

Hygienic Principles of Using Seller Insecticide in Agriculture

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Annotation: Most chemicals are highly resistant to the environment and retain their toxic properties under natural conditions. Some pesticides have carcinogenic, mutagenic, and gonadotoxic properties. Therefore, when studying the toxicity of pesticides, it is important to assess their gonadotoxic, carcinogenic, and mutagenic effects. Pesticides with such properties are prohibited for use in agriculture. In some parts of the world, the use of toxic chemicals with these properties continues. At the national level, the annual damage from agricultural pests is 45 billion soums. Therefore, agricultural technology requires the implementation of complex measures.

Keywords: insecticide, sanitary and toxicological, permissible concentrations, migration, hygienic regulation.

Relevance. Among the measures that contribute to increasing the yield of agricultural crops, the chemical method of combating weeds, pests and plant diseases has acquired great importance.

Increasing chemicalization of agriculture, which contributes to increasing crop yields and obtaining a huge economic effect, simultaneously leads to the introduction of new biologically active factors into the environment, which increasingly complicates the problem of protecting it from possible adverse effects consequence. Currently, our republic knows more than 100 chemical compounds used in agriculture for these purposes [1,2,4,5].

In order to improve environmental protection measures, hygienists and sanitary doctors of our Republic pay special attention to the need for further development of theoretical and practical foundations of hygiene in the use of pesticides [8,9,10,11].

The hygienic justification of standards for the permissible level of pesticide residues in food products, the maximum permissible level (MPC) in the air of the working area and in the atmospheric air, soil and also in the water of reservoirs, the regulation of the conditions of their use taking into account the whole variety of factors that determine the duration of the preservation of these chemical substances in nature, are the basis of the system for preventing all kinds of adverse effects on humans [3,7,11,12,13,14].

According to sanitary legislation, no chemical substance can be allowed for use in the national economy without a thorough toxicological and hygienic assessment (Law of the Republic of Uzbekistan on the sanitary and epidemiological well-being of the population, 2015).

Among the pesticides used in agriculture, insecticides occupy a special place. Of these, synthetic pyrethroids have received wide recognition. These insecticides are mostly relatively low-toxic for warm-blooded organisms. With a single effect, however, they are noted for their high resistance in the environment. The latter feature determines the possibility of their accumulation in soil, food products, mixing in ecological and food chains, the final link of which is a person [4,5,7,8,13,14,16,17,18].

In this regard, and also taking into account that individual groups of substances of this class are characterized by embryotoxicity, mutagenicity, and other manifestations of biological activity, The introduction of pesticides from the group of synthetic pyrethroids into agricultural practice must be accompanied by their comprehensive study and strict regulation. High insecticidal and economic efficiency stimulates the search for new pesticides from the class of synthetic pyrethroids.

As a result of such searches, a new, promising insecticide was created – Seller 20%ks. To resolve the issue of the possibility of using them on large areas intended for food crops (wheat), and to develop

appropriate preventive regulations, there was a need for a toxicological and hygienic assessment of this drug, which is included in the plans of the problem commission of the Ministry of Health of the Republic of Uzbekistan.

Our goal was to assess the danger of Seller's disease to humans and, taking into account the specific features of farming in Central Asia, to develop regulations that guarantee safety for the environment (soil, air, water bodies) and consumers of plant products grown in hot climates.

The purpose of the study. We were given the goal of substantiating the possibility of using the insecticide Seller taking into account the specific features of farming in Central Asia and the development of hygienic regulations that guarantee safety for the environment (soil, air, water bodies) and consumers of plant products grown in hot climates.

Research objectives.

1. To study the persistence, migration and translocation processes of Seller in the soil-plant system in the soil - climatic conditions of Uzbekistan depending on the type of soil, type of irrigation, the rate of consumption of the preparation and the season of their vegetation.
2. To determine the main parameters of Seller's toxicity for warm-blooded animals with single and multiple administration, to evaluate the cumulative properties of the drug, the remote consequences with multiple administration necessary for the development of hygienic regulations.
3. Provide a comparative description of the insecticides being studied and those already in use, taking into account their chemical structure and biological activity, determining the place of the new pesticide in the series of synthetic pyrethroids .
4. Develop hygienic regulations that ensure safety for the environment (air, soil, water bodies) and consumers of plant-based food products grown on soil treated with Seller .

Scientific novelty of the work.

It consists in the fact that for the first time, multi-faceted studies were conducted on the toxicological and hygienic assessment of the new, promising insecticide Seller and a set of hygienic regulations was developed to ensure the safety of its use in agriculture, taking into account factors characteristic of the soil and climatic conditions of Uzbekistan and other Central Asian republics (soil type, irrigation conditions, etc.).

Objects and methods of research

The object of the study was the insecticide Seller 20% k.s. produced by OOO Euzo - Team , Uzbekistan - Germany . The name of the active substance is alpha-cyano-3-phenoxytensyl (2,2-dichlorovinyl)-2,2-dimethylcyclopropane-carboxylot. Chemical class c- synthetic pyrethroid , purpose - insecticide.

Scope of application: wheat-bug-harmful turtle, common leech, flea beetles of the leaf beetle family, aphids, thrips of the phleothripidae family , gray grain moth.

Materials and their discussion. Seller 20% k.s. is a non-systemic insecticide of contact and abdominal action with a pronounced residual effect on treated plants . – non -systemic insecticide of contact and abdominal action with a pronounced residual effect on treated plants. Preparation form of the preparation. Aggregate state – suspension concentrate, white (light cream) in color with a weak chemical odor. The preparation is not volatile, not explosive , does not have corrosive properties.

The study of acute toxicity was carried out on laboratory animals - rats of both sexes when it was introduced into the stomach of experimental animals in doses of 50.0 - 500.0 mg / kg Based on the experiment, the average lethal dose was established at the level of 300.0 (204.0 ± 395.0) mg/kg of body weight, LD₁₆ – 120.0 mg/kg; LD₈₄ – 440.0 mg/kg.

The clinical picture of poisoning was as follows: animals became lethargic, nasal discharge, increased salivation, difficulty breathing, animals assumed a lateral position, after which clonic convulsions were

observed. Thus, according to the parameters of acute toxicity, the drug belongs to hazard class III, according to SanPiN RUz No. 0321-15 "Hygienic classification of pesticides by toxicity and hazard". Skin irritant effect of the drug on the eyes and skin was studied. The drug was administered in its native form into the conjunctival sac of the animal's eye in the amount of 2-3 drops, the second eye served as a control. Redness and lacrimation were observed in the experimental eye of the animal 1 hour after administration. Minor suppuration and blepharospasm were observed 4 hours after administration. On the 3rd day, the observed signs of irritation (conjunctivitis) tended to decrease and disappeared on the 4th-5th day of the experiment. Based on the conducted studies, it can be concluded that the drug has an irritating effect on the mucous membranes of the eyes.

Skin irritant action of insecticide *Seller* on experimental animals - white rats. The preparation was applied to the clipped skin areas in its native form, after 4-hour exposure the preparation was washed off and observations of the experimental skin areas were carried out. Immediately after removing the application, redness, swelling and isolated cracks were noted on the experimental areas. The observed signs of irritation were noted for 3-4 days, by the 5th day of the experiment there were no signs of irritation. Based on the experiment, it was established that the preparation has an irritating effect on the skin.

The cumulative properties of the drug were studied in a subchronic (4 month) experiment on white rats, which were divided into 2 groups. The first group received the drug at a dose of $1/10$ LD₅₀ (30 mg/kg). The second group served as a control. Due to the absence of animal deaths, it was not possible to calculate the cumulation coefficient. However, based on the manifestation of some signs of intoxication (excitement after administration of the drug), it can be concluded that the drug has weak functional cumulation.

Based on the study of the chronic toxicity of the drug using mathematical modeling, the threshold and ineffective doses were established at the level of 3.0 and 0.6 mg/kg, respectively. The permissible daily dose of the drug was calculated and scientifically substantiated at the level of 0.72 mg/person/day.

The long-term effects of the drug on the body of experimental animals were studied.

The study of the long-term effects of the drug was conducted in a two-year experiment on rats.

During the experiment for 2 years, the carcinogenic effect of the preparation was not revealed. The number of neoplasms in the experimental groups of animals did not exceed the spontaneous control level. Signs of teratogenicity, embryotoxicity and mutagenicity were also not noted. Thus, the insecticide *Seller* 20% k.s. does not have a carcinogenic, teratogenic, embryotoxic and mutagenic effect. In order to establish the maximum permissible concentration (MPC) of the preparation in water bodies, studies were conducted to study the effect of the preparation on the organoleptic properties of water and the sanitary regime of water bodies. According to the effect on the organoleptic properties of water (odor), the threshold concentration was set at 0.04 mg/l. The preparation in this concentration did not foam and did not change the color of the water. According to the sanitary and toxicological experiment, the threshold concentration was set at 0.72 mg/l.

The complex of conducted studies, taking into account the data of the sanitary-toxicological experiment, allowed us to recommend the MAC of the drug in the water of reservoirs at the level of 0.04 mg/l, the limiting indicator of harmfulness is organoleptic.

Based on data on the stability of the preparation, toxicometric parameters, and guided by generally accepted approaches to standardizing pesticides in food products in hygienic practice, the maximum permissible level (MPL) of the preparation is recommended: in wheat – 0.18 mg/kg.

However, taking into account the minimum consumption rates of the preparation – 0.05 l/ha, there should be no residual amounts of the preparation in wheat.

Guided by methodological approaches to the standardization of harmful substances in the air (methodology-2014. With AnPiN of the Republic of Uzbekistan No. 0293-11), taking into account

the toxicological parameters and its physicochemical properties, maximum permissible concentrations (MPC) are substantiated and recommended by calculation insecticide Seller in the atmospheric air at the level of 0.002 mg/m³ ; in the air of the working area – 0.24 mg/ m³ .

The calculation of the approximate permissible concentration (APC) of the preparation in the soil was carried out in accordance with the methodological manual “Methods of complex and accelerated standardization of pesticides in environmental objects - 2014”

The calculation was based on the data of the maximum permissible level of the preparation in food products of plant origin. The approximate permissible concentration of the insecticide in the soil was proposed at the level of 0.2 mg/kg.

Conclusion

Based on the conducted experimental studies and examination of the provided documentation, it was established: Seller 20% k.s. is a non-systemic insecticide of contact and abdominal action with a pronounced residual effect on treated plants. The drug exhibits an effect directed against eating. The scope of application is on wheat against harmful turtles, leeches. The insecticide affects the intestinal tract and nervous system of insects. The effect appears immediately after treatment within the first hour. The period of protective action is one full season. Spraying during the growing season. The period of the last treatment before harvesting is 15 days. According to the parameters of acute toxicity, the drug belongs to hazard class III (SanPiN RUz No. 0321-15). The study of the effect of the drug on the mucous membranes of the eyes of experimental animals made it possible to establish that the drug has an irritating effect on the mucous membranes of the eyes and skin. The study of the cumulative properties of the drug made it possible to establish that the drug has a functional cumulation. The permissible daily dose is scientifically substantiated at the level of 0.72 mg/person/day. The insecticide Seller 20%k.s does not have carcinogenic, mutagenic, embryotoxic effects.

Based on a set of conducted studies, hygienic standards Seller 20%k. a have been developed and recommended: MAC in water of reservoirs at the level of - 0.04 mg/l (limiting sign of harmfulness - organoleptic); MAC in the air of the working zone - 0.24 mg/m³ ; MAC in the atmospheric air - 0.002 mg/m³ ; MDU in wheat - 0.18 mg/kg, APC in soil - 0.2 mg/kg. Sanitary protection zone (SPZ) - 200 meters; time of returning to work - 7 days.

Thus, based on the above, the insecticide Seller 20% k.s. can be recommended for use in agricultural practice, subject to the mandatory use of personal protective equipment for the eyes, skin, respiratory organs (irritates eyes and skin) and compliance with the regulations for the use of the drug, recommended consumption rates and safety measures when working with pesticides.

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