

## SAFETY OF APPLICATION OF NEW PESTICIDE PREPARATIONS INTRODUCED INTO AGRICULTURE OF THE REPUBLIC

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**Abstract.** The article presents data on toxicological and hygienic characteristics of new plant protection means introduced into the Republic's agriculture. As a result of the research, it was established that new pesticides are low hazardous; they have irritating effects on mucous membranes of eyes and skin in different degrees; they have functional cumulation. Hygienic norms and standards of pesticides in environmental facilities and regulations for their safe use - sanitary protection zones and employment terms.

**Keywords:** defoliant, herbicide, seed disinfectant, insecticide, hygiene, toxicity, medium dosage, irritation, standard, safety, environment, agriculture.

### Introduction.

One of the most important public environmental and human health objectives is preventing pesticide pollution in the biosphere. To address this, a strict system of preventive state supervision over the use of pesticides is in place [3]. Hygienic institutions thoroughly study each new pesticide product. Its introduction into agricultural production is carried out only after a comprehensive discussion of hazard study results and assessment. Long-term world experience in the use of chemical plant protection agents allowed to improve the criteria of their sanitary and hygienic assessment and to develop requirements, strict

fulfillment of which ensures the safety of applied pesticides for human, useful fauna flora. Great success in the development of hygiene of pesticide use was achieved by domestic science and practice. In recent decades, in-depth studies on widely used and newly recommended pesticide formulations have continued [2]. The character of their action on various organs and systems was studied, the mechanism of action was specified, stability, transformation processes in living organisms and other objects of the environment were studied. New pesticide formulations and technologies of their application were evaluated. Widely planned research on the substantiation of hygienic rules of pesticide use in different agriculture branches was conducted.

As a result of this work, new data on pesticide hazards were obtained and preventive measures were improved. Some pesticides hazardous to the biosphere have been removed from the list of those permitted for use in agriculture. In return, they have been introduced or are being introduced into agricultural practice more effective, economically beneficial and less dangerous for the environment and human health domestic means of plant protection.

**Research materials and methods.** Hygienic, toxicological, biochemical and statistical methods were used in the research. The research was conducted following the "Methodology of complex and accelerated normalization of pesticides in the environment objects." [4, 5]. New plant protection agents (pesticides) were studied: defoliant "Fankalciydef", herbicide "Mefasin", insecticide "Nano-chitosan", defoliant "Fanbaraka", insecticide "Succinate chitosan", fungicide "Kuprum-hit", defoliant "Phosphodef", cotton defoliant "Ecodef".

**Research results.** One of the most important government tasks for environmental and human health protection is preventing the biosphere [1]. To solve this problem, a strict system of preventive state supervision over pesticides was established [3]. Hygienic institutions thoroughly examine each new pesticide. It is only introduced into agricultural production after a comprehensive discussion of the hazard study results and assessment [3]. The research was conducted under the grant project HS-2017091231 "Development of toxicological and hygienic norms of new domestic import-substituting pesticides in environmental facilities and justification of measures on protection of public health."

Complex toxicological and hygienic studies on new domestic pesticide preparations were conducted: cotton defoliant "Fankalciydef," herbicide "Mefasin," insecticide "Nanohitosan," defoliant "Fanbaraka," insecticide "Succinate chitosan," fungicide "Kuprumhit," defoliant "Phosphodef," Cotton defoliant "Ecodef" to develop hygienic recommendations to justify safety regulations for the use of new pesticides in agriculture.

Cotton defoliant "Fankalciydef" by parameters of acute toxicity belongs to IV class of danger (Sanitary Regulations, Norms and Hygienic Norms of the Republic of Uzbekistan № 0321-15) [8], has a slightly irritating effect on mucous membranes of the eyes and skin. The study of the preparation's cumulative properties allowed to establish that the preparation has weak functional cumulation established by changing carbohydrate metabolism, the enzymatic activity of blood serum during the experiment, with normalization of parameters after a 30 day recovery period. Threshold and maximum inactive doses of the preparation at the level of

4.0 and 0.8 mg/kg of body weight have been established, based on which the acceptable daily dose for a person at the level of 1.6 mg/person/day has been scientifically proved. The study of the preparation influence on organoleptic properties and a sanitary regime of water bodies allowed to establish threshold concentration and limiting sign of harmfulness at the level of 1.0 mg/l (limiting sign of harmfulness organoleptic - odor). Considering the data of sanitary and toxicological studies, the maximum allowable concentration of the preparation in the water of reservoirs - 1.0 mg/l was developed and scientifically proved. The study of hygiene of the pesticide use in agriculture and a set of hygienic and toxicological studies allowed to develop scientifically substantiated hygienic standards for the pesticide in environmental facilities: maximum allowable concentration in water - 1,0 mg/l; maximum allowable concentration in atmospheric air - 0,2 mg/m<sup>3</sup>, maximum allowable concentration in the working zone - 3,0 mg/m<sup>3</sup>; approximate allowable concentration in the soil - 1,15 mg/kg; maximum allowable level in cotton oil - "not allowed"; sanitary protection zone - 100 m; terms of working after-treatment of the field with the preparation - 5 days. For the development of recommendations on improvement of working conditions of the workers of "Fankalciydef" calcium defoliant liquid chlorate production shop and mechanics of the drivers, who carry out defoliation of cotton with "Fankalciydef" defoliant, researches on a study of working conditions and their influence on the functional condition of different systems of the working organism (central nervous, cardiovascular, thermoregulatory, visual analyzer, attention function) were conducted. The study of the technological process of calcium defoliant "Fankalciydef" liquid chlorate production and working conditions of apparatuses and operators of "Fankalciydef" defoliant production shop allowed to establish that in the process of working activity, apparatuses and operators are exposed to the unfavorable influence of carbon dioxide, chlorine vapors, hydrochloric acid vapors and dust. In the breathing zone of apparatuses of local control panels, the concentration of carbon dioxide was lower than the maximum permissible concentration, chlorine vapors exceeded the maximum permissible concentration by 1.2 times, hydrochloric acid vapors by 1.04 times, dust by 1.06 times. In the central control panel operators' breathing zone, the content of harmful chemical substances and dust did not exceed the maximum allowable concentration. At the workplaces of apparatuses of local control panels, the noise is fixed, the equivalent level of 86 dBA, of operators of the central control panel - 84 dBA. In the cold period of the year, the apparatuses and operators work in cooling conditions, and in the warm period of the year - heating microclimate. The labor process of apparatuses and operators is tense. According to the aggregate of harmful production factors, working conditions of apparatuses and operators of "Fancalciumdef" calcium defoliant liquid chlorate production shop belong to class 3 of the 3rd degree of harmfulness. The professional risk of workers of "Fancalciumdef" liquid calcium chlorate production shop is higher than average. There is a probability of the development of neurotic disorders, hypertension and coronary artery disease. The study of working conditions of mechanics-drivers allowed to establish: according to the set of harmful production factors, working conditions of mechanics-drivers, who produce defoliation of cotton with "Fancalciumdeph" defoliant belong to the 3rd class of 3 degrees of harmfulness, and the level of professional risk of development of professionally caused diseases is above average [10].

The herbicide "Mephasin" by parameters of acute toxicity belongs to the III class of hazard. The study of acute toxicity on three types of laboratory animals allowed to establish that the drug has no species sensitivity. The preparation has a slightly irritating effect on the eyes' mucous membranes and at 4-hour exposure of the preparation on the skin causes slight irritation of skin cover. Herbicide "Mephasin" in the study of the cumulative properties of the drug causes changes in the pigment and carbohydrate function of the liver, which is manifested in increasing the content of total and bound bilirubin, glucose, amylase, alkaline phosphatase and cholesterol in serum; the most sensitive and stable indicator at repeated exposure to herbicide "Mephasin" is an increase in the activity of alanine, asparagine-transferase in serum; during the experience and after one month of the recovery period in the indicators of biochemical processes in serum there were no deviations from the norm; when studying the cumulative properties of herbicide "Methasine" took into account changes in the indicators - carbohydrate, protein, pigment and lipid (cholesterol) metabolism and after cessation of potency during the recovery period were at the control level. The aforesaid testifies that the preparation has a mild accumulation of functional character. The acceptable daily dose for a person at the level of 0.72 mg/person/day has been calculated and scientifically proved. Studies on the effect of the preparation on organoleptic properties of water allowed to establish that the limiting sign of the water preparation's harmful effect is an odor - concentration of 0.4 mg/l. Considering the obtained data of sanitary-toxicological experiments and results in the experiment, the maximum allowable concentration of the preparation in reservoirs' water was recommended at the level of 0.4 mg/l. Hygienic standards of the preparation in environmental objects were recommended: maximum allowable concentration in the air - 0,1 mg/m<sup>3</sup>, maximum allowable concentration in the air of working zone - 2,0 mg/m<sup>3</sup>; approximate allowable concentration in the soil - 0,5 mg/kg, maximum allowable level in cotton oil - "not allowed," in rice - 0,025 mg/kg; sanitary protection zone - 100 meters, terms of going to work after treatment with the preparation - 5 days. Field tests of the preparation have shown that composite herbicide "Mefasin" in the amount of 1.5 kg/ha provides highly effective weed control when certain substances at low consumption rates become useless for weed control. This is explained by the synergetic effect, which allows reducing the rates of application of active substances, expanding the range of action of herbicide drug and ensuring the destruction of harmful weeds with less labor and money.

The insecticide "Nanochitosan" [6] in terms of parameters of acute toxicity, belongs to the IV class of danger (Sanitary Regulations, Norms and Hygienic Regulations of the Republic of Uzbekistan № 0321-15), has an irritating effect on the mucous membranes of the eyes, does not irritate the skin. The studies on potential cumulative properties of the preparation have been conducted. As a result of the preparation's biological effect, there were no changes in blood cholinesterase activity and the summation-threshold indicator. The absence of changes in blood biochemical parameters during the whole observation and animal death allows concluding that the preparation has no cumulative properties. The threshold and inactive doses in chronic experience at the level of 20.0 and 4.0 mg/kg, respectively, have been established at the application of mathematical modeling methods, based on which the permissible daily dose for a person at the level of 4.8 mg/person/day has been calculated and scientifically proved. To establish the maximum allowable concentration of water preparation,

the effect of the preparation on the organoleptic properties of water was studied. In the experiment, the preparation concentrations from 0.17 to 8.0 mg/l were used. The results of the study showed that the preparation gives water a specific odor and bitter-oxygen flavor. The threshold of smell at 20°C (1 point) is 0.35 - 0.70 mg/l, the practical limit (2 points) is 0.35 - 1.50 mg/l. The odor threshold is between 1.0 - 3.0 mg/l; the applicable threshold is between 3.0 - 7.0 mg/l. Proceeding from the above mentioned, it can be concluded that the limiting sign of the harmful effect of the preparation on organoleptic properties of water is its odor - 0.4 mg/l. The preparation in the threshold concentration by smell did not affect foaming, color, water transparency, and a sanitary water body regime. Considering the data from the sanitary toxicological experiment, the maximum allowable concentration of the preparation in reservoirs' water was recommended at the level of 0.4 mg/l. Based on generally accepted in hygienic practice methodological approaches to the rationing of harmful substances in the air, food products, soil, taking into account the data on the toxicity of the preparation, physical and chemical properties of the preparation are recommended by calculation: maximum permissible concentration in the air of the working zone at the level - "not allowed"; maximum permissible concentration in the air of the working zone at the level - 8,0 mg/m<sup>3</sup>; maximum permissible level in cotton oil - "not allowed," maximum permissible level in vegetables - 0,2 mg/kg; approximate permissible concentration of the preparation in the soil at the level of 0,55 mg/kg [11]; regulations for safe use: sanitary protection zone - 50 meters, terms of work after-treatment of the field with the preparation - 3 days.

Defoliant "Fanbaraka" by parameters of acute toxicity belongs to substances of IV class of danger (low hazardous substance, Sanitary rules, norms and hygienic norms of the Republic of Uzbekistan № 0321-15) [8]. Experimental studies of pos-volioli establish the average lethal dose of the preparation (LD<sub>50</sub>): for white rats at the level - 4250.0 mg/kg, LD<sub>16</sub> - 2375.0 mg/kg, LD<sub>84</sub> - 6100.0 mg/kg; for white mice at the level - 4025.0 mg/kg, LD<sub>16</sub> - 3275.0 mg/kg, LD<sub>84</sub> - 4750.0 mg/kg; for rabbits at the level - 4700 mg/kg. The product has a mild irritant effect on the eyes' skin and mucous membranes, has poor functional cumulation. As a result of the study of the preparation's chronic toxicity, the threshold and maximum inactive doses of the preparation at the level of 7.5 and 1.5 mg/kg have been established. Based on the obtained data, the acceptable daily dose for a person - 1.8 mg/person/day was calculated and scientifically proved. The problem of protecting water bodies from pollution due to its wide national and cultural significance and the resulting differences in water use made it necessary to differentiate the objectives and methods of scientific research and practical activities in health, agriculture and other sectors of the economy. Research on the effect of the preparation on organoleptic properties of water aimed to determine the threshold concentration of the preparation in terms of its effect on smell, flavor, color, transparency and foam. It was found that the preparation gives it a specific aromatic-tic smell and flavor when it gets into the water. The odor perception threshold (1 point) was 1.0 mg/l; the applicable threshold (2 points) was 2.0 mg/l. The statistical treatment results postulate that the odor threshold concentration was 1.03 mg/l, while the practical threshold was 2.0 mg/l. The threshold concentration preparation did not change the watercolor, transparency, and foam formation and did not affect the smell. Considering the conducted researches and data of sanitary and toxicological experiments (threshold concentration of 1.6 mg/l), MPC of the preparation in

the water of reservoirs is recommended at the level of 1.0 mg/l, limiting sign of harm - organoleptic (smell). Based on generally accepted approaches to hygienic rationing of harmful substances in the air, soil and food products, taking into account the parameters of toxicity and physical and chemical properties of the preparation, are scientifically grounded and recommended: maximum permissible concentration in the air - 0,2 mg/m<sup>3</sup>, maximum permissible concentration in the air of the working zone - 3,0 mg/m<sup>3</sup>; approximate permissible concentration of the preparation in the soil at the level of - 0,6 mg/kg; maximum allowable level in cotton oil at the level - "not allowed," maximum allowable level in potatoes - 0,2 mg/kg; sanitary protection zone - 100 meters, terms of coming to work after-treatment of the field with the preparation - 5 days.

The insecticide "Succinate chitosan" [7] in terms of acute toxicity parameters, belongs to the IV class of danger, has no skin-irritating effect, irritates the mucous membranes of the eyes; cumulative properties are poorly expressed, have a functional character. An acceptable daily dose (DSD) for humans at the level of 3.6 mg/person/day is recommended. Hygienic norms and regulations for the use of the drug in agriculture: maximum permissible concentration in water of reservoirs - 1,0 mg/l, maximum permissible concentration in air of working zone - 7,0 mg/m<sup>3</sup>, maximum permissible concentration in atmospheric air - 0,7 mg/m<sup>3</sup>; approximate permissible concentration in the soil - 1,15 mg/kg, maximum permissible level in cotton oil - "not allowed"; sanitary-protective zone - 50 meters, terms of work after-treatment of the field with the preparation - 3 days.

Fungicide "Kuprumhit." To establish the acute toxicity of the drug, acute experiments on 3 types of laboratory animals: white rats, mice, rabbits. Doses from 5000 to 13000 mg/kg were studied on white rats. In the experiment, 30 white rats weighing 180-200 grams were taken, divided into 5 groups of 6 individuals in each. Toxicometry parameters were studied on 50 white mice, injected in doses from 5000 to 9000 mg/kg of animal weight. Animal deaths were not observed in any of the experimental groups. On experimental animals - rabbits, a setting of upper parameters of toxicity was carried out by the Deichmann Le Blanc method. Due to the absence of animal death, it was impossible to calculate the preparation's average lethal dose. Thus, the average lethal dose of the preparation was determined at the level of more than 5000,0 mg/kg for all kinds of animals that allow concluding: the preparation belongs to IV class of danger (low-toxic compounds) according to Sanitary rules, norms and hygienic norms of the Republic of Uzbekistan № 0321-15. The preparation has a slightly irritating effect on eyes and skin; the preparation has weak functional cumulation. The study of chronic toxicity of the preparation using mathematical modelling methods allowed to establish the threshold and non-acting doses at the level: 30.0 and 6.0 mg/kg, respectively. The permissible daily dose at the level of 7.2 mg/person/day was calculated and scientifically proved based on the received data. As a result of experiments on the effect of the preparation on water's organoleptic properties, it was established that the preparation gives water-specific flavor and insignificant smell. To establish threshold concentrations on flavor and odor, a mass method of research was used, in which odorators and tasters participated. The trials were conducted with concentrations of the preparation from 0.3 to 40.0 mg/l. Based on conducted experiments, taking into account the data of sanitary and toxicological studies, the maximum allowable concentration of the preparation in the water of reservoirs was recommended at the

level - 3,0 mg/l (limiting sign of harm - organoleptic - flavor). It was recommended: maximum allowable concentration of the preparation in the atmospheric air - 0,1 mg/m<sup>3</sup>; maximum allowable concentration in the air of the working zone - 10,0 mg/m<sup>3</sup>, the maximum allowable level of the preparation in the products of plant origin (cotton oil) - "not allowed"; approximate allowable concentration in the soil at the level - 1,15 mg/kg; sled-protective zone - 50 meters, terms of work after the field treatment with the preparation - 3 days.

Defoliant "Phosphodef." Experimental studies to determine the parameters of toxicity of the drug were conducted on 3 types of laboratory animals: white rats, mice, rabbits. As a result of the research, the average lethal dose (LD50) for white rats - 4000.0 mg/kg, LD16 - 2600.0 mg/kg, LD84 - 6300.0 mg/kg; mice: LD50 at the level - 3450.0 mg/kg, LD16 - 2300.0 mg/kg, LD84 - 4550.0 mg/kg; rabbits - 3900.0 mg/kg. In terms of acute toxicity parameters, the preparation belongs to IV class of danger - low-toxic compounds (Sanitary Regulations, Norms and Hygienic Norms of the Republic of Uzbekistan № 0321-15). The preparation has a slightly irritating effect on the mucous membranes of the eyes and skin. The study of cumulative properties of the preparation was carried out on 40 white rats. Animals were divided into 2 groups of 20 animals each. The first group of animals received the dose 1/10 of the average lethal dose (LD50).

The second group served as a control. Throughout the whole experience of animals' death, there were no observed changes in some biochemical parameters of experimental animals' blood. As a result of experimental studies, it was found that the preparation has weak functional cumulation. The studies of chronic toxicity of the preparation were carried out using mathematical modeling methods. Threshold and inactive doses were established at the levels: 10.0 and 2.0 mg/kg, respectively. The acceptable daily dose at the level of - 2.4 mg/person/day was calculated and scientifically proved. To ration the preparation in water reservoirs, the preparation on the organoleptic properties of water was studied. As a result of the experiments, it was established that the preparation gives an insignificant smell to the water. The researches were carried out based on "concentration-effect" dependence taking into account odorators' reaction. Studying of influence of chemical substances on the organoleptic properties of water is obligatory, as, for many substances, the exactly organoleptic sign of harmfulness is the limiting one at substantiation of maximum permissible concentration. In the established threshold concentration by smell (0.9 mg/l), the preparation did not affect transparency, color, and water foaming. Based on the conducted experiments, taking into account sanitary and toxicological studies (2.4 mg/l), the maximum allowable concentration of the preparation in the water of reservoirs was recommended at the level - 0.9 mg/l (the limiting sign of harmfulness is organoleptic). Taking into account the generally accepted methodical approaches to the rationing of harmful substances in the air, based on the data on the toxicity of the preparation, physical and chemical properties, the maximum permissible concentration of the preparation in the air - 0.2 mg/m<sup>3</sup>; maximum permissible concentration in the air of the working zone - 3.0 mg/m<sup>3</sup> was recommended by calculation. The maximum allowable concentration of the preparation in cotton oil is recommended at the level - "not allowed" in fruits - 0.4 mg/kg, in vegetables - 0.45 mg/kg; approximate allowable concentration of the preparation in the soil - 0.01 mg/kg; regulations for safe use: sanitary protection zone - 100 meters, terms of work after treatment with the preparation - 3 days.

Defoliant "Ecodef" [9]. Experimental studies were conducted on 3 types of laboratory animals: white rats, mice, rabbits. It was found that in terms of parameters of acute toxicity, the preparation belongs to the IV class of danger - low-toxic compounds have a slightly irritating effect on the mucous membranes of eyes and skin. The preparation's cumulative properties were studied on 40 white rats, which were divided into 2 groups of 20 individuals each. The first group of animals received the preparation in a dose of 1/10 of the average death dose (LD50). The second group served as a control. There were no animal deaths during the whole experience. The study of some biochemical parameters of experimental animals' blood revealed statistically reliable changes in critical parameters. According to the research results, it can be concluded that the drug has weak functional cumulation. Chronic toxicity of the preparation was studied using mathematical modeling methods. Threshold and inactive doses at the level of 5.0 and 1.0 mg/kg, respectively, were established; an acceptable daily dose for a person at the level of 1.2 mg/person was recommended. To substantiate the maximum allowable concentration of the preparation in the water of reservoirs, experiments were carried out in conditions of model reservoirs to study the influence of the preparation on the organoleptic properties of water. Concentrations of the preparation from 0,1 to 10,0 mg/l were tested in the experiment. The results of the study showed that the preparation gives it a slight smell when in water. The threshold of smell was at the level from 0.25 to 2.0 mg/l. Statistical treatment data allow to consider the threshold concentration by smell - 0.89 mg/l, practical limit - 2.0 mg/l. In the established threshold smell concentration (0.8 mg/l), the preparation did not affect water taste, color and foaming. Based on the conducted experiments, taking into account sanitary toxicological studies (1.2 mg/l), the maximum allowable concentration of the preparation in the water of reservoirs was recommended at the level - 0.8 mg/l (the limiting sign of harmfulness - organoleptic). It is recommended: maximum permissible concentration of the preparation in the air - 0,2 mg/m<sup>3</sup>; maximum permissible concentration in the air of the working zone - 3,3 mg/m<sup>3</sup>, the maximum permissible level of the preparation in cotton oil - "not allowed," tentative permissible concentration of the preparation in the soil - 0,15 mg/kg; regulations of safe application: sanitary protection zone - 100 meters, terms of work after-treatment of the field with the preparation - 3 days.

**Discussion of results.** The results of complex hygienic and toxicological studies allowed to establish that all studied new import-substituting means of plant protection (pesticides) belong to IV class of hazard; have an irritating effect on mucous membranes, eyes and skin of different degree; have functional cumulation. Cotton defoliant "Fancalciumdef": maximum allowable concentration in water of reservoirs - 1,0 mg/l; maximum allowable concentration in atmospheric air - 0,2 mg/m<sup>3</sup>, maximum allowable concentration in working zone - 3,0 mg/m<sup>3</sup>; approximate allowable concentration in soil - 1,15 mg/kg; maximum allowable level in cotton oil - "not allowed"; sanitary-protective zone - 100 m; terms of coming to work after field treatment with the preparation - 5 days. According to the aggregate of production factors, the working conditions of the "Fankalciydef" calcium defoliant liquid chlorate production shop belong to the 3rd class of the 3rd degree of harmfulness. Herbicide "Mefasin": Maximum allowable concentration in water of reservoirs - 0.4 mg/l, maximum allowable concentration in atmospheric air - 0.1 mg/m<sup>3</sup>, maximum allowable concentration in

air of working zone - 2.0 mg/m<sup>3</sup>; tentative permissible concentration in soil - 0,5 mg/kg, maximum permissible level in cotton oil - "not allowed", in rice - 0,025 mg/kg; sanitary protection zone - 100 meters, terms of work after-treatment of the field with the preparation - 5 days. During field trials of the preparation, it was established that composite herbicide "Mefasin" in the amount of 1.5 kg/ha provides highly effective weed control, becomes useless for weed control. Insecticide "Nanochitosan": maximum permissible concentration in water - 0,4 mg/l; maximum permissible concentration in atmospheric air - not allowed, maximum permissible concentration in working area - 8,0 mg/m<sup>3</sup>; tentative allowable concentration in soil - 0,55 mg/kg; maximum allowable level in cotton oil - "not allowed", in vegetables - 0,2 mg/kg; sanitary protection zone - 50 meters; terms of work after field treatment with the preparation - 3 days. Defoliant cotton "Fanbaraka": maximum permissible concentration in water of reservoirs - 1,0 mg/l; maximum permissible concentration in atmospheric air - 0,2 mg/m<sup>3</sup>; maximum permissible concentration in air of working zone - 3,0 mg/m<sup>3</sup>; maximum permissible level in cotton oil - "not allowed", in potatoes - 0,2 mg/kg; approximate permissible concentration in soil - 0,6 mg/kg; sanitary protection zone - 100 meters, terms of work after-treatment of the field with the preparation - 5 days. The insecticide "Succinatechitosan": Maximum permissible concentration in water - 1,0 mg/l; maximum permissible concentration in atmospheric air - 0,7 mg/m<sup>3</sup>; maximum permissible concentration in air of working zone - 7,0 mg/m<sup>3</sup>; maximum permissible level in cotton oil - "not allowed"; approximate permissible concentration in the soil - 1,15 mg/kg; sanitary protection zone - 50 meters, terms of work after-treatment of the field with the preparation - 3 days. Seed softener, "Kuprumkhit" fungicide: Maximum allowable concentration of the preparation in the water of reservoirs - 3.0 mg/l (limiting sign of harm - organoleptic - flavor); maximum allowable concentration of the preparation in atmospheric air - 0.1 mg/m<sup>3</sup>; maximum allowable concentration in the air of the working zone at the level - 10.0 mg/m<sup>3</sup>, the maximum allowable level of the preparation in the products of plant origin (cotton oil) at the level - "not allowed"; approximate allowable concentration in the soil at the level - 1.15 mg/kg; sanitary-protective zone - 50 meters, terms of working after the field treatment with the preparation - 3 days. Defoliant cotton "Phosphodef": maximum permissible concentration in water - 0.9 mg/l; maximum permissible concentration in atmospheric air - 0.2 mg/m<sup>3</sup>; maximum permissible concentration in air of working zone - 3.0 mg/m<sup>3</sup>; maximum permissible level in cotton oil - "not allowed", in vegetables - 0,45 mg/kg, in fruits - 0,4 mg/kg; approximate permissible concentration in soil - 0,01 mg/kg; sanitary protection zone - 100 meters, terms of work after treatment with the preparation - 3 days. Defoliant "Ecodef": maximum allowable concentration in water - 0,8 mg/l, maximum allowable concentration in atmospheric air - 0,2 mg/m<sup>3</sup>, maximum allowable concentration in air of working zone - 3,3 mg/m<sup>3</sup>; approximate allowable concentration in the soil - 0,15 mg/kg, maximum allowable level in cotton oil - "not allowed"; sanitary-protective zone - 100 meters, terms of work after-treatment of the field with the preparation - 3 days. A complex of conducted hygienic and toxicological research on new import-substituting pesticides: defoliant "Fankalciydef," herbicide "Mefasin," insecticide "Nanohitosan," defoliant "Fanbaraka," insecticide "Succinate chitosana," fungicide "Kuprumhit," defoliant "Phosphodef," Cotton defoliant "Ecodef" allows concluding that the studied preparations can be recommended for wide use in agricultural practice as low-toxic effective means of plant protection.

**Conclusion.** Development of criteria of safe application of new plant protection means will contribute to preserving population health in areas of the wide use of pesticides, improvement of control over the environment, effective prevention of possible adverse consequences of their use in the Republic's agriculture.

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