological assets or the determination of the true value of biological assets in organic production.

A critical evaluation of domestic and international regulations pertaining to the conceptual framework for accounting biological assets has exposed ambiguities and inconsistencies in their interpretations. Moreover, the organisational and technological intricacies inherent to organic production, in addition to its repercussions on agroecosystems and the natural environment, have not been incorporated within accounting standards.

It has been determined that agricultural land, particularly organic agricultural land, by its natural and economic nature, meets the criteria for recognition as biological assets.

It has been determined that there is presently a necessity for the standardisation of organic production accounting and the systematic development of methods for the assessment and accounting of biological assets in organic production.

A novel definition of the concept of "biological assets in organic production" is hereby proposed, with particular consideration for the specificities of such activities and their impact on agroecosystems. Criteria for recognizing biological assets in organic production accounting have been developed. In particular, it has been proven that:

– Recognition of biological assets in accounting should be based on all the characteristics inherent in the asset category: controlled resource; future economic benefits.

– Biological assets in organic production provide not only economic benefits, but also other advantages at both the enterprise and macro-level.

– Thus, the criteria for recognising biological assets in organic production are as follows:

– Control over them by the operator of organic production.

– Biological transformations of these assets occur under conditions that meet the requirements of organic legislation.

– Receipt of economic and other benefits from their use.

– The possibility of their reliable valuation.

Further research is required in order to assess both the biological assets in organic production and the benefits (economic and otherwise) associated with their use.

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