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Current state and prospects for the development of agriculture in the Vinnytsia region

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► **Abstract.** The agriculture of the Vinnytsia region plays an important role in the economy of this region, ensuring food security, employment stability and socio-economic development. The study aims to analyse the current state and peculiarities of the functioning of agriculture in the Vinnytsia region, as well as to identify prospects for the development of this sector of the region's economy. To achieve this goal, the following methods were used: abstract-logical, system-structural, method of analysis and comparison, economic-statistical, tabular, graphical and other methods. The study analyses current trends in agricultural development, covering information up to 2022, as there are currently no official statistics for 2023. It is established that 2022 was a difficult year for the country, as evidenced by the decline in plant production in the region from 2018 to 2022, but at the same time, there was a certain increase in the production of animal products. The study examines the structure of production and efficiency indicators of agriculture, which indicate both positive and negative trends. In particular, the positive side of the dynamics is the increase in the number of agricultural enterprises and the stability of the region's share in the national agricultural production. However, negative trends include a decline in production, a decrease in the profitability of operating activities and other indicators that reflect the impact of economic and technological factors on the industry. The study noted that proper use of fertilisers is essential for increasing land productivity. Several challenges that limit the productivity and sustainability of agricultural development in the region were identified. Climatic conditions, such as temperature and precipitation, environmental, economic and social problems that require an integrated approach to address them. The article substantiates the prospects for agricultural development, namely: optimisation of land use, introduction of modern technologies, support for agriculture and stimulation of ecological agricultural production. Examples of the introduction of modern technologies and innovations in the region's agriculture, including the cultivation of products without the use of chemical fertilisers and pesticides, and the use of precision farming and biogas projects, are considered. Initiatives and programmes to support small and medium-sized enterprises and organic agriculture are also highlighted. These aspects can be used to create development strategies and make informed decisions

► **Keywords:** agricultural crops; indicators; development; production; ecological production; crop production; livestock production

► Introduction

The current extremely difficult political situation in the country, caused by the Russian invasion of Ukraine, has led to a sharp decline in the national economy. Due to the occupation and hostilities, a large part of Ukraine has suffered considerable losses and has become, one might say, incapacitated. Therefore, in such circumstances, the central and western regions of the country must ensure their maximum productivity.

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Agriculture is the most basic human activity, encompassing both the cultivation of crops and the feeding of animals. A. Gamage *et al.* (2023) determined that agricultural land is an important resource in the world from which humanity feeds and houses itself. The industry under study provides a significant part of economic activity around the world. People rely on agriculture to feed their families, earn a living and start businesses, regardless of their size (Abhilash *et al.*, 2022).

F. Mathlouthi *et al.* (2022) concluded that the growing demand for agricultural products globally is creating a variety of employment opportunities that cross over into different economic sectors and societal sectors. First, it creates new jobs in agriculture in the region itself, including farms, processing plants and farm support services. In addition, increased agricultural production requires expanded trade and transport, which opens opportunities for jobs in logistics.

Ye. Marynchenko (2023) emphasises that agriculture is an industry that must constantly evolve and look for innovative approaches based on the use of high-yielding seed varieties, chemical fertilisers, water, pesticides, etc. New challenges, such as climate change, high market competition and limited resources, make it necessary for agriculture to find effective and sustainable solutions. According to the author, land is a special object of innovation.

The importance of investment support for the technological growth of the agro-industrial sector of the economy was emphasised by Yu. Sahachko *et al.* (2023). The researchers believe that one of the most promising areas is attracting foreign investment, as Ukraine has great potential in agriculture. In addition, it is crucial to provide financial support to small and medium-sized agribusinesses by creating favourable conditions for obtaining loans and other financial resources and developing support programmes in the agricultural sector.

In their study of agriculture, M. Wrzecińska *et al.* (2023) and M. Boiko (2023) examined the impact of modern technologies on increasing the efficiency of agricultural production. The introduction of IT solutions in agriculture facilitates data processing, visualisation, and decision-making, which leads to reduced costs, increased efficiency, and improved food security.

Numerous scientists, including F.H.M. Tang *et al.* (2021) and M. Tudi *et al.* (2021), argue that agrochemicals used for crop treatment include a wide range of pesticides that can be toxic not only to the plant species in question but also to the environment. According to F. Isbell *et al.* (2023), the addition of fertilisers to agricultural land also leads to the loss of biodiversity and the decline of many ecosystems.

The current state of agriculture in the Vinnytsia region is determined by a complex of factors, such as land use, agricultural production, financial support for agricultural enterprises, as well as the impact of climate change and other environmental factors. Analysis of current trends and challenges provides effective strategy planning and informed decision-making for the further development of the region's agriculture. Given the above, the issues raised are quite relevant and require further research. The study aims to analyse the current state and peculiarities of the functioning of agriculture in the Vinnytsia region, as well as to identify directions for the development of this sector of the region's economy.

Materials and methods

Due to the variety of existing research methods, those that provide an accurate result and cover all aspects of the processes under study are important. The study was based on the following methods:

1) abstract and logical methods to summarise theoretical approaches to the formation of the foundations of agricultural development in the region;

2) systemic and structural methods to analyse the potential of the agricultural sector of Vinnytsia region;

3) analysis and comparison methods to assess the level of agricultural development in the region;

4) economic and statistical methods for processing statistical data and assessing the current state of agriculture;

5) tabular and graphical methods for visualising changes in the agricultural sector.

The study addresses the economic and mathematical statistics methods that form the basis for assessing the current level of agricultural development and allow for mathematical interpretation of the results of such analysis. The study also focuses on substantiating scientific, theoretical and practical aspects and developing recommendations on regional peculiarities of agricultural development.

The theoretical and methodological basis of the study includes the basic principles of general economic theory, achievements of advanced science and practice in improving the economic efficiency of agriculture in the Vinnytsia region. The overall structure of the study includes successive stages. The first stage is an analysis of the current state of agricultural development in the Vinnytsia region for the period of 2018-2022. This stage of the study is based on analytical and statistical data from the Official website of the State Statistics Service of Ukraine (n.d.), Main Department of Statistics in Vinnytsia Region (n.d.), Analysis of water resource provision for population and economic sectors (n.d.). The data on agricultural development used in this paper includes information up to and including 2022, as official statistics for 2023 are not yet available due to the collection and processing of updated data, which requires significant time, especially during the period of martial law in Ukraine.

The second stage of the research aims to study the main challenges that hinder the effective development of agriculture. The theoretical basis of this stage includes scientific publications on the topic under study (Said *et al.*, 2020; Abdel-Fattah *et al.*, 2021), materials of the Programme of Economic and Social Development of Vinnytsia Oblast for 2024 (Order of the Chief of the Regional Military Administration No. 1465…, 2023).

The third stage of the study involves, based on the analysis of the current state of functioning of agriculture in the Vinnytsia region, substantiation of further prospects for the development of this sector of the region's economy, namely the optimisation of land use (Bubyr, 2021), the introduction of modern technologies (Nyaga *et al.*, 2021; Gorobets *et al.*, 2021). Support for agriculture (Petliuk & Miedviedkova, 2021; Vdovenko *et al.*, 2022; Dobrunik & Kuznietsova, 2022) is one of the key factors in ensuring the

sustainable development of this sector. It is also necessary to stimulate the ecological production of agricultural products (Joshi, 2023; Abas,2023). Sources of information included agricultural development programmes (Resolution of Vinnytsia Regional Council No. 922..., 2020; Resolution of Vinnytsia Regional Council No. 978..., 2020), examples of leading agricultural enterprises in the region (MHP Food UK Limited, n.d.; Farm enterprise "Ukraine", n.d.).

▸ Results and Discussion

Vinnytsia region has a temperate climate and fertile land. Therefore, agriculture is the main sector of the region's economy, which determines the food supply, employment and socio-economic development of the region. Over a long period, there has been a steady upward trend in the production of many types of agricultural products. However, according to I. Tomashuk (2022), active military operations in much of Ukraine have led to large-scale problems that have a destructive impact on the current state and prospects of agricultural development.

As for the Vinnytsia region, according to M.Franchuk (2020), 2012.0 thousand hectares of agricultural land are used in the region, of which 1730.5 hectares are arable land, 48.0 hectares are perennial plantations, 48.8 hectares are hayfields, and 183.9 thousand hectares are pastures. In terms of agricultural land, the region ranks ninth among other regions of Ukraine. For a comprehensive analysis of the current state of development of the region's agro-industrial complex (AIC), it is necessary, first of all, to analyse the dynamics of agricultural production (Table 1).

Table 1. Gross agricultural production

Indicators	Years					Deviation, %	
	2018	2019	2020	2021	2022	2022/ 2018	2022/ 2021
Agricultural enterprises of all categories							
Agricultural production, million UAH, incl.	56,520.9	57,168.9	48,688.6	59,467.8	48,597	-14.0	-18.3
▸ crop production, mln. UAH	41,738.0	39,426.9	30,841.8	42,039.2	31,537.1	-24.4	-25.0
▸ husbandry, mln. UAH	14,782.9	17,742.0	17,846.8	17,428.6	17,059.9	+15.4	-2.1
Enterprises							
Agricultural production, million UAH, incl.	40,876.3	42,411.8	35,169.1	45,409.3	35,608.3	-12.9	-21.6
▸ crop production, mln. UAH	30,833.0	29,100.7	21,521.9	31,754.4	21,948.5	-28.8	-30.9
▸ husbandry, mln. UAH	10,043.3	13,311.1	13,647.2	13,654.9	13,659.8	+36.0	+0.04
Household farming							
Agricultural production, million UAH, incl.	15,644.6	14,757.1	13,519.5	14,058.5	12,988.7	-17.0	-7.6
▸ crop production, mln. UAH	10,905.0	10,326.2	9,319.9	10,284.8	9,588.6	-9.3	-6.8
▸ husbandry, mln. UAH	4,739.6	4,430.9	4,199.6	3,773.7	3,400.1	-28.3	-9.9

Source: calculated per data from the Official website of the State Statistics Service of Ukraine (n.d.); Main Department of Statistics in Vinnytsia Region (n.d.)

As can be seen, 2022 was a difficult year for the country, as evidenced by the minimum value of agricultural production in the region (UAH 48,467.8 million) for the period from 2018 to 2022. It is worth noting that this decline in production in 2022 was due to a significant decrease in the volume of plant products produced, in particular, by 25% compared to 2021 and by 24.4% compared to 2018.

Despite the lack of published statistics for 2023, it is worth noting that, according to Oleh Sidorov, Director of the Regional Military Administration Department of Agricultural Development (In Vinnytsia region..., 2023), Vinnytsia region is the leader in agricultural production among all regions of Ukraine (during 10 months of 2023, there was an increase in agricultural production in the region by almost 30%). It is worth noting the better state of livestock production. For example, the value of this indicator in 2022 increased by 15.4% compared to 2018. However, compared to the previous year, 2021, the volume of livestock production decreased slightly by 2.1%. This positive trend in livestock production is determined by the sustainability and efficiency of enterprises, where in 2022 the volume of output increased by 36% and 0.04% compared to 2018 and 2021, respectively. Considering the structure of agricultural production, it should be noted that in the period 2018-2022, the majority of products in the region, namely 63.3-73.8%, are plants, while livestock accounts for about 26.2-36.7% (Fig. 1).

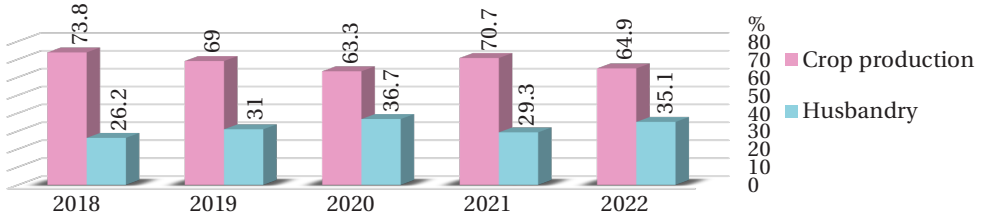

Figure 1. Dynamics of the structure of agricultural production, %

Source: calculated per data from the Official website of the State Statistics Service of Ukraine (n.d.); Main Department of Statistics in Vinnytsia Region (n.d.)

Analysing the key performance indicators of agriculture in the Vinnytsia region (Table 2), it is necessary to note a positive trend in the growth of the number of business entities in the studied sector of the economy. For example, the number of agricultural enterprises increased from 2,715 in 2018 to 2,908 in 2022. It is worth noting that this growth is partly the result of the relocation of enterprises from the southern and eastern regions of the country.

Table 2. Key indicators of agricultural efficiency in the Vinnytsia region

Indicators	Years					Deviation, %	
	2018	2019	2020	2021	2022	2022/ 2018	2022/ 2021
Number of enterprises, units.	2,715	2,765	2,751	2,858	2,908	+7.1	+1.7
Share of the region in the national output, %.	8.4	8.4	8.0	8.3	8.4	0	+1.2
incl.: ▸ crop production	7.9	7.3	6.5	7.2	7.8	-1.3	+8.3
▸ husbandry	10.4	12.5	12.9	13.2	10.1	-2.9	-23.5
Production output per 100 ha of agricultural land, thousand UAH.	2,806.1	2,841.4	2,419.9	2,956.6	2,684.5	-4.3	-9.2
Production output per 1 person, UAH.	36,044	36,814	31,672	39,141	33,214	-7.9	-15.1
Number of employees, thousand people	36.3	35.5	33.0	33.8	32.2	-11.3	-4.7
Labour productivity per employee, thousand UAH.	1,491.3	1,536.8	1,399.1	1,759.4	1,509.2	+1.2	-14.2
Profitability of operating activities of enterprises, %.	20.2	10.7	16.7	18.5	16.1	-20.3	-13.0

Source: calculated per data of Official website of the State Statistics Service of Ukraine (n.d.); Main Department of Statistics in Vinnytsia Region (n.d.)

According to the studies, the region's share in the national production continues to remain at the level of 8.0-8.4%, which is a crucial indicator of the successful development of agriculture in the region. A negative downward trend in 2022 occurred in several important indicators related to agriculture, such as output per 100 hectares of land, per person, number of employees employed in the industry, and labour productivity. This may be caused by a decrease in agricultural production in the current year, as well as the impact of technological changes, automation and new management approaches in agriculture.

An analysis of the operating profitability of agricultural enterprises in the Vinnytsia region over the past five years has revealed several significant trends and changes in this indicator. In 2018, the profitability was 20.2%, which indicated a high level of profitability for most companies in the industry. However, this figure declined in the following years. In 2019, the profitability was 10.7%, which may be due to the economic situation, changes in the agricultural market and the cost of new technologies. In 2020-2021, the profitability increased to 16.7% and 18.5%, respectively, indicating an improvement in operating efficiency. However, in 2022, there was another decline to 16.1% due to the difficult economic and political situation in the country.

The opinion of M. Franchuk & H. Khaietskyi (2021) that the main factor in increasing the yield of land resources in the Vinnytsia region is the use of mineral and organic fertilisers is notable. In particular, the dynamics of mineral and organic fertiliser application to the soil by enterprises in the study region for the period 2017-2022 are shown in Table 3.

Table 3. Dynamics of mineral and organic fertiliser application to the soil by Vinnytsia region enterprises in 2017-2022

Indicators	Years					
	2017	2018	2019	2020	2021	2022
Mineral fertilisers						
Fertiliser applied, thousand tonnes	162.7	160.2	153.5	187.6	148.6	213.8
Fertilised area, thousand ha	1,103.9	1,040.3	966.5	988.5	979.8	999.4
Share of fertilised area, %.	94.1	94.9	91.9	95.3	90.7	94.9
Fertiliser applied per hectare, kg, including:						
▸ exact sown area	139	146	146	190	138	203
▸ area treated with fertilisers	147	154	159	181	152	214
Organic fertilisers						
Fertiliser applied, thousand tonnes	511.7	803.1	625.5	725.8	600.8	645.4
Fertilised area, thousand ha	22.8	42.9	37.1	40.0	45.5	39.9
Share of fertilised area, %.	1.9	3.9	3.5	3.9	4.2	3.8
Fertiliser applied per hectare, kg, including:						
▸ exact sown area	512	622	598	700	556	613
▸ area treated with fertilisers	15,230	16,179	16,505	18,154	13,213	16,176

Source: compiled based on Analysis of water resource provision for population and economic sectors (n.d.)

Based on the data presented in Table 3, it is possible to conclude that there were slight fluctuations in the application of mineral and organic fertilisers between 2017 and 2022. However, in 2022, despite the difficulties in the country, companies in the region were able to increase the volume of mineral fertilisers applied by 65.2 thousand tonnes and organic fertilisers by 44.6 thousand tonnes compared to 2021. Analysing the situation in crop production in the period from 2020 to 2022, it is worth noting the stability of the area of land used for crops, which varies between 1628.0 and 1653.1 thousand hectares (Table 4). However, a detailed analysis of structural changes in the dynamics of sown areas shows a decrease in the area under grain crops by 89.9 thousand ha in 2022. This led to an increase in the area under industrial crops, in particular oilseeds, soybeans, mustard, sunflower and rapeseed, in the region.

Table 4. Dynamics of sown areas under crops, thou hectares

Crop type	All farm types			Enterprises			Household farming		
	2020	2021	2022	2020	2021	2022	2020	2021	2022
Agricultural crops	1,628.0	1,653.1	1,631.5	1,207.8	1,232.1	1,210.6	420.2	421.0	420.9
Cereals and legumes:	878.6	900.9	811	709.5	722.4	638.5	169.1	178.5	172.5
▸ wheat	316.1	317.5	320.1	261.1	258.0	263.7	55.0	59.5	56.4
▸ corn	451.7	458.9	386.7	389.8	393.3	323.2	61.9	65.6	63.5
▸ barley	88.6	94.0	80.7	46.5	51.0	38.3	42.1	43.0	42.4
▸ rye	1.8	3.2	2.0	0.6	1.9	0.9	1.2	1.3	1.1
▸ oats	0.8	1.0	0.8	0.4	0.6	0.4	0.4	0.4	0.4
▸ buckwheat	6.7	6.9	8.8	3.0	3.2	5.1	3.7	3.7	3.7
Grain and legumes	9.0	9.4	10.2	4.3	4.6	5.4	4.7	4.8	4.8
Industrial crops:	429.1	511.2	572.1	460.3	479.2	540.2	37.8	32.0	31.9
▸ oil crops	442.9	450.0	523.1	416.1	423.0	496.2	26.8	27.0	26.9
▸ soy	103.0	84.1	105.3	91.2	72.2	93.4	11.8	11.9	11.9
▸ mustard	-	0.4	0.7	-	0.2	0.5	-	0.2	0.2
▸ winter rapeseed and kohlrabi	50.2	64.6	89.1	49.4	63.8	88.3	0.8	0.8	0.8
▸ sunflower	289.0	311.6	328.0	275.1	297.6	314.0	13.9	14.0	14.0
▸ sugar beet	48.5	49.6	48.4	43.4	44.5	43.4	5.1	5.1	5.0
Roots and tubers. Vegetables and melons:	132.8	126.8	130.9	0.5	0.4	0.5	132.3	126.4	130.4
▸ potatoes	109.6	101.8	105.7	0.2	0.2	0.3	109.4	101.6	105.4
▸ vegetables	21.1	22.4	23.1	1.1	-	14.2	20.0	22.4	8.9
▸ melons and gourds	2.1	2.3	2.1	-	-	-	2.1	2.3	2.1
Fodder crops:	124.2	114.3	117.3	37.5	30.1	31.4	86.7	84.2	85.9
▸ fodder beetroot	19.7	16.9	18.2	-	-	-	19.7	16.9	18.2
▸ fodder corn	21.5	14.7	18.7	21.2	14.5	18.5	0.3	0.2	0.2

Source: calculated per data of Official website of the State Statistics Service of Ukraine (n.d.); Main Department of Statistics in Vinnytsia Region (n.d.)

Considering the various aspects of this study, it is worth noting that many challenges impede agricultural development and lead to a decrease in crop productivity. As noted by M.E.S. Said *et al.* (2020) and M.K. Abdel-Fattah *et al.* (2021), the quantity and quality of the crop are largely influenced by climate. First, air temperature affects physiological processes in plants, such as photosynthesis and fruit development. For example, high temperatures cause stress to plants and lead to lower yields. Secondly, precipitation is important for soil moisture and water regime, which in turn affects plant growth and development. Therefore, understanding climatic conditions and their impact on crop production helps farmers develop better management strategies to ensure adequate yields and quality of agricultural products.

Furthermore, the development of agriculture in the region is affected by environmental issues, high production costs, low productivity, market competition, lack of access to foreign export markets, insufficient infrastructure and technology, and socio-economic problems in rural areas, which require a comprehensive approach and joint efforts by the government, rural communities, businesses and the public.

It is worth noting that the Programme of Economic and Social Development of Vinnytsia Region for 2024 (Order of the Chief of the Regional..., 2023) identifies numerous risks and possible challenges, including difficulties in exporting products due to the destruction or complications of transport logistics, the suspension of the grain corridor and further blockade of Black Sea ports, a decrease in lending and investment, etc. These problems, caused by the ongoing war on the territory of the country, are a serious obstacle to the development of the agricultural sector in the region and the country.

The prospects for the development of agriculture in the Vinnytsia region cover a wide range of aspects, from the efficient use of land resources to the introduction of new technologies and the development of agricultural enterprises. Thus, optimisation of land use means rational and efficient use of agricultural land to maximise

its potential. To achieve this goal, it is important to ensure the preservation of soil fertility, rational location of agricultural land, efficient use of water resources, application of modern geospatial analysis technologies, and stimulation of rural cooperatives. The statement of N. Bubyr (2021) that determining the optimal ratio of different types of land in the structure of land use in a particular territorial community will help to streamline the land fund formed on the territory is noteworthy. These measures will increase agricultural productivity, preserve the environment and improve the quality of life of the rural population.

Among the main prospects for the development of agriculture in the Vinnytsia region is the use of modern technologies, which cover a wide range of innovative solutions, from the introduction of automated farm management systems to the use of drones and modern agricultural machinery and equipment. According to J.M. Nyaga *et al.* (2021), and N. Gorobets *et al.* (2021), the use of such technologies increases production efficiency, reduces labour and fuel costs, improves product quality and increases the competitiveness of agricultural enterprises.

An example of the effective implementation of modern technologies and methods of agriculture in the Vinnytsia region is the international company MHP (MHP Food UK Limited, n.d.). Many of MHP's crop production enterprises, including PJSC Zernoproduct MHP, have already implemented a full range of precision farming elements. For example, by using double, autumn and spring verti-till technology, the company managed to increase soybean yields by 0.3-0.5 tonnes compared to conventional tillage, not including savings on fuel, technological operations and fertilisers. Furthermore, the use of a precision seeder can reduce the number of seeds per hectare by up to 100,000, while ensuring uniform sowing and increased uniformity of germination. The use of strip-till for tillage contributes to an increase in corn yield by 4 cwt/ha or more, which is especially important in conditions of sufficient rainfall, which was typical for most regions in 2022.

Since 2016, MHP has been actively developing its digital platform, which is currently forming the Digital Agro 360 ecosystem, which includes digital tools to increase agricultural productivity (MHP Food UK Limited, n.d.). Studies have shown that when the spreader sections are automatically switched off, fertiliser overruns are within 0.5-0.6%. In the case of manual spreading control, this figure increased to more than 5%. Based on all the figures, the difference between automatic and manual control is more than $6 per hectare, which has a significant impact on the efficiency of resource use when cultivating large areas. It is also important to note that spreaders with automatic control reliably adhere to the set application rate (instead of the prescribed rate of 200 kg/ha, they can set 180 or 190 kg/ha).

At the same time, the company continues to actively implement biogas projects, in particular, the Ladyzhyn Biogas complex leads to a reduction in greenhouse gas emissions, estimated at 100 thousand tonnes of CO^2 equivalent annually. In addition, organic fertilisers, which contain abundant nutrients necessary for plant growth, are a valuable product obtained from biogas complexes.

Another exemplary example of the use of modern technologies for growing and processing agricultural products in the region is Farm Enterprise "Ukraine" (Farm Enterprise "Ukraine", n.d.). The farm uses a modern No-Till tillage system. This approach is an agricultural technology that eliminates traditional methods of tillage before sowing seeds or planting plants. Instead, plant residues, such as stems and roots, are left on the field even after harvesting, which helps to preserve soil moisture, maintain soil structure, reduce erosion and help increase yields. The company has managed to increase organic matter by 0.25% to 0.75% on its No-Till fields. In addition, No-Till reduces the use of machinery and fuel (40-60 litres of diesel per hectare), which leads to lower emissions and contributes to more sustainable and environmentally friendly agriculture.

It is worth noting that to develop the region's agro-industrial production, the Action Plan for 2021-2023 for the implementation of the Strategy for Balanced Regional Development of Vinnytsia Region until 2027 (Resolution of Vinnytsia Regional Council No. 922..., 2020) sets out the introduction of agrotechnologies using IT innovations and support for the development of the organic agricultural sector as one of the main tasks.

An important aspect of ensuring the stability and development of agriculture is its support, which includes financial assistance, access to credit and subsidies, as well as advice and information support on agricultural technology, marketing and management (Petliuk & Miedviedkova, 2021; Vdovenko *et al.*, 2022; Dobrunik & Kuznietsova, 2022). It is also necessary to support the development of agricultural infrastructure, including the construction of roads, irrigation systems, crop storage facilities, etc. O. Yushkevych (2019) argues that support for agriculture contributes to job creation, raising farmers' incomes, and supporting sustainable rural development.

To support the business environment in the region, the Regional Programme for the Development of Small and Medium-Sized Enterprises for 2021-2027 (Resolution of Vinnytsia Regional Council No. 978..., 2020) was developed, with the priority goals of creating conditions to promote entrepreneurship, increasing the ability of small and medium-sized enterprises to obtain financial resources, creating infrastructure to support business, increasing competitiveness and developing the innovative potential of enterprises.

It is worth emphasising that an important task in ensuring the sustainable development of the region's agricultural sector is to promote organic agriculture (Joshi, 2023; Abas, 2023). In particular, providing financial incentives and subsidies to farmers who use environmentally friendly production methods, supporting the introduction of organic farming and growing products without the use of chemical fertilisers and pesticides. It is also essential to support research and development of new technologies aimed at reducing the environmental impact of agricultural activities, such as the use of alternative energy sources and waste minimisation. Promoting organic agriculture contributes to the conservation of biodiversity, human health and the sustainable use of natural resources.

Thus, the study of agriculture in the Vinnytsia region revealed several key trends. First of all, the region has significant areas of agricultural land, which makes it an

important player in the national agricultural sector. Despite a slight decline in agricultural production, especially of crops, in 2021-2022, there was a certain recovery in the region's agricultural sector. Therefore, it is necessary to improve agricultural development strategies to encourage the introduction of modern technologies, optimise the use of land resources and support environmentally friendly agriculture.

Conclusions

Thus, agriculture remains an important sector of the Vinnytsia region's economy, which determines the food supply, employment, and socio-economic development of the region and the country. The region under study has all the potential natural and economic opportunities.

The analysis of the current state of agricultural development in the Vinnytsia region demonstrated a stable situation, given the current military conflict in the country. Thus, the volume of agricultural production in 2022 (when the military invasion began) decreased by 18.3%. However, in 2023, agricultural production in the region increased by almost 30%. In addition, it is worth noting that the area under crops accounts for 95% of the region's arable land, which indicates the efficient use of land resources. Moreover, a positive aspect of the development of the industry under study is its leading position among the country's regions, namely 8.4%. The value of this indicator is important, as a significant part of Ukraine's territory is currently incapacitated due to the ongoing hostilities and mining of agricultural land.

It is worth noting that many challenges hinder the development of agriculture and lead to lower crop productivity: climatic conditions, environmental problems, high production costs, low productivity, market competition, lack of access to foreign export markets, insufficient infrastructure and technology, as well as socio-economic problems in rural areas. However, such challenges require finding ways and directions to reduce their negative impact on the industry under study.

Further research should specify proposals for the development of agriculture through a deeper study of such aspects as optimising the use of land resources, considering their fertility and agricultural-climatic conditions, and introducing innovative modern technologies in all areas of agricultural production, design and implementing effective programmes to support agricultural development, including financial and technical assistance to farmers, as well as promoting environmentally friendly practices in agriculture by encouraging the use of organic production methods and conservation of natural resources.

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Conflict of interest

None.

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Сучасний стан та перспективи розвитку сільського господарства Вінницької області

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▸ **Анотація.** Сільське господарство Вінницької області відіграє важливу роль у економіці даного регіону, забезпечуючи продовольчу безпеку, стабільність зайнятості та соціально-економічний розвиток. Метою дослідження було проведення аналізу сучасного стану та особливостей функціонування сільського господарства Вінницької області, а також визначення можливих перспектив розвитку даного сектору економіки регіону. Для досягнення цієї мети були використані наступні методи: абстрактно-логічний, системно-структурний, метод аналізу та порівняння, економіко-статистичний, табличний, графічний та інші методи. В статті проведено аналіз сучасних тенденцій розвитку сільського господарства, що охоплює інформацію до 2022 року, оскільки наразі немає офіційних статистичних даних за 2023 рік. Встановлено, що 2022 рік був складним для країни, що підтверджено зменшенням виробництва рослинної продукції у регіоні за період з 2018 по 2022 рік, але одночасно відбувся певний ріст у виробництві продукції тваринного походження. Досліджено структуру виробництва та показники ефективності сільського господарства, які свідчать про відчутні як позитивні, так і негативні тенденції. Зокрема, позитивною стороною динаміки є збільшення кількості сільськогосподарських підприємств та стабільність частки області у загальнодержавному виробництві сільськогосподарської продукції. Проте, негативними тенденціями є зниження виробництва продукції, зменшення рентабельності операційної діяльності та інші показники, що відображають вплив економічних та технологічних факторів на галузь. Зазначається, що належне використання добрив є важливим чинником підвищення урожайності земель. Виокремлено низку викликів, які обмежують продуктивність та стійкість розвитку сільського господарства у регіоні. Зокрема, кліматичні умови, такі як температура та опади, екологічні, економічні та соціальні проблеми, які потребують комплексного підходу для їх вирішення. Обгрунтовано перспективи розвитку сільського господарства, а саме: оптимізацію використання земельних ресурсів, впровадження сучасних технологій, підтримка сільського господарства та стимулювання екологічного виробництва сільськогосподарської продукції. Розглянуто приклади впровадження сучасних технологій та інновацій у сільське господарство області, зокрема вирощування продукції без застосування хімічних добрив та пестицидів, використання точного землеробства та біогазових проєктів. Висвітлено ініціативи та програми підтримки малих і середніх підприємств та екологічного сільського господарства. Розуміння цих аспектів дозволяє розробляти стратегії розвитку та приймати обґрунтовані рішення

▸ **Ключові слова:** сільськогосподаські культури; показники; розвиток; виробництво; екологічне виробництво; рослинництво; тваринництво