

УДК 338.439.5:631.95

V. Nahorny,
PhD in Economics, Associate Professor of the Department of Economics,
National University of Life and Environmental Sciences of UkraineORCID ID: <https://orcid.org/0000-0001-5551-4779>A. Salnikova,
PhD in Ecology, Associate Professor of the Department of General Ecology, Radiobiology
and Life Safety, National University of Life and Environmental Sciences of UkraineORCID ID: <https://orcid.org/0000-0001-6706-2140>T. Mirzoieva,
Doctor of Economic Sciences, Professor,
National University of Life and Environmental Sciences of UkraineORCID ID: <https://orcid.org/0000-0002-0034-6138>

DOI: 10.32702/2306-6792.2025.16.91

ECONOMIC FACTORS INFLUENCING THE DEVELOPMENT OF THE PLANT PROTECTION PRODUCTS MARKET

В. В. Нагорний,

к. е. н., доцент, доцент кафедри економіки, Національний університет біоресурсів і природокористування України

А. В. Сальнікова,
к. с.-г. н., доцент, доцент кафедри загальної екології, радіобіології та безпеки життєдіяльності,
Національний університет біоресурсів і природокористування УкраїниТ. В. Мірзоєва,

д. е. н., професор, Національний університет біоресурсів і природокористування України

ЕКОНОМІЧНІ ЧИННИКИ, ЩО ВПЛИВАЮТЬ НА РОЗВИТОК РИНКУ ЗАСОБІВ ЗАХИСТУ РОСЛИН

The purpose of this article is to conduct a comprehensive analysis of the main economic factors shaping the development of the plant protection products market, as well as to determine their impact on decision-making by agricultural market participants. As a result of the analysis, it was found that the development of the plant protection products (PPP) market is influenced by a wide range of economic factors, among which the following play a key role: the price situation in the agricultural products market, the purchasing power of agricultural producers, the level of prices for PPPs and logistics costs, investment activity in the agricultural sector, the competitive environment, government regulatory policy, macroeconomic stability and the national currency exchange rate, external economic conditions, as well as the transformation of consumer priorities. The study has proven that the price situation in the agricultural products market determines the level of production profitability and, consequently, affects the financial capacity of farmers to invest in high-quality plant protection products. It has also been demonstrated that the purchasing power of agricultural producers is a decisive factor in shaping the demand for plant protection products in the domestic market. It has been stated that the level of prices for plant protection products and logistics costs determines the final cost of production. It has been demonstrated that investment activity in agriculture promotes the technological renewal of the sector, while the competitive environment ensures price flexibility, improves product quality, and fosters the implementation of innovative solutions. It has been proven that government regulatory policy can both stimulate and restrain the development of the plant protection products market,

while macroeconomic stability and the national currency exchange rate influence pricing processes and the accessibility of products for consumers. It has been demonstrated that external economic conditions determine the stability of supply, the product range, and pricing policy in the plant protection products market, while shifts in consumer priorities create new market niches—primarily for biological products and environmentally safe plant protection solutions. Thus, the PPP market is a dynamic system, sensitive to changes in both the domestic and external environment, requiring flexible adaptation strategies from market participants and effective government policy.

Метою статті є комплексний аналіз економічних чинників, що формують розвиток ринку засобів захисту рослин, а також визначення їх впливу на прийняття рішень суб'єктами аграрного ринку. У результаті проведеного аналізу було встановлено, що на розвиток ринку засобів захисту рослин (ЗЗР) впливає ціла низка економічних чинників, серед яких ключове значення мають: цінова кон'юнктура на аграрну продукцію, купівельна спроможність сільськогосподарських виробників, рівень цін на ЗЗР та логістичні витрати, інвестиційна активність в агросекторі, конкурентне середовище, регуляторна політика держави, макроекономічна стабільність і курс національної валюти, зовнішньоекономічні умови, а також трансформація споживчих пріоритетів. У ході дослідження доведено, що цінова кон'юнктура на аграрну продукцію визначає рівень рентабельності виробництва та, відповідно, впливає на фінансову спроможність аграріїв інвестувати у якісні засоби захисту рослин. Доведено, що купівельна спроможність сільгоспвиробників виступає вирішальним фактором формування попиту на ЗЗР на внутрішньому ринку, а рівень цін на ЗЗР та логістичні витрати зумовлює кінцеву вартість продукції. Доведено, що інвестиційна активність у сільському господарстві сприяє технологічному оновленню галузі. Доведено, що конкурентне середовище забезпечує цінову гнучкість, підвищує якість продукції та сприяє впровадженню інноваційних рішень. Доведено, що регуляторна політика держави може як стимулювати, так і стримувати розвиток ринку ЗЗР. Звернено увагу, що макроекономічна стабільність та курс національної валюти впливають на процеси ціноутворення й доступність препаратів для споживача. Доведено, що зовнішньоекономічні обставини визначають сталість постачання, асортимент та цінову політику на ринку ЗЗР, а зміна споживчих пріоритетів формує нові ніші на ринку — насамперед для біологічних препаратів та екологічно безпечних засобів захисту рослин. Отже, ринок ЗЗР є динамічною системою, чутливою до змін у внутрішньому та зовнішньому середовищі, що потребує гнучких стратегій адаптації з боку учасників ринку та ефективної державної політики.

Key words: price situation; agricultural products; agricultural producers; plant protection products market; investment activity; agricultural sector; macroeconomic stability; external economic conditions; transformation of consumer priorities.

Ключові слова: цінова кон'юнктура; аграрна продукція; сільськогосподарські виробники; ринок засобів захисту рослин; інвестиційна активність; агросектор; макроекономічна стабільність; зовнішньоекономічні умови; трансформація споживчих пріоритетів.

PROBLEM STATEMENT

In modern agricultural production, plant protection products (or PPPs) play a key role in ensuring the stability and efficiency of farming.

According to a Markets and Markets study, the global PPP market was valued at over USD 76 billion in 2023, and it is projected to reach USD 101 billion by 2028, with an average annual growth rate of approximately 5.8%. The main drivers of this growth are the increasing demand for food due to population growth, the intensification of agricultural production, the expansion of monoculture areas, as well as the negative effects of climate change, which lead to a rise in the incidence of diseases and pests. In Ukraine, the consumption of plant protection products is also increasing.

According to the State Service of Ukraine for Food Safety and Consumer Protection, in 2023, the import of plant protection products amounted to approximately 75.5 thousand tons, with the value of

imported products exceeding USD 1.28 billion. Moreover, the share of imported PPPs in the structure of agricultural enterprises' expenses is steadily growing, indicating the importance of these products in modern agricultural production technologies.

It should be noted that this development is largely driven by the influence of a complex set of economic factors that not only affect the plant protection products market but actually shape it. These issues become particularly relevant in conditions of economic instability, declining purchasing power of agricultural producers, and limited access to financing.

ANALYSIS OF RESEARCH AND PUBLICATIONS

The peculiarities of the formation and development of the plant protection products market are highlighted in the scientific works of Neryanov I. V., Holiuk V. Ya. [1], Hruzinska I.,

Smagina A., Zhygadlo V., Stadnyk R., Perepelytsia O. [2], and others. In particular, these scholars examine various aspects of the PPP market, including its structure and dynamics, fundamental principles of its formation, regulatory environment, innovative development of plant protection products, and prospects for further market growth.

At the same time, the economic factors shaping the development of the plant protection products market have not been sufficiently explored, which, in our opinion, is due to the relative complexity of assessing their impact in a dynamic agricultural environment and the limited availability of empirical data on the financial performance of PPP producers and consumers.

This highlights the necessity for further research to identify the economic factors influencing the development of the plant protection products market.

FORMULATION OF THE ARTICLE'S OBJECTIVES

The purpose of this article is to conduct a comprehensive analysis of the main economic factors shaping the development of the plant protection products market, as well as to determine

their impact on the decision-making of agricultural market participants.

THE PAPER MAIN BODY

Within the framework of the outlined study, the authors examined the plant protection products market as a set of economic relations formed between producers, suppliers, distributors, and consumers of products intended for controlling pests, diseases, and weeds in agriculture.

In particular, the focus is on the production and circulation of the following types of plant protection products: herbicides (used to eliminate weeds), fungicides (for combating fungal diseases), insecticides (against harmful insects), seed treatments (used for treating seeds before sowing), growth regulators, biological products, and others [2]. In this context, the plant protection products market encompasses:

1. Supply of the aforementioned PPPs from manufacturers (including global companies such as Bayer, Syngenta, BASF, Corteva, etc., as well as local players [3]), importers, distributors, and retail sellers.

2. Demand for PPPs from agricultural enterprises, farming households, agricultural cooperatives, and agroholdings.

3. Pricing processes. It is important to note that the cost of plant protection products depends on the type of product, manufacturer, season, global raw material prices, logistics, exchange rate fluctuations, and other factors.

4. Regulation, including government licensing, certification, customs policy, and environmental restrictions.

The analysis of the above provisions makes it possible to identify a list of key economic factors influencing the development of the plant protection products market, including: price trends for agricultural products, purchasing power of agricultural producers, the price level of PPPs and logistics costs, investment activity in the agricultural sector, the competitive environment, government regulatory policy, macroeconomic stability and the exchange rate of the national currency, external economic conditions, and changes in consumer preferences.

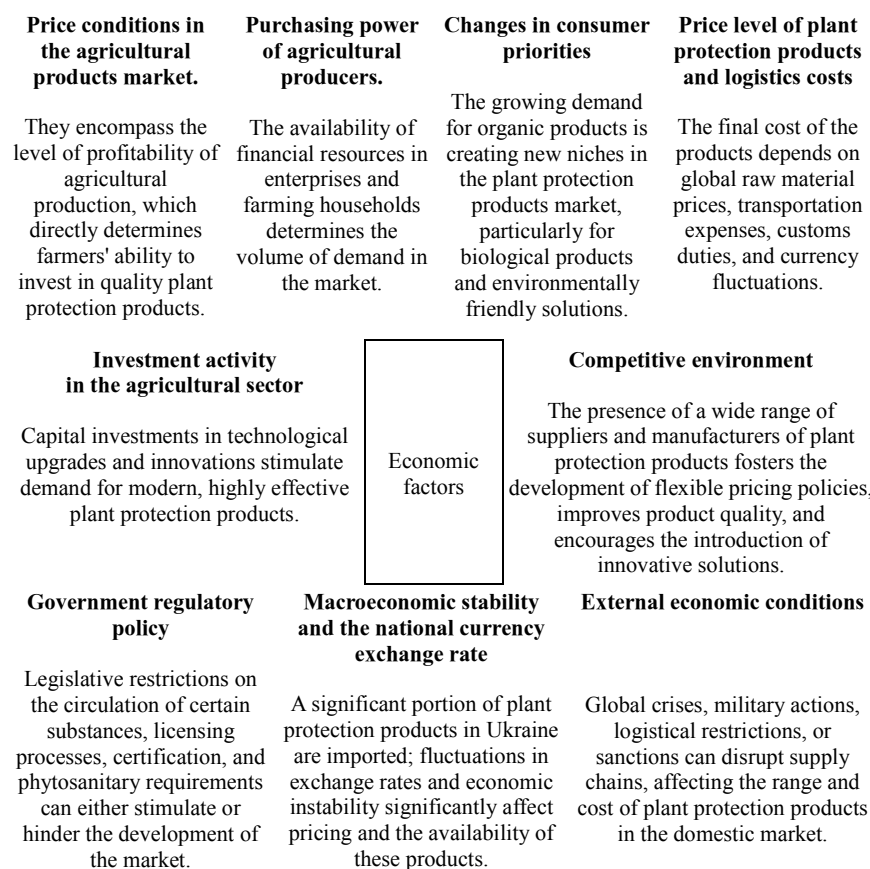


Fig. 1. Systematization of economic factors influencing the development of the plant protection products market

Source: compiled based on [1; 5–6].

Table 1. The impact of price conditions in the agricultural products market on farmers' behavior and the structure of demand in the plant protection products market

Indicator characterizing the situation	Situation: Low prices for agricultural products	Situation: High prices for agricultural products
Financial condition of agricultural producers	Decreased income, shortage of working capital	Increased profitability, availability of free resources
Spending strategy	Optimization: reduction of expenses on plant protection products	Active investment in technologies, including plant protection products
Types of products predominantly used	Generics, budget-friendly products, simplified formulations	Original, innovative, highly effective products
Volume of plant protection products purchases	Reduction in overall purchase volumes	Growing demand—both in volume and value terms
Application rates of products	Decrease in application rates, fewer treatments	Maintaining or increasing application rates, full adherence to technological schemes
Treated areas	Partial refusal to treat certain areas or crops	Expansion of treated areas with full technological support
Demand structure in the plant protection products market	Shift towards cheaper products, decreased demand for specialized products	Rising demand for comprehensive solutions, premium segment
Overall condition of the plant protection products market	Market stagnation or contraction	Active growth, emergence of new products, expansion of the product range

Source: compiled based on [1; 3; 5].

The economic dynamics of the plant protection products market are shaped by a multitude of interrelated economic factors (see Fig. 1), which model both the internal conditions of the agricultural sector's functioning and external macro-economic and global challenges.

The price situation in the agricultural products market is one of the economic factors that shapes the financial capacity of agricultural producers and compels them to invest in high-quality plant protection products.

The higher the purchase prices for the produced goods, the greater the income of farmers and the amount of funds they can allocate to improve production efficiency. Conversely, when prices for agricultural products are low, farmers' incomes decrease, forcing them to optimize expenses (which is reflected in reducing purchases of expensive or specialized products, lowering application rates, choosing cheaper or generic products, and sometimes even completely foregoing certain treatments), as is evident from the data in Table 1.

Thus, the profitability level of agricultural production, shaped by the current price conditions, directly influences the effective demand for plant protection products. This makes the market vulnerable to fluctuations in global agricultural prices, seasonal trends, and the pricing policies of major exporting/importing countries

of agricultural products. For example, following the sharp rise in grain prices in 2021, Ukraine experienced an increase in demand for original plant protection products and biological preparations. At the same time, in 2022—2023, due to falling global prices and logistical difficulties

Table 2. The impact of pricing on the development of the plant protection products market

Pricing components	Features by which the component affects the price level of PPPs and logistics costs:	Example of pricing impact
Global raw material prices	The cost of key chemical components and active ingredients forms the basic production cost.	An increase in the prices of oil, mineral fertilizers, or chemicals directly raises the cost of herbicides, fungicides, and insecticides..
Transportation and logistics costs	The cost of delivering PPPs from the manufacturer to the end consumer includes maritime, rail, road, and domestic logistics expenses.	Rising fuel prices, port disruptions, or logistical delays increase the final cost of products.
Customs duties and taxes	Taxation of imported PPPs (customs duties, VAT, excise taxes) directly affects the purchase price for farmers and agricultural enterprises.	Changes in customs policy can sharply raise or lower prices.
Currency fluctuations	Since most imported PPPs are priced in US dollars or euros, fluctuations in the hryvnia exchange rate impact the cost of products on the domestic market.	Hryvnia devaluation makes imports more expensive, driving up final prices.

Source: compiled based on [5; 7].

caused by the war, some farmers reduced their expenditures on plant protection products by opting for cheaper products or decreasing the number of treatments.

Alongside price conditions, the purchasing power of agricultural producers is also crucial, as it determines the volume of demand in the plant protection products market. It reflects the availability of financial resources within enterprises, farming households, and agrohholdings, which can be allocated to the purchase of products for combating pests, diseases, and weeds.

Pricing of plant protection products is one of the key economic factors determining the accessibility of products for farmers and, consequently, the development of the market. The formation of the final cost of PPPs is influenced by several interrelated components, including global raw material prices, transportation and logistics costs, customs duties and taxes, and currency fluctuations (see Table 2).

Thus, the final price of plant protection products is shaped by global economic processes and local market conditions. It is a critical factor for the profitability of agricultural production, as effective and stable production cannot be ensured without accessible and competitively priced plant protection products.

Investment activity in agriculture is one of the economic factors that determines the development of the plant protection products market. This is due to the fact that capital investments in the agricultural sector are directed not only toward expanding cultivated areas, equipment, and infrastructure but also toward the implementation of modern technologies that enhance production efficiency and reduce crop losses.

The main aspects of how investment activity influences the PPP market include technological process modernization, the introduction of innovative products, increased volumes of plant protection products purchases, stimulation of research and development, and a positive multiplier effect (see Table 3).

Thus, investment activity in agriculture acts not only as a catalyst for the technological development of the agricultural sector but also directly stimulates growth and structural changes in the plant protection products market [3—4]. Targeted capital investments increase demand for innovative, environmentally friendly, and more

Table 3. Key aspects of the impact of investment activity on the development of the plant protection products market

Components of investment activity	Features through which the component influences the development of the plant protection products market	Example of the impact of investment activity
Modernization of the technological process	Investments enable agricultural enterprises to transition to precision farming, automated pest control and treatment systems, which require the use of high-quality, specialized PPPs.	Use of GPS systems and drones for targeted application of herbicides and fungicides.
Introduction of innovative products	Enterprises gain access to the latest biological products and formulations with low environmental impact, enhancing crop protection efficiency.	Use of biological products for pest control.
Increase in volumes of PPP purchases	With available financial resources, invested enterprises can regularly supply their crops with the necessary treatments.	Large agrohholdings purchase the required volumes of fungicides and herbicides for the entire season.
Stimulation of research and development	Investments create the conditions for developing new, effective products adapted to local climatic and agronomic conditions.	Collaboration between agricultural enterprises and research institutions to test new PPP formulations.
Positive multiplier effect	Increased productivity and profitability of production raise farmers' incomes, stimulating further demand for PPPs.	Increased farmer incomes allow for expansion of treated areas and greater product purchases

Note / *This refers to products that reduce the toxic load on soil and water.
Source: compiled based on [3—4; 6].

effective products, while also creating favorable conditions for the advancement of scientific research in the field of crop protection.

We have also identified the competitive environment as one of the factors that determines the nature of functioning and the dynamics of development of the plant protection products market.

A high level of competition among market participants—both international and domestic companies—creates conditions for improving the efficiency of market mechanisms, contributes to price optimization, enhances product quality, and expands the range of products available.

This is because the main aspects of the competitive environment's influence are focused on forming a flexible pricing policy, improving product quality, fostering innovation and technological development, attracting new players, and promoting localization of production.

Regulatory policy of the state is one of the key tools influencing the formation, structure, and dynamics of the development of the plant protection products market. It includes a system of legislative, regulatory, and administrative measures that govern the production, import, circulation, application, and disposal of PPP [6].

Table 4. The impact of state regulatory policy on the development of the plant protection products market

Indicator characterizing the impact	Stimulating impact	Restraining impact
Registration and certification procedures for PPPs	The introduction of a transparent and predictable registration system reduces the administrative burden on businesses, accelerates the market entry of new products, and increases the level of competition.	Bureaucratic procedures, lengthy document review periods, excessive burden on applicants, limited transparency in decision-making processes.
Import and circulation of innovative products	Reduction of customs barriers, harmonization of technical regulations with EU standards, and simplified access for modern biopreparations and innovative formulations.	Restrictions on the import of certain active substances, complex approval procedures for new products, lack of incentives for introducing innovative solutions.
Phytosanitary requirements for products	Clear and effective phytosanitary requirements for products protect the domestic market from counterfeit, smuggled, and uncertified plant protection products, which can have negative consequences for ecosystems and human health.	Excessive rigidity or opacity of requirements can complicate market access for products, delay supplies, and create risks of shortages of plant protection products during critical periods.

Source: compiled based on [2; 6].

These mechanisms can either stimulate or restrain the development of the industry, as evidenced by the data in Table 4.

Macroeconomic stability is one of the factors that determine the overall investment climate in the country, the financial confidence of economic entities, as well as the predictability of develop-

For example, Ukraine has a system of state registration for PPP, without which the use of these products is prohibited. Simplification or digitization of this process can reduce costs for companies in the PPP market.

State regulatory policy defines the "rules of the game" in the plant protection products market. Its effectiveness lies in achieving a balance between ensuring access to high-quality and effective plant protection products and the need to guarantee environmental safety, public health, and compliance with international standards. Both excessive regulation and insufficient control can negatively impact the market dynamics.

Table 5. Impact of external economic changes on the development of the plant protection products market

Components of external economic changes	Features Through which the component affects the development of the plant protection products market	Example of the impact of foreign economic changes
Global economic crises	Global financial shocks disrupt production and logistics chains, leading to shortages of certain active substances, increased raw material costs, and delays in supply.	Under such conditions, manufacturers reduce production or change pricing policies, leading to higher prices for plant protection products for the end consumer.
Armed conflicts and military actions	Due to destroyed infrastructure, blocked logistics routes, complicated customs clearance, and rising insurance and transportation costs, the plant protection products market experiences supply disruptions, higher prices, and limited options for farmers.	The ongoing military conflict in Ukraine since 2022 has resulted in reduced imports of plant protection products, disrupted logistics, and increased prices of the products.
Sanctions and international trade restrictions	Trade sanctions restrict access to certain supplier countries, technologies, or active ingredients. This may force the market to seek alternative sources, affecting the price, quality, and availability of products.	Sanctions against Russian and Chinese chemical companies cause a reduction in the supply of plant protection products, a shift toward European or Indian manufacturers, and increased logistics costs.
Disruptions of global logistics chains	Restrictions on container transportation, port congestion, rising fuel prices, or changes in trade routes cause supply delays and increase the production costs of plant protection products.	The closure of Black Sea ports and the overload of land border crossings in Ukraine have led to delivery delays of plant protection products and shortages of certain products during peak seasons.

Source: compiled based on [1—2; 5—7].

ment in specific markets, including the market for plant protection products [3; 5]. Considering that over 90% of PPPs on the Ukrainian market are of imported origin, this segment is highly sensitive to fluctuations in the exchange rate, inflationary processes, and external economic risks.

Global or regional external economic changes (including global crises, military conflicts, logistics restrictions, or sanctions) also directly impact supply volumes, pricing policies, product assortment, and the overall stability of the plant protection products market [1–2].

Foreign economic factors are inherently unpredictable but at the same time critically important for the functioning of the plant protection products market. Their impact is multi-layered: ranging from the macroeconomic environment to specific price situations in the domestic market. In the current conditions, the agricultural sector requires adaptive logistics, diversification of import sources, and the development of domestic production of plant protection products to reduce vulnerability to external shocks.

In modern agricultural production, the environmental component and food safety are becoming increasingly important factors shaping the development of the plant protection products market. As consumers increasingly prefer organic products, this affects the demand for agricultural goods and, accordingly, the use of plant protection products [1]. Specifically, this trend has several economic implications for the PPP market: the development of new market segments, redistribution of investments, price differentiation, impact on import-export flows, and the formation of sustainable development in the agricultural sector (Table 6).

The shift in consumer priorities stimulates the emergence of new market segments, promotes the redistribution of investments into research and development of biopreparations, creates price differentiation of products, and influences import-export flows.

CONCLUSIONS

As a result of the conducted analysis, it was established that the development of the plant protection products market is influenced by a range

Table 6. Nature of the impact of changing consumer priorities on the development of the plant protection products market

Components of changing consumer priorities	Features explaining how each component influences the development of the plant protection products market	Example of the impact of changing consumer priorities
Development of new market segments	The growing demand for organic products stimulates the production and sales of biopesticides, natural fungicides and insecticides, as well as plant growth regulators of natural origin.	Sales of biological fungicides in the organic farming segment in Ukraine have increased by 15–20% over the last 3 years.
Redistribution of investments	Manufacturers of plant protection products increasingly invest in the development of environmentally safe formulations, laboratory research, and product certification for organic farming. This leads to a shift in the investment structure within the market and the emergence of new technological solutions.	Manufacturers invest in R&D of biopreparations and obtain organic product certification for export to the EU.
Price differentiation	Organic and biological plant protection products are generally more expensive than traditional chemical pesticides. However, growing demand allows companies to offset development and marketing costs, while also creating added value for consumers.	The cost of biopreparations for seed treatment is 25–30% higher than traditional chemical counterparts.
Impact on import and export flows	The increasing demand for biopesticides stimulates the import of innovative products and opens up opportunities for the export of certified organic produce.	Import of biopreparations from Germany and export of Ukrainian organic grain to the EU.
Formation of sustainable development in the agricultural sector	The use of environmentally safe plant protection products reduces the negative impact on soils, water, and the environment, while enhancing market stability.	Reduction in synthetic pesticide use by 10% in farms applying biopreparations while maintaining crop yields.

Source: compiled based on [1; 5; 7].

of economic factors, among which the key ones are: the price conjuncture of agricultural products, the purchasing power of agricultural producers, the price levels of PPP and logistics costs, investment activity in the agricultural sector, the competitive environment, state regulatory policy, macroeconomic stability and the national currency exchange rate, foreign economic conditions, as well as the transformation of consumer priorities.

The study substantiated the following points:

— The price conjuncture of agricultural products determines the profitability level of production and, accordingly, influences the financial capacity of farmers to invest in quality plant protection products.

— The purchasing power of agricultural producers is a decisive factor in shaping the demand for plant protection products in the domestic market.

— The price level of plant protection products and logistics costs determine the final product price, taking into account global fluctuations in raw material prices, transportation costs, customs duties, and currency risks.

— Investment activity in agriculture stimulates demand for innovative and highly effective products, contributing to the technological renewal of the sector.

— The competitive environment ensures price flexibility, improves product quality, and promotes the implementation of innovative solutions.

— State regulatory policy can both stimulate and restrain the development of the plant protection products market.

— Macroeconomic stability and the national currency exchange rate directly affect pricing processes and the availability of products for consumers.

— External economic conditions determine the stability of supply, product assortment, and pricing policy in the plant protection products market.

— Changes in consumer priorities create new market niches—primarily for biological products and environmentally friendly plant protection solutions.

Thus, the plant protection products market is a dynamic system sensitive to changes in both domestic and external environments, requiring flexible adaptation strategies from market participants and effective government policies.

The prospects for further research lie in a deeper analysis of the impact of innovative technologies, the biologization of production, and changes in the regulatory environment on the transformation of the structure and dynamics of the PPP market.

Література:

1. Нерянова І. В., Голук В. Я. Проблеми та стан ринку засобів захисту рослин від початку повномасштабного вторгнення. Збірник тез Міжнародної науково-практичної конференції "Бізнес, Інновації, менеджмент: проблеми та перспективи". Київ, 25.04.2024. с. 88—89.

2. Грузинська І., Смагіна А., Жигадо В., Стадник Р., Перепелиця О. Зелена книга. Регулювання внутрішнього виробництва та обігу засобів захисту рослин. 2018. 104 с.

3. Vasylenko L. World tendencies of development of the plants protecting tools market. *Ekonomika APK*, 2018, № 25 (2), 100—106.

4. Круть М. В. Екологічна спрямованість інновацій Інституту захисту рослин НААН. *Захист і карантин рослин*. 2014. Вип. 60. С. 184—190.

5. Wen Jun Zhang, Fu Bin Jiang, Jian Feng Ou. Global pesticide consumption and pollution: with China as a focus. *Proceedings of the International Academy of Ecology and Environmental Sciences*, 2011. № 1 (2). p. 125—144.

6. Вдовенко Н., Томілін О., Коваленко Л., Гечбаія Б., Кончаковський Є. Світові тенденції та перспективи розвитку ринку засобів захисту рослин. *Agricultural and Resource Economics: International Scientific E-Journal*. 2022. № 8 (2). С. 179—205.

7. Кучер А. В., Кучер Л. Ю., Пащенко Ю. В. Циркулярна економіка в системі сталого розвитку аграрного сектора в умовах євроінтеграції. *Економіка та суспільство*. 2021. № 32. <https://doi.org/10.32782/2524-0072/2021-32-24>

References:

1. Neryanova, I.V. and Golyuk, V.Ya. (2024), "Problems and state of the plant protection products market since the beginning of the full-scale invasion", *Zbirnyk tez V Mizhnarodnoyi naukovopraktychnoyi konferentsiyi "Biznes, innovatsiyi, menedzhment: problemy ta perspektyvy"* [Collection of Abstracts of the V International Scientific and Practical Conference "Business, Innovation, Management: Problems and Prospects"], Kyiv, Ukraine, 25.04.2024, pp. 88—89.

2. Hruzins'ka, I., Smahina, A., Zhyhadlo, V., Stadnik, R. and Perepelytsya, O. (2018), *Zelena knyha. Rehulyuvannya vnutrishn'oho vyrobnytstva ta obihu zasobiv zakhystu roslyn* [Green Book. Regulation of domestic production and circulation of plant protection products], Kyiv, Ukraine

3. Vasylenko, L. (2018), "World tendencies of development of the plants protecting tools market", *Ekonomika APK*, vol. 25 (2), pp. 100—106.

4. Krut, M.V. (2014), "Ecological orientation of innovations of the Institute of Plant Protection of the NAAS", *Plant Protection and Quarantine*, vol. 60, pp. 184—190.

5. Zhang, W.J., Jian, F.B. and Ou, J.F. (2011), "Global pesticide consumption and pollution: with China as a focus", *Proceedings of the International Academy of Ecology and Environmental Sciences*, vol. 1 (2), pp. 125—144.

6. Vdovenko, N., Tomilin, O., Kovalenko, L., Gechbaiya, B. and Konchakovsky, E. (2022), "World trends and prospects for the development of the plant protection products market", *Agricultural and Resource Economics: International Scientific E-Journal*, vol. 8 (2), pp. 179—205.

7. Kucher, A.V., Kucher, L.Yu. and Pashchenko, Yu.V. (2021), "Circular economy in the system of sustainable development of the agricultural sector in the context of European integration", *Ekonomika ta suspil'stvo*, vol. 32. <https://doi.org/10.32782/2524-0072/2021-32-24>

Стаття надійшла до редакції 08.08.2025 р.