

# NEGATIVE EFFECT OF PESTICIDES ON THE BIOSPHERE AS A THREAT TO ENVIRONMENTAL SAFETY

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**Annotation.** The article is devoted to the biological impact of pesticides on the natural environment. Excessive use of pesticides, their improper transportation and storage complicates the ecological situation in the world, reduces the reproductive capacity of the biosphere. An analysis of the causes of their negative consequences on nature and the environment is offered. Forms of illegal sale and production of pesticides are highlighted. The main negative environmental consequences of the use of pesticides are presented. The legislative level of regulation of pesticide use processes and responsibility for violations of legislation on pesticides and agrochemicals is characterized. It has been established that the illegal use of pesticides has a multifaceted negative impact on the biosphere, the scale of which is compared to global environmental factors. The main danger of pesticides is their entry into the biological cycle, during which they enter the bodies of people and animals. The issue of pesticide storage in warehouses throughout the territory of Ukraine, where active hostilities are taking place, is outlined, which poses even more threats that may arise as a result of their outbreak and getting into the environment. The need for urgent decision-making and coordination of many issues related to the solution of this problem before the potential occurrence of negative consequences is actualized. As a result, not influencing this situation can lead to irreversible consequences in the form of a biological disaster. New approaches to solving the problem of illegal use of pesticides and ways to neutralize their negative impact on the biosphere in the conditions of martial law in Ukraine are proposed.

**Key words:** pesticides, biosphere, negative impact, threats, environmental safety.

## 1. Introduction.

The issue of handling pesticides is an area of increased ecological and socio-economic danger. As a result of the military invasion, from February 24, 2022, in accordance with the Law of Ukraine "On the Legal Regime of Martial Law", martial law was introduced in Ukraine [1]. The Order of the Ministry for the Reintegration of the Temporarily Occupied Territories of Ukraine dated March 19, 2024, No. 77, approved the Amendments to the List of Territories Where Hostilities Are Conducted or Temporarily Occupied by the Russian Federation [2]. Thus, the updated list includes settlements in Dnipropetrovsk, Donetsk, Mykolaiv, Sumy, Kharkiv, Kherson, Chernihiv, Zaporizhzhia and Luhansk regions. Active hostilities caused enormous damage to the environment. The estimated amount of this damage is more than 962 billion hryvnias [3, p. 49]. Unfortunately, we have to state that the ecological sphere of Ukraine is suffering irreparable damage, the consequences of which will be felt for quite a long time.

## 2. Analysis of scientific publications.

A number of works by Ukrainian scientists, primarily such as H. Bukanov, M. Vasylenko, O. Vishnevskaya, S. Zhukauskas, L. Kadenyuk, O. Kardash, H. Kleshnya, are devoted to the problems of the formation and implementation of the state environmental policy and environmental security of the state. D. Kollarov, S. Lutkovska, O. Mashkov, V. Melnyk, V. Mikheev, M. Nalisko, N. Okhota, O. Palienko,

T. Pishenina, I. Prydatko, O. Romanashenko, Ya. Samosienko, O. Tymoshenko, N. Tyutyunnyk, V. Cherneta, etc., however, the issue of the development of unified methodological principles of state management of the preservation of the natural environment of people's life under the legal conditions of martial law remains open for discussion.

### 3. The aim of the work.

To carry out an analysis of state policy and the current state of legal regulation of activities related to pesticides, with the aim of making proposals for its improvement in modern conditions.

### 4. Review and discussion.

In modern conditions, the problem of the effects of pesticides on natural ecosystems and human health has become particularly relevant. Pesticides pollute soil, air, and water resources, including underground aquifers. In addition to their direct purpose, pesticides have a multifaceted negative impact on the biosphere, the scale of which is compared to global environmental factors. The main danger of pesticides lies in their entry into the biological cycle, during which they enter human and animal bodies. The toxicity of pesticides is determined for all living organisms, which is explained by the similarity of their main biochemical processes and the molecular biological organization of living organisms. The issue of handling pesticides is an area of increased ecological and socio-economic danger. Their legal regulation is carried out in accordance with the laws of Ukraine "On pesticides and agrochemicals" [4], "On environmental protection" [5], "On the public health system" [6], "On environmental impact assessment" [7], "On plant protection" [8], as well as:

- The procedure for granting a permit for the import and use of unregistered pesticides and agrochemicals of foreign production, approved by the Resolution of the Cabinet of Ministers of Ukraine dated March 4, 1996 No.288 [9];
- Procedure for conducting state tests, state registration and re-registration, maintaining lists of pesticides and agrochemicals approved for use in Ukraine, approved by Resolution of the Cabinet of Ministers of Ukraine dated 03.04.1996 No.295 [10];
- The procedure for removal, disposal, destruction and neutralization of unsuitable or prohibited pesticides and agrochemicals and their containers, approved by the Resolution of the Cabinet of Ministers of Ukraine dated 03.27.1996 No. 354 [11];
- Procedure for state accounting of the availability and use of pesticides and agrochemicals, approved by the Resolution of the Cabinet of Ministers of Ukraine dated November 2, 1995 No. 881 [12];
- The procedure for obtaining a certificate on the right to work with pesticides, approved by the resolution of the Cabinet of Ministers of Ukraine dated May 9, 2023 No. 458 [14];

According to Art. 1 of the Law of Ukraine "On Pesticides and Agrochemicals", pesticides are toxic substances, their compounds or mixtures of substances intended for the destruction, regulation and cessation of the development of harmful organisms, as a result of which plants, animals, people are affected and damage is caused to material assets, as well as rodents, weeds, woody and shrubby vegetation, fouling species of fish. The term "pesticides" also includes plant protection products [4].

The provisions of Article 3 of the Law of Ukraine "On Pesticides and Agrochemicals" as one of the main principles of state policy in the field of activities related to pesticides and agrochemicals define the priority of preserving human health and protecting the natural environment in relation to the economic effect of their use. as well as their safety for human health and the natural environment during their production, transportation, storage, testing and application, subject to compliance with the requirements established by sanitary standards and other legal acts [4].

According to Article 16 of the Constitution of Ukraine, ensuring environmental safety and maintaining ecological balance on the territory of Ukraine is the duty of the state [14]. At the same time, in modern

conditions throughout the territory of Ukraine, where active hostilities are taking place, pesticides are stored in warehouses, which poses potential threats to the environment that may arise as a result of their outbreak and, as a result, entering the atmosphere.

Among the main negative environmental consequences of the use of pesticides, the following should be highlighted:

- their ability to accumulate in the soil and be transported by living organisms along the trophic chain;
- reduce biological productivity and normal functioning of soil microbiocenoses;
- reduce the intensity of soil self-cleaning processes;
- ability to accumulate in rivers, seas and groundwater;
- inhibit biochemical processes and prevent the natural restoration of fertility;
- causes loss of nutritional value and taste qualities of agricultural products.

Pesticides can also accumulate in agricultural products, with which they enter the body of people and animals. Similarly, water and air contaminated with pesticides have a detrimental effect on the human body. Thus, the entry of pesticides into the human body causes difficulty breathing, damage to the central nervous system, severe headache, stomach upset, fever and even the onset of coma. The constant influx of pesticides into the human body is accompanied by a sharp decrease in body weight, hearing, the development of cataracts, and allergic reactions. All pesticides, without exception, when carefully studied, showed either mutagenic or other negative effects on living nature and humans.

Therefore, in order to protect the environment from the negative impact of pesticides, it is necessary to follow all regulations regarding the use of pesticides: application rates, terms, methods of application. A deeper study of the biological processes associated with the cultivation of agricultural crops at the modern level of agriculture, the study of the population dynamics of harmful and beneficial organisms, the improvement of combat tactics due to the fuller use of agrotechnical methods, resistant varieties, and biological agents will make it possible to reduce the use of pesticides and reduce the negative impact on the environment.

Another problem in Ukraine is the trade in illegal pesticides, which is gaining dangerous proportions. According to various estimates, 20-25% of the national pesticide market is illegal. Every year, a significant share of active substances is imported, but no one controls them. Therefore, to counter the trade in illegal pesticides, it is necessary to use the principle of anticipation and have the resources to implement a set of measures aimed at identifying illegal production and trade routes, confiscation of illegal goods and elimination of seized stocks.

Violation of legislation on pesticides and agrochemicals according to Art. 20 of the Law of Ukraine "On Pesticides and Agrochemicals" entails civil, disciplinary, administrative or criminal liability in accordance with current legislation. In particular, persons guilty of:

- hiding or distorting information that could cause or has caused a threat to human life and health, as well as property and the surrounding natural environment;
- non-compliance with requirements, sanitary norms and rules and other legal acts during the production, transportation, storage of pesticides, agrochemicals and technical means of their application (except for technical means of applying pesticides and agrochemicals, which are covered by the requirements and procedures of the technical regulation on machine safety);
- contaminated with pesticides and agrochemicals above the permissible levels of agricultural raw materials, feed, food products, soil, water, air;
- violation of regulations and sanitary norms and rules of transportation, storage, trade and use of pesticides and agrochemicals;

- use of pesticides, agrochemicals, technical means that have not passed state tests, registration, re-registration;
- violation of the rules of disposal, destruction of agricultural raw materials and food products that do not meet the established requirements regarding the content of pesticides and agrochemicals;
- non-fulfillment of legal requirements of officials who carry out state supervision and control;
- the use of known falsified pesticides and agrochemicals [4].

In the current legal conditions of martial law in Ukraine, it is important to recall the materials of the preparatory documents of the Geneva Conventions for the Protection of Victims of International Armed Conflicts of August 12, 1949 and the Additional Protocol (I), which are used for the purpose of their interpretation, it follows that extensive (large-scale) damage in the sense of the Convention is damage that "... covers an area of several hundred square kilometers..." [15]. As for such a sign of damage to the environment as its longevity, in science it is understood as damage that lasts one season or a period of several months. The seriousness of the damage implies the presence of a threat to human life, natural and ecological resources, and the preservation of biodiversity.

In this regard, it should be emphasized that the specified consequences can be caused as a result of the following actions:

- a) direct damage, destruction of objects of flora and fauna, atmospheric air (in particular, destruction by fire, pollution by combustion products), water resources as a result of the use of weapons (in particular, artillery, missile attacks, etc.);
- b) theft of natural resources in the occupied territories [16, p. 27-28];
- c) purposeful change of the natural environment as a method of waging war [17].

Investigating war crimes against the environment, T. S. Sadova defines this concept as an act prescribed by international humanitarian law that encroaches on the environment and its components, the rational use and protection of which ensure human life, and consists in the direct illegal execution of an attack, when it is known that such the attack causes extensive, long-term and serious damage, which is clearly disproportionate compared to the specific and directly expected general military advantage [18, p. 256].

Proving offenses related to the use of pesticides and agrochemicals must be based on the establishment of a cause-and-effect relationship between the act of using such substances and the negative consequences they caused. Therefore, in such cases, appropriate laboratory studies and examinations cannot be dispensed with, which will be key in determining which substance and when exactly it was used and whether its use is the cause of the specified consequences, which, for example, consist in the death of objects of the animal world. Next, the person(s) guilty of committing the specified acts and the degree of guilt should be established.

## **5. Conclusions.**

Taking into account the above, it can be concluded that the illegal use of pesticides has a multifaceted negative impact on the ecological sphere of Ukraine, the scale of which is compared with global environmental factors. In modern conditions, when the storage of pesticides in warehouses throughout the territory of Ukraine, where active hostilities are taking place, carries even more threats that may arise as a result of their outbreak and, as a result, getting into the environment, there is an urgent need for urgent decision-making and coordination of many issues related to the solution of this problem to the potential possibility of negative consequences. As a result, not influencing this situation can lead to irreversible consequences in the form of a biological disaster. A tragic example of such consequences with the failure of pesticides can be found at a plant in Bhopal (India) in 1984, when 200,000 people died and 500,000 suffered serious illnesses from the release of deadly gas into the atmosphere. That is why the system of state control over the use of pesticides



should be changed to an effective one that will prevent harm to human health and the environment. In addition, there are alternatives to the use of pesticides in the world, which are no less effective and more environmentally friendly. Ukraine needs to borrow foreign experience in banning and reducing the use of pesticides.

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