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EVALUATION OF DOMESTIC COTTON DEFOLIANT "THIODEF" AND ITS REGULATION IN ENVIRONMENTAL OBJECTS AND FOODSTUFFS

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ABSTRACT

The article presents the data of toxicological-hygienic studies of domestic cotton defoliant "TioDEF". Based on conducted research, the degree of toxicity and danger of the preparation is established, hygienic norms in objects of the environment and foodstuffs are scientifically grounded. Regulations for the safe use of defoliant in agriculture are recommended.

Keywords: defoliant, toxicity, environment, regulations, normative, water, air, soil, food products.

Introduction: The tasks of public health protection can be successfully solved only in the presence of information on the behavior of chemical substances in different environments and comprehensive consideration of their impact on the human body. Scientific data and methodological developments in the hygiene and toxicology of pesticides served as a basis for creating a specialized type of state sanitary supervision in the general health care system. currently, one of the main problems of agriculture is the introduction of low-toxic, non-stable, import-substituting pesticide preparations. Domestic hygienists have significantly contributed to the problem of environmental protection under conditions of production and intensive use of pesticides in certain sectors of the national economy, including cotton growing. Scientists of the republic are conducting multifaceted research on the development, synthesis and introduction of new domestic defoliants into agricultural practice [4, 5]. Together with the Institute of General and Inorganic Chemistry of the Academy of Sciences of the Republic of Uzbekistan, we conduct complex studies of a new defoliant "TioDEF". Obtaining a complex active defoliant with fungicidal properties and containing nutrients is an important task of the

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chemical industry. Thiocarbamide, besides containing nutrients, has fungicidal properties [6]. The use of thiocarbamide and its compounds together with defoliant leads to early maturation of the crop and protects it from bacteria and mold, reduces agrochemical treatment and makes it possible to obtain high-quality cotton fiber. "TioDEF" - defoliant, the field of application - agriculture, recommended for use on cotton as a defoliant; spraying carries out the treatment.

Research materials and methods. Hygienic, toxicological, biochemical and statistical methods of research were used. Experimental studies were conducted following the "Methodology of complex and accelerated rationing of pesticides in environmental objects" [3]. [3]. The toxicity and hazard of the preparation were determined according to SanPiN No. 0321-15 "Hygienic classification of pesticides by toxicity and hazard" [1] [1], GOST 32436-2020 "Test methods for the effects of chemical products on the human body (tests to assess acute irritating effect)" [2]. [2].

A new cotton defoliant "TioDEF" was studied. Physico-chemical properties of the preparation - transparent liquid, with a faint odor; composition of the preparation: mass fraction of sodium chlorate - 38.2%, urea - 21.5%, thiocarbamide - 1.5%, water - the rest; specific gravity - 1.37 g/cm³.

Results and Discussion. Acute toxicity of the preparation was studied on 3 types of laboratory animals (white rats, white mice, and rabbits). 18 white rats were taken into the experiment and divided into 3 groups, which were intragastrically administered the drug in doses of 1000.0 - 3000.0 - 5000.0 mg/kg; the average lethal dose of the drug for white rats was set at 3450.0 mg/kg, LD₁₆ - 2300.0 mg/kg, LD₈₄ - 4550.0 mg/kg. White mice - received the drug intragastrically at doses of 1500.0 - 2000.0 - 2500.0 - 3000.0 - 3500.0 mg/kg of animal body weight; the mean lethal dose was set at 2550.0 (2867.75 ÷ 2232.25) mg/kg. Rabbits were enterally administered the drug in doses of 4700.0 - 5900.0 - 7100.0 mg/kg, which made it possible to establish the average lethal dose (LD₅₀) at the level of 5900.0 mg/kg. Manifestations of acute intoxication were expressed in the lethargy of animals, decreased motor activity, and hair ruffling and were homogeneous for all types of laboratory animals. As a result of studies, it was established that defoliant "MCA" according to the parameters of acute toxicity, belongs to the substances of IV class of hazard - low hazardous compounds (SanPiN RUz № 0321-15) [1].

The irritating effect of the drug. Eye mucous membranes - experiments were carried out on 3 rabbits, the drug was introduced into the right eye in its native form, and the left eye served as a control. Immediately after the injection, the animals were restless, snorting. In 30 minutes, slight lacrimation was observed. In 1 hour - slight hyperemia, insignificant mucous discharge from the experimental eye, subsequently forming a film on the eye, wool around the eyes moist. The tendency to decrease the signs of irritation was observed by the end of the working day. After 24 hours from the beginning of the experiment - the animals had insignificant mucous discharge from the eyes. After 48 hours, the signs of irritation were absent. Thus, the drug belongs to compounds with moderate irritating effects on the eyes' mucous membranes according to the irritative action's severity. Dermal irritating effect - experiments were carried out on 5 white rats, to which the drug in its native form was applied to the cut skin areas in the abdomen region. After 4-hour exposure, the preparation was washed off with running water and the experimental skin areas were observed. Medium degree hyperemia was

observed on the experimental areas, which disappeared by the end of the working day. Conclusion: the preparation has a slightly irritating effect on the skin.

Experimental studies on the study of cumulative properties of the drug were carried out under conditions of a 2-month experiment. The experimental animals were administered the drug at a dose of 1/10 LD₅₀. Throughout the whole experiment, no death of animals was observed, therefore, it was not possible to calculate the cumulation coefficient. The introduction of the drug into the body of experimental animals resulted in insignificant changes in biochemical parameters, which were restored after a 30-day recovery period. Based on the above stated, it can be concluded that the defoliant "TioDEF" has weak cumulative properties.

Hygienic norms of the preparation in environmental objects. Plant protection agents used in agriculture, when getting into the water of water bodies, can deteriorate the organoleptic properties of water, giving it an unpleasant odor and taste. In order to substantiate the maximum permissible concentration (MPC) in water bodies, experiments on the effect of the preparation on the organoleptic properties of water were conducted. As a result of the research, it was found that the preparation gives water a weak odor when it gets into the water. Concentrations of the preparation from 0.5 - 3.5 mg/l were studied. According to the data of most odorants, the threshold concentration was set at 1.5 mg/l. According to the results of the graphical method, the threshold concentration was found to be 1.5 mg/L, and the practical limit was 3.2 mg/L. Given the fluctuation of threshold values caused by the individuality of odorators, the obtained data were processed by the statistical method of Student-Fisher with consideration of popping values, which allowed to establish the threshold concentration at the level of 1.6 mg/l, practical threshold - 1.8 mg/l. Analyzing materials to study the drug's effect on water's organoleptic properties allows us to consider odor as a limiting sign of harmfulness, threshold - 1.5 mg/l. Based on the above, considering the data of the sanitary-toxicological experiment (threshold 1.2 mg/l), the MPC of the drug in water bodies is recommended at the level of 1.0 mg/l, the limiting sign of harmfulness is sanitary-toxicological.

Taking into account generally accepted in hygienic practice methods of rationing of harmful substances in the air, based on toxicological studies, MAC in the atmospheric air - 0.2 mg/m³, MAC in the air of the working zone - 2.5 mg/m³ were calculated and scientifically justified.

The approximate permissible concentration of the drug in soil was calculated following the "Methodology of complex and accelerated rationing of pesticides in environmental objects" [3]. [3]. According to the generally accepted calculation formula, the RAC of the drug in soil was recommended at the level of 0.39 mg/kg. Taking into account methodological approaches to rationing of pesticides in foodstuffs, it is recommended that the MPC of the drug in cotton oil is "not allowed". Hygienic regulations of the safe application of defoliant "TioDEF" were developed and recommended: sanitary protection zone (SPZ) - 100 meters, time of going to work - 3 days.

Conclusion.

Defoliant "TioDEF" - according to the parameters of acute toxicity, belongs to low toxic substances according to SanPiN RUz № 0321-15 (IV class of hazard); it has a slightly irritating effect on the skin, moderately irritates the mucous membranes of the eyes, cumulative weakly expressed. From hygienic positions, the use of defoliant "TioDEF" in agriculture of the republic has no objections

and can be recommended for wide application. The conducted laboratory-experimental studies on the scientific substantiation of hygienic standards and regulations of safe application will be used for subsequent environmental monitoring of defoliant application.

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