**Pesticide Definitions and Terminology**

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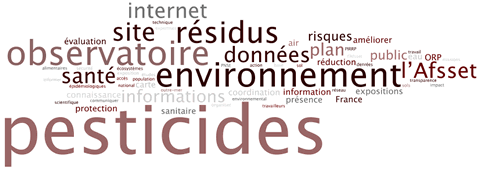
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**Pesticides Definitions and Terminology**



**What is a pesticide?**

The term “pesticide” is a combination of two Latin words – *pest* and *cido*. “Pest” is an organism, which causes destruction, disease or injury on plants and animals, while “cido” means destroy or kill. Therefore pesticides possess the ability to destroy plant pests and diseases.

Pesticides are mainly chemical compounds either artificially synthesized or extracted from plant products. Pesticides from biological agents such as bacteria, viruses, fungi, etc., have been developed lately. So the term “pesticide” includes chemical substances, preparation or organisms, used in pest control.

Pesticides are divided in various groups, depending on the pest which they destroy, as follows:

*Insecticides* – destroying insects;

*Fungicides –* destroying fungi;

*Rodenticides –* killing mice and other rodents;

*Herbicides –* destroying weeds and substituting manual weeding, and also

*Plant Growth regulators*

Besides these main groups there are other subgroups. As, for instance, *aphidicines* are used in aphid control, *larvicides* – in the control of larvae, *acaricides* – in the control of mites, etc.

Farmers usually receive pesticides in the form of ready preparations. They contain a definite percentage of active chemical compound, which is the given pesticide. They are different preparations (formulations), which contain additives, aiding their easier solution or sticking of the pesticide to the plant.

The preparations have the following trading forms: water soluble powder, wettable powder, water soluble or water emulsion concentrate, granulates and dust. Granulated and dust preparations are directly applied without further dissolution.

Pesticides Destroy Plant Pests and Stop Diseases



**Routes of entry of pesticides into human organism**

*Respiratory (inhalator) route.* Breathing of air containing pesticides is an easy way for their penetration into the blood and from there into all organs and tissues. Only in case they have an irritating effect they provoke coughing or chest pain, otherwise they are taken up unnoticed.

*Dermal penetration.* A great part of the pesticides pass through intact skin and cause even fatal poisoning. This way of penetration is typical for pesticide application on skin, which is not protected by appropriate working clothes.

*Oral intake.* This can happen only in cases of great violation of the working rules, eating food with dirty hands or contaminated food. The poison could be taken up by mistake, if it is not in its original packing.

*Penetration through the eyes.* Contamination of the eyes with pesticides results in irritation and burning. The poison can also penetrate into blood. Eyes are very sensitive to pesticides.

***Exposition*** means possibility for the pesticide in a given situation to penetrate into the human organism, through the skin, by inhaling or by ingestion.

***Dose-effect relationship***. The greater the quantity of substance taken up, the higher is the effect.

When inhaling the toxic substance, the dose, which will be taken into the organism depends on the concentration of the substance in the air (measured in mg/m), on the duration of inhalation of polluted air and on the depth of respiration. Strenuous physical work causes deeper and accelerated breathing, which leads to the uptake of greater amount of poison. It is of importance whether the substance is easily dissolved in the biological liquids, or part of it is expired.

**What is toxicity and how is it measured?**

*Toxicity* is the capability of producing harmful effect. One and a same pesticide differs in its effect in various organisms. Best pesticides are those which are more toxic to the pests for which they are intended, and less toxic to man and animals.

*The toxic effect* could be expressed either by clearly manifested symptoms and disturbed functions, measured with definite tests, **or** by changes in blood and urine, in the activity of some enzymes, etc., assessed through a specially directed search for negative pesticide effects.

*Toxicity* depends on the chemical structure of the compound, on its stability to penetrate into organism and on the possibilities of the organism for detoxification.

*Toxicity* of a substance is tested in experimental animals, most often rats. It is measured by oral LD50 in mg/kg body weight. This is the quantity of the pesticide for 1kg of the body weight, which kills 50% of the experimental animals.

The concentration of the pesticide in the air, which causes the death of 50% of the experimental animals during single inhalator exposure for 4 hours is called *average lethal concentration (LD50).*

It is obvious that the lower the *lethal dose of concentration*, the more dangerous the pesticide is. We accept that a pesticide is practically not dangerous for acute poisoning, when its lethal dose is several grams per kg bw (body weight). In this case great quantities of the pesticide are needed for *lethal human intoxication*.

*Dermal toxicity.* A large part of the pesticides penetrate through the skin and can cause damage or death. The dangerous effect in this case is measured by the *dermal average lethal dose (LD50),* i.e. the dose, which in contact with the skin of experimental animals (solution or emulsion) causes the death of half of them.

*Corrosive* is a substance, which at the place of its contact with human skin or mucous membranes, causes visible disturbances or revocable damage.

*Irritant* is the substance, which causes *inflammatory reactions* in the eyes, skin or respiratory system, when in contact with them. A good example are the herbicides, which are strong *irritants* of the *skin* and *mucous membranes.*

*Local effect.* We talk of such an effect, when the damage arises on the spot, where the substance is in contact with the body and cause *irritation* of the skin, eyes and mucous membranes.

*Systemic effect* is the one produced when the substance penetrates into the blood system, reaches various organs and systems and causes damage to them.

*Cumulative effect.* During a long term exposure some toxic substances may cumulate in the tissues. Others, without material cumulation in the organism, cause irreversible changes (functional cumulation).

The organism has systems, which detoxicate and eliminate the toxic substances. It is of great importance to give time to the organism to perform this purifying action, i.e. to have daily periods of rest, shorter working time with pesticides, etc.

The state of the organism is of particular importance for the elimination of poisons. In case of sick kidneys or liver this is very hard to accomplish and for that reason it is not recommended for people with such illnesses to come in contact with pesticides.

*Latent period* is the span of time between the beginning of the exposure and the first manifestation of the symptoms. This period varies depending on the substance and its effect. For instance, development of *cancer* due to the effect of a pesticide requires long years, depending on the exposure.

*Acute toxicity.* The symptoms are evident immediately or very soon after the substance has penetrated once or several times in the organism. In most cases the symptoms can disappear shortly after treatment or spontaneously. Often the *poisoning* is due to absorption of a large dose for a short period of time. Depending on the dose, the poisoning can be lighter or heavier and the relation between symptom and exposure is always obvious.

*Chronic toxicity*. It manifests itself after a long-term exposure (months and years) to low doses or concentrations of a given substance, therefore in order to be manifested, the symptoms need the lapse of a certain period of time after the beginning of the exposure.

*Sensitivity to poisons.* The individual reaction to uptake of a given substance into the organism depends on many factors, among which the most important are: age, sex, genetic status, nutrition, health status, harmful habits (drinking alcohol, smoking), taking medicines, pregnancy, post-operation period.

*Allergy*. Some people develop an allergy to certain toxic substances. In these cases the reaction is changed, most often stronger than it could be expected at a given dose. The substances, which could cause such kind of a reactions are called allergic or sensitizing substances.

*Mutagenic effect.* Some substances can harm the genetic (hereditary) material of the cell. This material consists of genes, which are found in the chromosomes. Genes and chromosomes contain information, which determines the cell functioning and the propagation. When injured these functions are disturbed, leading to some *health disturbances*, including *cancer*.

*Effects on reproduction* include the disturbances both of female and male reproductive organs, which leads to disturbed ability for creating progeny. The teratogenic and fetotoxic effects are included here.

*Terratogenic effect* have the substances that cause *congenital defects* (*malformations*) in the newborn, when the mother has taken in the substance during pregnancy.

*Fetotoxic effect* means disturbance of the progeny without evidence of *malformations*.

**What is a hazard?**

The toxicity of a given compound is its main property, which makes it dangerous to humans, but it is not the only one. Along with toxicity, the hazard depends also on the exposure, i.e. on the possibility this substance to enter into the organism by respiration or by dermal way, depends on the absorbed dose, on the period of time when the person has been exposed to the action of the substance.

Therefore it appears very important when applying pesticides to ensure conditions, which minimize the hazard, and mainly the exposure to the pesticide. A pesticide could be highly toxic, but if it is used in the form of granules, the exposure would be minimal, and consequently the possibility for dangerous *poisoning* would be less probable.

**Hygienic norms**

*Waiting period*  is the number of days which should pass after the last spraying with a given pesticide before the crop is harvested. The waiting time varies depending on the type of pesticide and on the crop, fruit or vegetable.

*Re-entry period of save work* is the minimal number of days, which should pass before re-entering the treated fields after a particular spraying. This period is different for each pesticide, crop and conditions for pesticide application.

*Maximum permissible concentration (MPC)* for a particular harmful substance in the in the air at the working place (mg/m3) is the highest concentration, which does not cause illness or other deviations in the health status of the workers.

*Maximum residue limits (MRL)* in food products in mg/kg product are those, which do not cause negative health effects after long-term consumption of the product, i.e. a given pesticide can be present in the food product, but it is considered harmful in case its concentration is higher than that of the MRL.

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