Volume 3, Issue 3, March - 2025
ISSN (E): 2938-3781

Web of Agriculture: Journal of Agriculture and Biological Sciences
webofjournals.com/index.php/8

MICROBIOLOGICAL DECOMPOSITION OF BIOCIDES IS THE MAIN WAY OF SOIL DETOXIFICATION

Газиев М. А.
к.с.х.н., доцент, Ферганские государственные университет
Аграрные совместные факультет

Abstract
The need for the use of chemical means of plant protection against pests and diseases is determined by the fact that yield losses without the use of pesticides can be about 50%.

Introduction

Depending on the purpose, chemicals are divided into preparations for plant protection against pests and diseases, herbicides and means of pre-harvest treatment of crops. The first group is the most extensive and includes acaracides, bactericides, hematocides, zoocides, limacides, insecticides, lavvicides, nematicides, ovicides, fungicides and other drugs. Insecticides are most often used. These pesticides can include organochlorine, organophosphorus, inorganic and inorganic compounds of mercury, lead, mouse and other elements.

Herbicides are used as a means of selective destruction of weeds. Most often, various chemicals are used to protect cotton, alfalfa, winter wheat, corn, and sunflower. Of the means of pre-harvest crop treatment, defoliants and growth stimulants are most widely used.

In general, about 200 types of chemicals are used in agriculture in Uzbekistan.

All poisons used in agriculture as a means of combating pests and diseases of plants are more or less poisonous to animals and humans. Their widespread use has an ever-increasing impact not only on plants, but also on the entire living population of the Earth. It is noteworthy that only a small dose of pesticides reaches the organisms that are actually to be destroyed. A significant part of them has a negative effect on beneficial organisms, including those living in soils. Pesticides affect the microflora and microfauna of the soil, cause noticeable shifts in biochemical microbiological processes, accompanied by increased formation and release of carbon dioxide, ammonia, amino acids and other metabolic products. At the same time, the course and intensity of the processes of decomposition of soil organic substances - fiber, protein, sugars - change. Pesticides reduce the quality of agricultural products: the baking and nutritional properties of flour deteriorate, and the "wateriness" of meat increases. The danger of biocidal contamination of the biosphere in general and the soil in particular is aggravated by the fact that pesticides are detected only by specific methods of analysis that are difficult to carry out, manifest themselves through diseases and the death of organisms.

Here V.I. Vernadsky's law on the physicochemical unity of all living matter on the planet comes into force. A harmful component for some part of living matter cannot be neutral for another part, or a harmful component for some species of creatures is harmful for others. Any chemicals that

Volume 3, Issue 3, March - 2025
ISSN (E): 2938-3781

Web of Agriculture: Journal of Agriculture and Biological Sciences
webofjournals.com/index.php/8

are lethal to some organisms cannot but have a harmful effect on other organisms. The mass death of various animal organisms is well known.

The redistribution of biocides along the profile and in the horizontal direction occurs under the influence of soil moisture, as a result of diffusion with soil air, in the processes of sorption and desorption, migration of solutions, emulsions, suspensions. Some pesticides undergo various chemical transformations, pass into other compounds, sometimes more toxic than the original ones. For example, heptochlor, which is a relatively low-poisonous insecticide, under the influence of soil microorganisms turns into heptochloroepatide, the toxicity of which is 4-5 times higher.

In the study of the consequences of the systematic use of physiologically active compounds in biocenoses, the possibility of their transformation into non-toxic compounds by complete decomposition or the formation of non-toxic complexes was established. This phenomenon is called detoxification. The entire system of agricultural land use should be aimed at the complete and speedy detoxification of all biocides entering the soil.

Usually, groups of physical, physicochemical and biological factors of detoxification are distinguished. Physical factors include the sorption of biocides by highly dispersed minerals and organic soil colloids. This process depends on the properties of the soil, the nature and properties of the adsorbent, climatic and environmental factors. Thus, pesticides introduced into the soil during cold and damp weather are bound by the upper layer of the soil, so they are protected from leaching and decomposition. During the warming period, they desorb and re-emerge their activity. Some time after pesticide application, the soil establishes an equilibrium between the sorbed and solution fractions of the toxicant. The degree of desorption of a toxicant is usually judged by its content in the liquid phase. Physical factors of detoxification also include volatilization and thermal decomposition. The degree of evaporation of toxicants from the soil strongly depends on its moisture - the sorption of highly volatile pesticides in dry soil is much higher than in wet soil. The decomposition of the toxicant increases with an increase in temperature.

Of the physicochemical factors, the most significant is photodecomposition (photolysis), the main active principle of which is the long-wave ultraviolet rays of solar radiation. At the same time, photooxidation of many pesticides and their metabolites located on the surface of soil, plants and water bodies occurs. At the second stage of photolytic decomposition of a pesticide, its interaction with water molecules is of particular importance. Under the influence of the short-wave part of solar radiation, many phenols and related compounds can be converted into hydroquinone and pyrocatechol, which can be hydroxylated to tetraoxybenzene. The latter, as a result of oxidative condensation, can be transformed into stable polymerized products. As a result of photolysis, many esticides are transformed into less toxic products.

Chemical transformations of pesticides in soil and aquatic environment are mainly hydrolytic and oxidative processes. The speed of these processes depends on the type and number of halide atoms, the length of the hydrocarbon chain. An increase in the contact of the toxicant with the soil accelerates hydrolysis (for example, the colloidal fraction of the soil catalyzes the reaction of pesticides with various active particles of soil components). A significant role in the chemical decomposition of pesticides belongs to free-radical processes. Sources of free radicals in the soil are humic acids, as well as resins, pigments, antibiotics, vitamins.

It has been established that the microbiological decomposition of pesticides is the main way of

Volume 3, Issue 3, March - 2025
ISSN (E): 2938-3781

detoxification of soils, and any activation of microbiological activity contributes to the disappearance of pesticides from soils.

The rate of microbiological degradation of pesticides in the soil is determined by the content of humus, soil temperature and moisture, the presence of litter, the content of nutrients and other factors. Good conditions for the development of soil microorganisms intensify the biological detoxification of pesticides.

Thus, it is possible to control the processes of pesticide decomposition in the soil only with a detailed knowledge of its properties and the factors that determine these processes. Therefore, measures to protect soils from the accumulation of pesticides are based on a detailed study of the properties of soils and the behavior of toxicants, their biological activity, weather and climatic, agrotechnical, and geomorphological conditions. For each soil and climatic zone of the country, its own recommendations should be developed for the use and neutralization of pesticides in agricultural lands, taking into account the residual toxic effect and the duration of their storage in the soil.

In part, the fate of pesticides in the soil can be regulated by agronomic methods - processing, the use of irrigation and fertilizers, the choice of variety and crop, the method of application of toxicants, its depth, and term. It should also be noted here that root and tuber crops absorb and tolerate pesticides in larger quantities than other crops.

It is recommended in some cases to replace the continuous cultivation of crops with a strip one, which is not inferior to the first in efficiency. Measures of responsibility have been taken for strict compliance with the rules for the storage and consumption of pesticides in agriculture of the republic.

However, soil is not the only landscape object where pesticides are concentrated. They are recorded in groundwater, springs, open reservoirs, accumulate in almost all living organisms, plants, land animals, birds, insects, in the fauna of water bodies. Their constant migration along the food chains of organisms, including humans, has become a regularity.

The system of use of agricultural land should be aimed at the complete and speedy detoxification of all biocides entering the soil. Microbiological decomposition of biocides is the main way of detoxification of soils, and any activation of microbiological activity contributes to the disappearance of pesticides from soils.

Today, it is hardly possible to completely abandon the use of pesticides. Rational use of pesticides should be carried out by reducing the consumption rates of preparations, optimizing the terms and methods of application, selecting preparations that are most harmless to the environment and humans, reducing treatments based on taking into account the environmental and economic thresholds of harmfulness of phytophages.

Biologically harmless methods of pest control are well known. Unfortunately, they are used extremely rarely.

Wide propaganda of chemical-free cultivation of vegetables and fruits should be urgent. There are many simple and harmless ways to protect plants in the individual sector: this is the use of infusions from tomato shoots, tops, potatoes, tobacco, various traps with odorous substances, etc.

Against the Colorado potato beetle, spraying plants with an infusion of green chilli pepper mixed with garlic and tobacco is used. Pyrethrum (chamomile powder) is effective against aphids,

Web of Agriculture: Journal of Agriculture and Biological Sciences
webofjournals.com/index.php/8

Volume 3, Issue 3, March - 2025
ISSN (E): 2938-3781

caterpillars of butterflies. Preparations from onions, garlic, saphora, milkweed, horseradish, mustard, parsley, henbane have insecticidal properties.

Breeding and release into agroecosystems of ladybugs, ground beetles, trichogramma, ants and other predators and parasites are effective in plant protection.

Plants, like humans, need pharmaceutical protection. But one should remember the golden rule of Paracelets: "Everything is poison, it's all in quantity." Therefore, it is necessary to be careful with dosage, transportation, storage, etc. Rational use of pesticides should be carried out by reducing the consumption rates of preparations that are most harmless to the environment and humans, reducing treatments based on taking into account the environmental economic thresholds of phytophage harmfulness.

References

1. Dobrovolsky G.V., Nikitin E.D. Preservation of soils as an invariable component of the biosphere. Moscow, "Nauka" 2000. 184 p.
2. Kolesnikov S.I. Structural and functional role of soil in the biosphere.Moscow, 1999.
3. Pligina A.S. Destruction of pesticides in the environment. Modern science-intensive technologies. Moscow, 2013., No8., p.338.
4. Kholmatov B.T. Measures to combat soil cover pollution with pesticides. T., 2016.

Web of Agriculture: Journal of Agriculture and Biological Sciences
webofjournals.com/index.php/8