LEGAL RESTRAINTS OF PESTICIDE EFFECT ON HUMAN ORGANISM AND ENVIRONMENT UNDER INTERNATIONAL LEGISLATION

OGRANICZENIA PRAWNE DOTYCZĄCE WPŁYWU PESTYCYDÓW NA ORGANIZM CZŁOWIEKA ORAZ ŚRODOWISKO NATURALNE W KONTEKŚCIE PRAWA MIĘDZYNARODOWEGO

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ABSTRACT

Introduction: Human health depends on many factors: a level of medicine, quality of medical preparations, state of the environment, food safety, lifestyle and others. Phytosanitary products including pesticides used by farmers to kill, control reproduction and prevent animal, microbial or plant pests in the cultivation of agricultural products, which are the basis of human food, are one of the factors that may have an unfavourable effect on human health.

Aim: To analyze provisions of international legislation for presence of effective means to prevent a negative pesticide effect on human health and the environment.

Materials and methods: International acts, data of international organizations and conclusions of scientists have been examined and used in the study. The article also summarizes information from scientific journals and monographs from a medical and legal point of view with scientific methods. As a part of a systematic approach, issues of the pesticide effect in the course of their use on human health and the environment are analyzed.

Results: Based on the undertaken study, it has been found that developed countries take much better care of prevention and reduction of the negative pesticide effect on human health and the environment in the course of their use than developing countries.

Conclusions: The pesticide effect has a dual nature. On the one hand, it is positive to ensure efficient development of agriculture, but on the other hand, it is negative that is expressed in potential possibilities of harm to humans and the environment.

KEY WORDS: human health, pesticides, food, agriculture, environment.

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INTRODUCTION

In most cases, human health depends on an individual. The state policy in the field of public health and quality of organization of medical services activities is not less important for human health. Nutrition is one of the most important factors affecting human health. Safety and quality of food depends on the created conditions for production of high-quality and safe food. For each individual, properly organized agricultural production activities provide healthy and quality food, value of which can be depicted in the famous words of H. Heine "Man is what he eats".

Agriculture is constantly developing: a diversity of species of farm animals and plants is increasing, modern tools are appearing, selection achievements are being multiplied, new types of fertilizers and means of chemical protection from pests are appearing and being used, among which pesticides are particularly popular with farmers. Their main function is to kill, control reproduction and prevent appearance of animal, microbial or plant pests. But along with the positive effects, pesticides have a negative devastating effect on human health and the environment. Use of pesticides leads to their getting into the atmosphere, water, soil, food contamination and causing enormous harm to human health and wildlife.

THE AIM

To analyze provisions of international legislation for presence of effective means to prevent a negative pesticide effect on human health and the environment.

MATERIALS AND METHODS

There are more than 10,000 varieties of pesticides in the world. Depending on a production purpose, there are a few groups of such preparations: insecticides (killing harmful insects), bactericides and fungicides (affecting bacterial and fungal pathogens of plants), acaricides (destroying mites), zoocides (killing rodents), nematocides (killing mollusca and slugs) and herbicides (killing weeds as well as used for pickling seeds). Pesti-

cides include substances that are different in chemical composition of their ingredients: organophosphorus compounds, organochlorine compounds, organomercuric compounds, carbamates, nitrophenol compounds, preparations containing copper, biological preparations. Pesticides belong to a group of persistent organic pollutants [1, p. 98]. In other words, classification of pesticides is quite extensive. Each of its components is remarkable for an appropriate nature of its origin, purpose of application and sphere of influence having both positive and negative character.

RESULTS AND DISCUSSION

According to the Stockholm Convention on Persistent Organic Pollutants of 22 May 2001 [2], a group of persistent organic pollutants include aldrin, chlordane, DDT, dieldrin, endrin, heptachlor, hexachlorobenzene, mirex, toxaphene, dicophol, endosulfan, lindane, methoxychlor, pentachlorophenol. The purpose of the above mentioned Convention is to eliminate or restrict the production and use of persistent organic pollutants which are pesticides. The substances named in the Convention are listed into three categories: use of which shall be eliminated (even if they have positive effect on destruction of objects that are not desirable for humans), use of which shall be restricted and substances that are formed and released unintentionally from anthropogenic sources.

All the pesticides are substances that are alien to the wildlife and inaccessible for metabolic dissolution, almost all of them are capable of bioaccumulation, i.e. found in living organisms in higher concentrations than in the environment. The pesticide toxicity is manifested in both carcinogenic (development of cancer) or mutagenic (changes in genetic material) effects, effects on respiratory, endocrine, immune, nervous systems. A pesticide toxicity level is determined by an extent of ease of their penetration through the skin, ability to accumulate in the body, degree and rate of neutralization and elimination from the body [3].

Pesticide poisoning of people is fairly common. But it is impossible to measure an exact amount of harm caused to human health because poisoning can be acute and chronic [4], as well as it is very difficult to trace a relationship of a cause and effect between use of pesticides and occurrence of a certain type of disease.

Usually the cause of chronic poisoning is a long-term effect of small amounts of chemicals on the human body. A multiplicity of chronic pesticide poisoning has not been confirmed by an official quantitative estimation yet. An outreach team has created a database that provides vital information about dangers of these substances. Thus, scientists created a list of diseases whose contraction is most strongly associated with pesticide effect. We mean Alzheimer's disease, dementia, cancer, birth defects, endocrine disruptions, reproductive problems, asthma, allergies, diabetes, Parkinson's disease, development disability of children, etc. [5]. As you can see, diseases, which a human could potentially be taken ill with, concern their various systems and have a very dangerous nature for both physical and psychological conditions.

The negative pesticide effect is also manifested in a large number of acute poisoning cases which cause various diseases and deaths worldwide, especially in developing countries, but their number is regularly understated in the official statistics of different countries.

Acute pesticide poisoning can take a mild, moderate or severe course. A mild course of poisoning is characterized with weakness, dizziness, tolerable headache. If a toxic material is inhaled, there is irritation of mucous membranes. Toxic material ingestion causes diarrhea, pain in a pit of the stomach, unpleasant taste in the mouth. Symptoms are heavier in case of a moderate or severe course, moreover, they include vomiting, convulsions, unconsciousness, difficulty in breathing, disturbed cardiac activity. Fever is a general symptom of acute poisoning [6].

A person can be exposed to pesticides in different circumstances, in different doses and in different times. Poisoning is experienced by humans who are both professionally related to production and use of pesticides and unrelated to it. According to assessments of the American researchers, up to 40% of people professionally related to the production and use of pesticides have symptoms of poisoning. But the group of risk also includes people living on the outskirts of places where pesticides are used, getting pesticides with food products, drinking water from wells situated not far from burials of unused and prohibited pesticides and others. [4]. Consequently, the harm for human health is caused not only when there is a direct contact with them but in case of an indirect contact as well that is expressed through improper state of the environment in which pesticides fall, thereby affecting humans.

Due to a wide range of pesticides and their toxicities, clinical presentations of poisoning can vary significantly. Additionally, it can be difficult to determine whether nonspecific symptoms are actually due to the pesticide effect or other common environmental factors such as heat. A pesticide contact can occur via ingestion, inhalation, dermal absorption or ocular contact [7].

According to a survey of the European Federation of Food, Agriculture and Tourism Trade Unions (EFFAT), such effects on workers and operators as headaches, vomiting, abdominal pain, diarrhea caused by the spread during application (39% of the investigated incidents), preparation or mixing (28% of the investigated incidents), working with containers (6% of the investigated incidents) are most common [8]. According to the data of the WHO of 2004, about 3 million of pesticide poisoning cases and over 250,000 deaths per annum were recorded worldwide [9]. According to the data of the WHO of 2015, 2 million pesticide poisoning cases per annum are recorded in the world mainly in the result of work with them [10]. These positive trends in the number of people experiencing harm from pesticides have emerged due to a number of measures taken by the international community and governments of different countries separately. In general, morbidity and mortality associated with pesticide poisoning have decreased due to: amendment and improvement of policies on pesticides; implementation of permanent epidemiolog-

ical supervision and monitoring of pesticide poisoning; improving health services; training; development and implementation of various programmes to minimize risks of pesticide poisoning, etc. [9]. In other words, the thesis of the scientific community that "improvement of public health must be recognized as a main task of government policy" [11, p. 582] has finally been put into action.

One of the negative effects of pesticide use in agriculture is their effect on the environment. Pesticide use very often leads to violation of agricultural and hygiene orders, regulations, rules of pesticide use (consumption rates, frequency of processing, timing after cultivation, etc.) which leads to their accumulation in the environment. Having penetrated into ground and water, pesticides decompose very slowly, eventually migrating in the natural chain of air-soil-plant-animal-man [1, p. 100]. In other words, pollution of the environment leads to the pesticide effect on humans through consumption of food or water with pesticide residues.

Thus, humans may become a subject to indirect effects due to presence of pesticide residues in agricultural products. This effect has frequently been a subject of monitoring by the authorities of the Member States at the EU level as well as WHO (the World Health Organization) and FAO (the United Nations Organization for Food and Agriculture) resulting in development of pesticide residue standards for food [12]. Maximum residue levels have been established for many pesticide compounds. In this area, programs monitoring pesticide residues in food coordinated by nations and the Community are in force. For example, the US Department of Health and Human Services has provided an access to a monitoring result database since 1996. The provided results continue to show that a pesticide residue level in the US food supply is much below the statutory safety standards [13].

In general, pesticide residue issues are often discussed by international institutions. Thus, from 9 to 13 May 2016, in Geneva, a joint meeting of the FAO and WHO on issues of pesticide residues in food and the environment took place which resulted to a summary report of the Food and Agriculture Organization of the United Nations and the World Health Organization [14].

The risk assessment on pesticide residues in food, held by the joint meeting on pesticide residues of the FAO/WHO, sets a safe consumption level. To set the maximum permissible pesticide levels in food, governments and international organizations managing risks, such as the Codex Alimentarius Commission, use allowable daily doses. National authorities monitor compliance with the maximum permissible levels to make sure that an amount of pesticides that consumers are exposed to through food consumed throughout life does no have an injurious effect on their health [15].

Despite the fact that more than 90% of pesticides penetrate into the human body with food and a share of pesticides penetrating into the human body through water is low (about 5%), exposure to pesticides through water consumption is strictly limited by the Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy, which requires constant monitoring, pollution measurement and correction [16].

The potential pesticide effect on human health through air has been researched and regulated at the level of the international community insufficiently, which necessitates more research and regulatory activities.

Pesticides can penetrate into organisms of farm animals and birds with feed and water and as a result, they can be contained in animal products (milk, meat, eggs). Council Directive 96/23/EC of 29 April 1996 on measures to monitor certain substances and residues thereof in live animals and animal products and repealing Directives 85/358/EEC and 86/469/EEC and Decisions 89/187/EEC and 91/664/EEC establishes that import of animals and animal products by third countries is authorized given monitoring as well as adherence to the guarantees verified by means of checks.

Along with the positive pesticide effect in the development of agriculture, there is a significant negative effect on the environment and human health. Thus, the issue of effect in this case has a dual nature, which on the one hand, is expressed in the potential possibility of harm to humans and the environment, and on the other hand, pests that are also undesirable for humans may be effected as well and in this connection, the effect on them leads to destruction of such objects or reduction of their effect, which is positive.

A major challenge for developing countries is a large-scale penetration onto the market of more and more kinds of pesticides that are aggressive to humans and the environment, which is caused by the expansion of trade and economic relations of a nation, insufficient protected market. In the EU, there is quite a strict control over safety of plant protection products. To ensure safety for human health and the environment in the EU, certain rules for the application, handling, transportation and storage of pesticides have been set, which are binding for all land users. Among a large body of international legislation on plant protection product use, including pesticides, and limitation of their negative effect on human health and the environment, two groups of documents can be emphasized. The first group establishes general principles and limitations of interaction of plant protection products with nature and humans. The other group of international instruments has to do with direct regulation of a permissible pesticide effect on human health and the environment.

Thus, among other objectives of the Community, Article 2 of the Treaty establishing the European Economic Community of 25 March 1957 determines a high level of protection and improvement of the environment and human health. Moreover, according to Article 174, among other objectives, policy of the Community on the environment should contribute to human health.

In its turn, according to the Model Law on Environmental Protection drafted under the auspices of the Council of Europe, the concept of "the environment" includes values shaping the environment created by humans as well as

the quality of life and conditions to the extent to which they have or may have an effect on the welfare and human health along with such natural resources as air, outer space, water, soil, climate, fauna and flora in their interaction. Thus, there is an emphasis on the fact that human health and environmental safety depends on a number of factors that can have effect on it directly and indirectly. Safety may consist of the lack of negative pollutant effects or reduction of such pollution to a minimum level.

The international documents establishing common rules for protection of the environment and humans from pollutants include the Directive 2008/1/EC of the European Parliament and of the Council of 15 January 2008 concerning integrated pollution prevention and control which defines the general concept of pollution - the direct or indirect introduction, as a result of human activity, of substances, vibrations, heat or noise into the air, water or land which may be harmful to human health or the quality of the environment. Given the definition, pesticides are precisely related to pollutants under the course of which negative impact may be done primarily on the environment and human health directly or indirectly.

Among other international documents of the outlined area, we can define the following acts: the Council Directive 67/548/EEC of 27 June 1967 on the approximation of laws, regulations and administrative provisions relating to the classification, packaging and labelling of dangerous substances; the Directive 1999/45/EC of the European Parliament and of the Council of 31 May 1999 concerning the approximation of the laws, regulations and administrative provisions of the Member States relating to the classification, packaging and labelling of dangerous preparations; the Regulation (EC) No 178/2002 of the European Parliament and of the Council of 28 January 2002 laying down the general principles and requirements of food law, establishing the European Food Safety Authority and laying down procedures in matters of food safety; the Regulation (EC) No 689/2008 of the European Parliament and of the Council of 17 June 2008 concerning the export and import of dangerous chemicals and others.

Analyzing provisions of certain regulations of the EU in detail, it can be noted that virtually all the measures concerning interaction of humans and the environment with the pollutants are aimed at highest possible protection of human life and health from exposure to these substances and to minimize such an effect on the environment. Thus, one of the objectives set in Article 1 of the Regulation (EC) No 689/2008 of the European Parliament and of the Council of 17 June 2008 concerning the export and import of dangerous chemicals is to promote shared responsibility and cooperative efforts in the international movement of hazardous chemicals in order to protect human health and the environment from potential harm. Article 10 provides that the Commission shall evaluate, in close cooperation with the Member States, the need to propose measures at the Community level in order to prevent any unacceptable risks to human health or the environment within the Community. Article 12 provides that the Commission shall evaluate the need to propose measures at Community level in order to prevent any unacceptable risks to human health or the environment within the Community, taking into account the information given in the decision guidance document. In addition, Article 14 provides that chemicals and articles the use of which is prohibited in the Community for the protection of human health or the environment, as listed in Annex V, shall not be exported.

Thus, considering the above mentioned provisions, we can note that there are regulations prescribed internationally providing to settle differences on interacting of respective substances with both humans and the environment in general. For the purposes of such settlement, there is preponderance of safety of human life and health and the environment, achievement of the maximum result while using these substances rationally with a minimal harm.

Among the international agreements directly related to the regulation of a pesticide turnover, the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade should be noted. The Convention defines a list of chemicals that have been banned or a turnover of which has been severely restricted because of their negative impact on human health. According to the Convention, where a chemical that is banned or severely restricted from the Convention list can be exported from its territory to a third country, that Party shall provide an export notification to the importing Party and seek for a consent to the import through a designated national authority of the importing Party which can then refuse to import the chemical [17].

For a long time, the procedure for conducting authorized testing, registration and re-registration, publishing lists of pesticides permitted for use, hazard assessment and labelling of pesticides was carried out in the European Union according to the requirements of the Council Directives 91/414/EEC of 15 July 1991 concerning the placing of plant protection products on the market and 67/548/EEC of 27 June 1967 on the approximation of laws, regulations and administrative provisions relating to the classification, packaging and labelling of dangerous substances as amended taking account of changes up to 1/08/2008. However, initially, the Council Directive 91/414/EEC of 15 July 1991 concerning the authorization, placing on the market, use and control within the Community of plant protection products in commercial form and the placing on the market and control within the Community of active substances intended for a use by wholesale traders, retailers and farmers in a coordinated way underwent numerous amendments and was subsequently repealed after enactment of the Regulation (EC) No 1107/2009 of the European Parliament and of the Council of 21 October 2009 concerning the placing of plant protection products on the market and repealing Council Directives 79/117/EEC and 91/414/EEC.

Paragraph 8 of the above mentioned Regulation defines its purpose - to ensure a high level of protection of both human and animal health and the environment and at the same time to safeguard the competitiveness of Com-

munity agriculture. It provides to apply the precautionary principle to ensure that industry demonstrates that substances or products produced or placed on the market do not have any harmful effect on human or animal health or any unacceptable effects on the environment. Paragraph 10 of the Regulations provides that substances should only be included in plant protection products where it has been demonstrated that they present a clear benefit for plant production and they are not expected to have any harmful effect on human or animal health or any unacceptable effects on the environment. In order to achieve the same level of protection in all Member States, the decision on acceptability or non-acceptability of such substances should be taken at Community level on the basis of harmonized criteria. These criteria should be applied for the first approval of an active substance under this Regulation. For active substances already approved, the criteria should be applied at the time of renewal or review of their approval.

On 1 July 2002, in addition to the Regulation (EC) No 1107/2009 and the Directive 2009/128/EC, the document "Towards a Thematic Strategy on the Sustainable Use of Pesticides" was adopted. Its main aim is minimizing the hazards and risks to health and environment from the use of pesticides through establishment of national plans to reduce hazards, risks and dependence on chemical control [12]. The above mentioned international legal framework, in particular, the Directives and Regulations, is mainly concerned with the initial and final stages of the period of pesticide validity, e.i. authorizing use of the substances in plant protection products before placing them on the market (prevention at the beginning) and maximum residue levels in food and feed. The Directives are being reviewed at the moment. The Thematic Strategy has complemented the legislative framework in force regulating stages of use of the plant protection products.

The main purposes of the Thematic Strategy are: minimizing the hazards and risks to health and environment from the use of pesticides; improved controls on the use and distribution of pesticides; reducing the levels of harmful active substances by replacing the most dangerous with safer alternatives; encouragement of the use of low input or pesticide-free crop farming [12].

The United Nations Organization for Food and Agriculture (FAO) has enacted the International Code of Conduct on the Distribution and Use of Pesticides which deals with guidelines for pesticide advertising according to which inaccurate and unsubstantiated advertising of these substances is prohibited. But a selective research of pesticide advertising conducted by the American non-governmental organizations has revealed many significant violations of the Code straight away [18].

CONCLUSION

Thus, given the above-mentioned provisions, we can conclude that: first, human health is an important value which they acquire at birth and try to keep up for the rest of their life. Pesticides act as substances having a negative effect on human health in any case, but events of such effects can have different origins. On the one hand, there is a direct use of pesticides and understanding the existence of a hazard, and on the other hand, there can an indirect negative effect of such harmful substances through the environment. Secondly, the international legal framework has a fairly extensive character of settlement of the outlined set of problems. Its provisions have a general nature concerning the well-being of humans and safety of the environment in general as well as specification of the activities related to the production, use, disposal, destruction, advertising, labelling, supply of pesticides. Thirdly, the provisions relating to pesticides are aimed, on the one hand, at settling differences concerning the maximum benefit from their use and, on the other hand, the minimum harm to human health and life and the environment in general. Fourth, it is necessary to take into account the dual nature of pesticides, which is, on the one hand, the possibility of potential harm to humans and the environment and, on the other hand, the possibility of effecting harmful organisms which are not desirable for humans. Fifth, on the basis of the study, it has been found that in the course of pesticide use, developed countries take much better care of the prevention and reduction of their negative effect on human health and the environment than developing countries.

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