MONITORING AND PREVENTING ENVIRONMENTAL CRIME IN ACCIDENTAL SITUATIONS WITH PESTICIDES

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Summary: Pesticides are biochemical compounds / mixtures of compounds intended to prevent, destroy, repel or mitigate pests. Pesticides can be classified according to the target organism, chemical structure and physical state. The most common distribution of pesticides is by purpose, that is, the organism they act on. During the production, storage, application of pesticides and waste treatment, significant damage to health, injury, minor and serious illnesses can result in death. Chronic low-dose exposure to these compounds has been shown to be a factor in the cause of various diseases of the nervous and immune systems. The eco-toxicity of a substance can only be considered if the relationship between dose and effect is known. The dose-effect relationship implies the existence of a 'threshold'. Through biochemical analyzes, ecology is trying to find the “answer” and the solution to the numerous problems of eco-crime that are increasingly engaging and surrounding us. Unfortunately, many of the problems of today are of human origin, the result of ignorance, non-compliance with health and safety measures at work. The design of future environmental events must take into account the fact that there is no way of knowing the future of certainty without including risk in the assessment.

Keywords: Pesticides, toxicological effects, eco-crime, monitoring, bioindicators, protection measures, eco-safety

Introduction

Constant and almost unpredictable changes in our country and the environment place challenging eco-demands on business people, at the macro and micro levels, in an effort to secure the survival, growth and development of agriculture, the circular economy, the eco-security system and sustainable development. The use of high-risk technology, pesticides and numerous synthetic inhibitors have created an increased concern for humanity for the future and reinforced the belief that ecology is on the way to becoming an essential business risk factor. In fact, it can be argued with much greater prudence and responsibility today that ecology has become the generator of new, hitherto unknown market demands, especially when it comes to eco-crime. The eco-balance is disturbed as a result of man's work activity, by which man "appropriates" nature, and creates products. Not only does this disrupt ecological balance and ecosystems, but also endanger human integrity and survival. The survival of human communities has, in the past, been very often threatened by natural disasters, epidemics, wars, food scarcity and other impacts, which, however, have always been spatially limited. There have never been more, more efficient human material capacities for the protection of eco-security, and society has never felt more helpless in relation to ec-threat. The careless attitude towards nature has put human civilization at risk of irreversible destruction of the natural environment, and therefore themselves. Mankind has fallen into this perilous situation because of its desire to increase its material wealth without any consideration and to any extent. On the one hand, industrialization can improve the standard of living of a large number of people, while on the other hand it has a negative impact on the quality of the environment and human health. Today, it is considered a serious and widespread problem that must be addressed at European level.

Environmental crime today

Environmental crime is a particular type of crime that results in environmental pollution on a larger scale or in a wider area, thereby endangering human health or causing large-scale destruction of wildlife. This crime has been particularly relevant in recent years due to the rapid development of science and technology and the introduction of new technologies, the use of new and powerful energy sources, the construction of a large number of industrial plants and the development of large urban areas. The conceptual foundations of combating environmental offenses are much broader than those of so-called criminal offenses. classic crime. In addition to the classical body of repression, various inspections, institutes and other institutions play an important role in combating this crime. Specific features of ecological crime In a large number of production processes, harmful things and waste in gaseous, liquid and solid state also occur to a large extent. Waste landfills also occur as sources of contamination.

In recent years, there has been an increase in techno-technological and traffic disasters, some of which pollute the environment with large quantities of toxic, flammable, explosive and radioactive substances for the health and the human environment. A large part of the chemical plant's industrial facilities is located near residential, water supply and communication facilities, with very sensitive buildings and spaces. In case of major accidents in the form of explosions, fires, spills of toxic substances, etc. environmental contamination occurs. The location of ecological disasters in spatial terms is characterized by a large surface area. In modern agriculture, as well as in public health, the control of plant and animal pests has used a variety of agents,

more or less toxic, commonly known as pesticides. The chemical composition of pesticides is: chlorinated hydrocarbons, organophosphorus products, dinitrophenols, nicotine, arsenic preparations, fumigation, organic compounds of mercury, preparations of coumarin, zinc phosphide, thallium sulfate, sodium fluoroacetate and some solvents.

Figure 1. Application of the back fertilizer in fruit production

2. Pesticides in a living environment

Pesticides are chemical compounds / mixtures designed to control pests in agriculture (microorganisms, insects, weeds, mites, patches, snails, birds, rodents). Pesticides are intended for: 1) the destruction of organisms harmful to plants, animals or plant and animal products, or their protection against such organisms; 2) the destruction of organisms harmful or undesirable to humans, or preventing the occurrence of such organisms; 3) acting on the life processes of plants in a way that is different from the action of nutrients; 4) the destruction of undesirable plants such as weeds; 5) destroying parts of plants or preventing undesirable plant growth. According to the types of control organisms used, pesticides are divided into: insecticides, insect repellents; acaricides for mite control; contaminating nematicides; limacids for the control of snails; rodenticides for controlling rodents (mice, voles, rats and hamsters); bird repellent corvids; fungicides for the control of fungal diseases; weed-killing herbicides. Herbicides also include growth regulators and physio tropes that act to slow growth, shorten shoot length, breathe and → transpiration of plants, and plant rooting phytohormone → cuttings and additional agents to improve wetting and adherence and enhance herbicide action. from the active substance and the carrier or solvent, depending on the form in which it is manufactured and marketed. Pesticides are very effective in "fighting" plant and animal pests, but there are some that are not without danger to the people who produce, transport, store and apply them, especially when it comes to pesticide waste. Poisoning / toxicity is usually caused by improper handling of pesticides due to a mistake or accident, but cases of intentional poisoning (eco-crime) are known. Pesticides can penetrate the body through the digestive tract through the respiratory system or through the skin. For many pesticides, poisoning is possible on any of these routes, but one of them is still the most common. Signs of poisoning may be different depending on the type of pesticide.

Toxic effects of pesticides include physiological, biochemical and structural disorders that occur in a living organism under the action of a toxic agent.

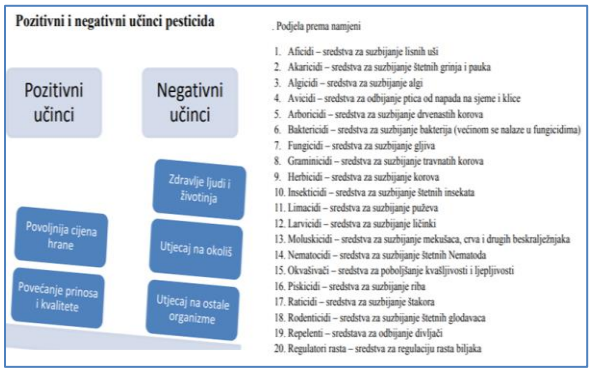


Figure 2. Pesticide division, positive and negative effects

Mutagenic effect - environmental factors that cause hereditary changes (mutagens)

affect changes in the chemical composition of hereditary matter, in genes directly or indirectly leading to mutations. Carcinogens have substances that cause malignant changes (cancer) of various organs in the body, that is, convert normal cells into cancer cells. Tumor is the multiplication of tissue by cell division. Benign and malignant are distinguished. The causes of carcinogenesis are pesticides, additives, radiation (ionizing, ultraviolet) hormones (estrogen), and malignant tumors are cancer (cancer).

Substances that have the ability to permanently damage the anatomical structures of the embryo have teratogenic effects. These include pesticides, antibiotics, cytostatics, mercury and emulsifiers.

A normal human cell is aerobic (consumes O2) and maintains normal electrical flow in the cell (ATP 36), vibrates and receives messages. So he receives a message for apoptosis.

The cancerous cell has low levels of O2 consumption (it is anaerobic) and low electricity flow (about 1 ATP). This cell receives no messages and is unable to carry out apoptosis; on the contrary, it multiplies uncontrollably.

The health and quality of life is a consequence of a complex electro-biochemical process, which occurs throughout the human body and every biomolecule, organelle, cell, tissue, organ and organism. This process is programmed in the body for each cell. Therefore, all cells need to be in solidarity and do exactly what their biological program instructs them to do. Under this program, cells divide and "die" all the time. In their place are new cells. If these cells drop out of the program, they do not receive the message that the job is done and continue to multiply. Such cells are closed to all messages and do not receive instructions that are transmitted electro-biochemically throughout the body - that they should die.

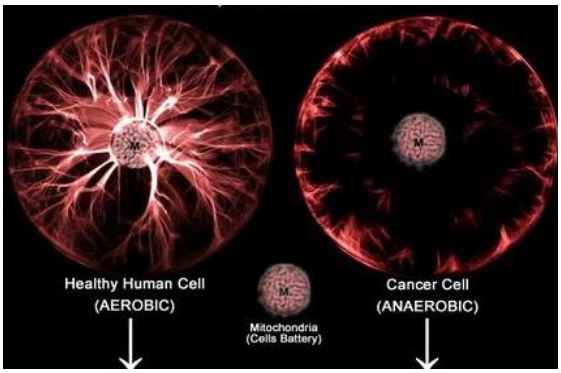
Deviation from the program creates a "disobedient" cell, which by its uncontrolled behavior can create "chaos" in the body and disrupt it so that the body itself eventually experiences the cessation of all functions-death. These are cancerous cells, which behave in a non-solidarity manner, multiply unnecessarily and excessively, hijack food from other cells and refuse to die out according to a program-what is called apoptosis[1]. The reasons for this disobedience are disturbances in the complex electro-biochemical process, that is, impaired metabolic balance.

This disorder is caused by the action and toxic substances (pesticides) in the air and food that the cell does not recognize as dangerous, and brings them into itself. Some fatty acids do not provide adequate energy to the cell, however much it is taken with food. The energy from them instead of ending up in the cell remains unused, with fats deposited on the walls of blood vessels, and medicine calls it arteriosclerosis.[2]

Figure 3. Normal and cancerous human cell with messages

[1] *Apoptosis* is a form of programmed cell death that occurs in physiological and pathological processes in the body. It is limited to single cells when the cell itself executes a programmed death, ie. commits suicide and no inflammatory reaction occurs.

[2] *Arteriosclerosis occurs when the walls of blood vessels that carry blood rich in oxygen and nutrients from the heart to the rest of the body - the arteries - thicken and become rigid, leading to a reduced diet of the tissues supplied to these blood vessels. Healthy arteries are elastic, but over time the walls become more rigid.*



3. Hazards and precautions for pesticide application

The aim of this paper is to investigate the application of plant protection devices to identify the causes of unintended consequences and to educate people who perform the plant protection process and use products in agricultural production. In the production and cultivation of different agricultural crops, man today performs various technological processes such as: tillage, fertilization, plant protection, pruning, etc. Weeds, plant diseases, insects and other pests are factors that significantly reduce the yield and quality of agricultural products. In some cases damage to the entire birth is possible. Against this background, intensive agricultural production without effective plant protection is unthinkable today. So poisoning can be very different depending on the type of pesticide. Most of them, more or less, affect the nervous system and cause headaches, dizziness, paralysis, agitation and other nervous disorders.

Agricultural plant protection products are various chemical compounds that destroy weeds, insects, diseases and other harmful organisms. Most commonly referred to as "pesticides". Devices used for spraying are called sprinklers. Spraying is a process of applying pesticides in liquid state whose droplets have a diameter of 0.05-0.15 mm. Irrigation is a process used in fruit and viticulture production. In order to eliminate mechanical hazards, the following rules apply when using sprinklers and sprayers: before use, all devices must be checked for correctness, the transmission elements and / or the PTO shaft must be adequately protected as well as the danger mark, the fans used on the sprayers should have a safety net in order to eliminate the danger to the worker, to check all pipeline connections before work, and to carry out precise inspection in the workshop once a year.

The chemicals (pesticides) we use to protect the herbs are toxic to humans, domestic animals, game, bees, fish and birds. When using pesticides, certain precautions must be taken to protect the health and quality of life of workers, especially in greenhouses:

- if it is possible to choose a chemical agent, then those suspicions that are toxic and dangerous to humans and the environment should be applied;
- not to make inventories, but to procure quantities of funds for a short period;
- use the funds in original packaging with undamaged labels;
- Store plant protection products in locked rooms that are properly marked. • Follow the manufacturer's instructions for use (concentration, hectare standard);
- do not take food, drink or smoke while handling pesticides, do not dispose of empty packaging near a well or pumping station, but dispose of it according to the manufacturer's instructions, obey the law on waste.

Different plant protection products must be used when using plant protection products, depending on the method of application and the harmful effects. When preparing and applying protective agents we use:

- rubber or plastic gloves resistant to the action of the agent we use,
- rubber or plastic boots resistant to the agent we use,
- protective clothing resistant to the

action of the agent we use,
- respirator.

4. Bioindicators of environmental vulnerability

Monitoring is a system of successive observations of environmental elements in space and time. One of the most organized and perfect monitoring systems is meteorological monitoring, which was established in the last century and covers a network of huge number of meteorological stations (I, II, III order) across the globe. An indispensable segment of the monitoring system is biological monitoring, which involves the use of living organisms as bioindicators of environmental changes in space and time.

Physicochemical monitoring methods are an indispensable segment of this system, since they provide accurate data on the presence and distribution of pollutants and the monitoring of pollutant emissions and emissions in general. For methodological reasons, biological monitoring is divided, in relation to which environmental changes are being monitored, to:

- biological monitoring of air pollution (using lichens and mosses as bioindicators);
- biological monitoring of aquatic pollution (bioindicators of altered state are algae, benthic fauna, bacteria, fish);
- biological monitoring of soil pollution (indicator-organisms are more plants, or vegetation).

In biological soil pollution monitoring, vascular plants (species, populations and phytocoenosis) are most commonly used as phyto indicators. Heavy metals are defined as those chemical elements that have metal characteristics and have an atomic number greater than 20. Hyperaccumulators are defined as those species that are capable of depositing (accumulating) metals at concentrations up to 100 times greater than concentrations that are measured on other plants that do not accumulate heavy metals. Metallophytes store huge amounts of heavy metals (0.5 g / kg, up to 25 g / kg dry weight of the plant), roughly in the amounts in which they adopt the basic macronutrients, which is 1000 times more than the amount of essential microelements. "

Indicators of heavy metals are those types (mosses, lichens, terrestrial and aquatic plants, etc.) Biological monitoring is divided, for methodological reasons, with respect to which environmental changes are monitored, namely air, aquatic and soil pollution. . Potentially, any organic species can be used as a bioindicator of environmental status. Lichen and moss are bioindicators used in air pollution monitoring. Bioindicators of soil pollution are most commonly plants, namely vegetation, microorganisms, bacteria, insects and also animal species.

Bioindication can be performed at all levels of the organization of living systems, starting from molecular, through biochemical-physiological, cellular, individual, population, special, biocenological (ecosystem), biome to biosphere.

In biological monitoring of aquatic pollution, the most common bioindicators of altered conditions are algae, bacteria and fish. The quality of the water in which the fish lives is very important for its survival.

Advantages of phytoremediation:

- phytoremediation is one of the cheaper biotechnologies;
- phytoremediation is a natural technology "environmental friendly", ie its use does not put additional strain on the environment;
- the provision of energy for this biotechnology takes place in a completely natural way (by plants in the process of photosynthesis);
- this biotechnology also achieves some side effects that are of little importance for environmental

conservation.

Microorganisms can oxidatively metabolize aromatic hydrocarbons as well. Phenols and their derivatives are common constituents of wastewater from the paper and oil refineries. Biocatalytic processes are also applied to remove explosives from soil and water

5. Biochemical processes in the human body

Metabolism is a biochemical process in which the modification of chemical compounds in living organisms and cells occurs. It is divided into anabolism, that is, biosynthesis (formation) of complex organic molecules, and catabolism, which is a reverse process from anabolism, which is the breakdown of complex organic compounds into simpler ingredients. The endocrine system has the greatest influence in metabolism. It is a set of chemical transformations that sustain life in cells, and these reactions are catalyzed by enzymes. They allow organisms to grow and reproduce, maintain their structures and "respond" to environmental energy stimuli.

The term metabolism may also refer to all chemical reactions in the presence of toxic pesticides occurring in living organisms, including digestion and transport of substances within and between different cells, when that set of reactions within cells is called intermediate metabolism or cell metabolism.

The normal maintenance and functioning of individual cells, tissues, organs and organisms cannot be imagined without the presence of minerals or ions of certain elements. These inorganic cell and tissue constituents are significant for life manifestations despite the fact that their percentage is very small relative to the total mass.

The content of ions of individual elements ranges over a wide interval. The physiological importance of ions is great, regardless of their content in individual cells and tissues of a living organism. The significance of these substances is reflected in the following:

- affect the maintenance of a "suitable" environment for normal protoplasmic activity;
- as electrolytes affect the osmotic pressure and the buffering properties of the cytoplasm as a whole;
- affect the maintenance of acid-base balance in cells and tissues;

All elements that make up living cells, tissues and organs are divided into two major groups:

1. a group of macroelements,
2. group of microelements.

In environmental monitoring, bioindicators, such as lichens, birds, and bacteria, are used to provide a realistic picture of the state of the environment. In the quantitative and qualitative assessment of the state of the environment, the key criteria for bioindicators are:

- indicators are useful and reliable in environmental monitoring,
- the indicator is the goal, if it is transparent and reproducible,
- the basic data are characterized by the methodology of collection, the data management systems that are integrally protected, as well as the quality assurance procedure, the data enable the description of changes or indicators of their movement, which are comparable in time and space, with representatives of the target population.

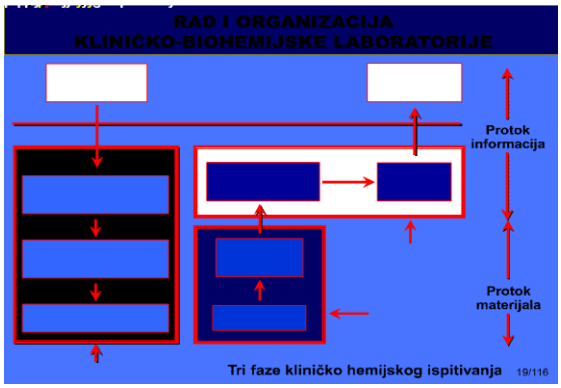


Figure 4. Organization of work of BHM laboratory under contamination conditions

6. Chemical protection under contamination conditions

In the conditions of use of NHB weapons, in the case of NHB accidents and NHB terrorism, in eliminating the consequences of contamination, one of the most important activities is to carry out single, group and final (group) decontamination. For decontamination of substances (in solution with water), calcium hypochlorite, the basic representative of inorganic substances with active chlorine, has the greatest application. In the prescribed solution, calcium hypochlorite meets the requirements (requirements) of efficiency, economy and universality in the decontamination and disinfection process. Obtaining Ca (OCl) 2 solution involves finding and collecting means and raw materials, determining quantity, determining use, developing process space and working devices, producing solution, determining decontamination efficiency and using it to eliminate the effects of chemical and biological contamination. The technological procedure depends on the quantity and quality of the means and equipment available, the ability of the people to work, the organization of work, while observing the prescribed measures of safety at work. Chemistry plays an important role in daily life. The development of chemistry and the chemical industry over the years has contributed to improving the quality of life of people. Zelenehemija's main goal is to adapt chemical processes and products to environmental protection. Green chemistry involves the development of new chemical reagents and methods that would increase the utilization of a chemical process while reducing the adverse impact on the environment. Green chemistry seeks to develop safer chemical processes, that is, chemical processes that will be harmless to humans and the environment. The processes of "green" chemistry are based on 12 principles, which speak about the reduction or removal of dangerous or harmful substances from the synthesis, production and application of chemical products. Historically, these principles can be recognized in terms such as process utilization, number of synthetic phases required, selectivity, etc. The goals of "green" chemistry in environmental protection and economic profit are achieved through several dominant directions such as catalysis, biocatalysis, use of alternative renewable raw materials (biomass), alternative reaction media (water, ionic liquids, supercritical liquids), alternative reaction conditions (activation microwave radiation) as well as new photocatalytic reactions. In order to maintain the ability to live and act, a balance needs to be struck between the use of natural resources, economic growth and the preservation of the environment. Green chemistry seeks to find and maintain that balance, creating a new generation of researchers and technologists who will analyze economically and on the processes and materials used in production and development while preserving natural resources and the environment.

Figure 5. Industrial symbiosis of sustainability in pesticide production / application

Conclusion

In everyday life and work we encounter many situations. Pesticides are pest control agents and we distinguish many types of pesticides. That is why it is very important that people who come into contact with pesticides are well informed about their purpose and dosage. If not used properly, pesticides can be very dangerous, both for nature and for humans. We live in a time where our environment is very polluted, so we have to take into account how polluted our environment is and what conditions we work under. It is important to determine the extent to which our work environment contains harmful gases and aerosols. One should be aware of the fact that it is very important to take care of the safety and security of the people around him, that is why he should always follow the rules and be careful when dealing with pesticides and control the amount of gases, aerosols and pollution in his environment. about eco-disorders, unfortunately, all these warnings and cries still do not cause too much concern among the population around the world. Everyone who comes into contact with pesticides should be informed in detail about the toxic properties of the preparation, the dangers of careless handling and the precautionary measures. In accordance with health and environmental regulations, persons working with pesticides must use personal protective equipment (protective clothing, protective footwear, gloves, respirators, safety caps and goggles). Conditions for skin and clothing washing should be provided, with mandatory hand washing before taking food and smoking. Medical pre-employment examinations and periodic health examinations to identify early changes (every 12 months) are important. Breastfeeding women are forbidden to work with pesticides, and diseases of the endocrine, central and peripheral nervous systems, respiratory system, and diseases of the liver, blood, and blood-forming organs are contraindications for working with pesticides. Shortening the contact time with toxic chemicals is of great preventative importance. Chlorinated hydrocarbon poisonings are usually reversible and end in successful healing. If residual poisoning with nervous system damage, hepatitis, and anemia occurs, the worker should be referred to a disability committee to verify altered work ability and risk of disability. Despite the various interpretations that can be found in the literature, this concept today has a central place in considering the second-hand perspective of humanity's survival and progress.

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