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**ECOLOGICAL AND TOXICOLOGICAL PROPERTIES OF THE BIOLOGICALLY ACTIVE COMPLEX OF FURFUROLIDENDIUREA WITH ZINC ACETATE****FURFUROLIDENDIKARBAMIDNING RUX ASETAT BILAN HOSIL QILGAN BIOLOGIK FAOL KOMPLEKSINI EKOLOGIK VA TOKSIKOLOGIK XUSUSIYATLARI****ЭКОЛОГО-ТОКСИКОЛОГИЧЕСКИЕ СВОЙСТВА БИОЛОГИЧЕСКИ АКТИВНОГО КОМПЛЕКСА ФУРФУРОЛИДЕНДИКАРБАМИД С АЦЕТАТОМ ЦИНКА****Askarov Ibrokhim Rahmonovich<sup>1</sup>**<sup>1</sup>Doctor of chemical sciences, Professor, Andijan State University**Isakov Khayatulla<sup>2</sup>**<sup>2</sup>Doctor of technical sciences, professor, Andijan State University**Mukhammedov Saidmurod<sup>3</sup>**<sup>3</sup>Doctoral student(PhD), Fergana Polytechnic Institute**Annotatsiya**

*Ushbu maqolada o'simlikni o'sishida, rivojlanishida va undagi kasalliklarga qarshi kurashishda yuqori biologik faolliklarni namoyon etgan furfural, karbamid va rux asetat asosida olingan preparatning atrof-muxit va inson salomatligiga ta'sirini o'rganish maqsadida olib borilgan tajriba natijalari keltirilgan. Preparatning zaxarlilik darajasi parametrlari, kumulyativ xususiyatlari, surunkali toksiklik, suvda va xavoda ruxsat etilgan me'yorlari aniqlangan.*

**Аннотация**

*В статье представлены результаты экспериментов, проведенных по установлению влияния на окружающую среду и здоровье человека, препарата на основе фурфурола, мочевины и ацетата цинка, показавшего высокую биологическую активность в росте, развитии и борьбе с болезнями растений. Определены параметры уровня токсичности препарата, кумулятивных свойств, хронической токсичности, допустимых норм в воде и воздухе.*

**Abstract**

*This article presents the results of experiments conducted to establish the effect of the drug on the environment and human health, based on furfural, urea, and zinc acetate, which has shown high biological activity in plant growth, development, and combating diseases. The parameters of the drug's toxicity level, cumulative properties, chronic toxicity, permissible standards in water and air have been determined.*

**Kalit so'zlar:** zaxarlilik darajasi, ruxsat etilgan me'yor, atrof-muxit, biologik faol modda, toksik, furfural, karbamid

**Ключевые слова:** уровень токсичности, допустимый предел, окружающая среда, биологически активное вещество, токсичное, фурфурол, мочевина

**Key words:** toxicity level, permissible limit, environment, biologically active substance, toxic, furfural, urea

**INTRODUCTION**

Nowadays, protecting and strengthening the health of the working population, which is the main principle for the economic well-being of the society, is one of the priority problems of environmental protection in the formation of a healthy nation. In agriculture, the protection of plants and their development includes the rational use of agrotechnical, biological and chemical methods, of which the chemical method is currently the most widely used method. An important part of the complex of modern agrotechnical measures of cotton and wheat cultivation is chemical treatment before sowing, improvement of plant development in all growing seasons and protection from pests, diseases, weeds, and defoliation before harvesting [1]. In addition to the indicator of biological activity, chemical preparations used in agriculture have another important indicator, which is their impact on the environment and human health [2]. Therefore, one of the tasks of the chemical industry is to provide low-toxic, biologically active, plant-stimulating agents to achieve high productivity in agricultural production.

**MATERIALS AND METHODS**

In intensive use of land, it is necessary to systematically control the state of its productivity, as well as the degree of contamination of the environment with pesticides, fungicides, and

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herbicides from agricultural products [3]. Modern trends in the development of world agricultural culture indicate the need to solve the problems of environmental protection, preservation of biological diversity and increase of soil fertility at the same time as providing food to the population [4, 5].

Medicinal preparations used in agriculture can enter the human body through plant and animal products [6, 7]. Ecological and toxicological properties of chemical preparations used in agriculture are taken into account by the variability of their distribution in the environment. The level of adverse effects of drugs on people and specific conditions of their use is determined by the presence of their residues in the soil and the effect on the quality of the crop [8, 9].

Taking into account the above, the toxicity parameters of the biologically active drug obtained on the basis of local raw materials furfural, urea and zinc acetate, recommended for agriculture, were studied. The compound of furfuralidenediurea with zinc acetate is a yellowish, non-volatile substance that forms a homogeneous solution when dissolved in water. To determine the level of toxicity of the drug, the toxic properties in warm-blooded animals were studied by a single administration of the animal through the gastrointestinal tract. The main criteria for evaluating the toxic effect of the drug in an acute experiment were: the behavior and general condition of animals, the time of onset of poisoning and death. In addition, experiments were conducted to determine the effect of the drug on the mucous membrane of the eyes and skin, cumulative properties, chronic toxicity, the effect of the drug on the organoleptic properties of water, as well as the permissible standards in air [Sanitary rules and standards, hygienic standards of the republic of Uzbekistan №0321-15].

### RESULTS AND DISCUSSION

In order to determine the average lethal doses of the drug, experiments were conducted on experimental animals - white rats and mice. The average lethal dose ( $LD_{50}$ ) of the drug in white rats is 2040.0 mg/kg ( $LD_{16}$ -1425.0 mg/kg,  $LD_{84}$ -2610.0 mg/kg), for white mice - 3275.0 mg/kg ( $LD_{16}$ -2700, 0 mg/kg,  $LD_{84}$ -3875.0 mg/kg) was determined. Clinical signs of intoxication are expressed in sudden agitation of animals, acceleration of breathing; and later, the animals were gathered in one corner of the cage, and their fur was wet and torn. So, it was determined that the level of toxicity belongs to substances of the 4 hazard class - low-hazard compounds.

In the study of the effect of the tested drug on the mucous membrane of the eyes of white rats, the right eye of the animals served as the experimental and the left eye as the control (standard). Narrowing and closing of the eye slit was observed 5 minutes after the introduction of the drug. One hour after the start of the experiment, the observed signs decreased and four hours after the start of the experiment, they disappeared completely. The drug has a mild irritating effect on the mucous membrane of the eye.

The effect of the complex on the skin was studied in 10 white rats, the complex was applied to the skin of the abdomen of the test animals in the form of an application. After 4 hours of exposure, the drug was washed off with running water and the experimental skin areas were observed. After removing the applications in the experimental areas, there were no signs of scratching in the dynamics after 1, 3, 5 days of the experiment. The drug does not have a negative effect on the skin.

The study of the cumulative properties of the complex was conducted in two groups of experimental animals. White rats of both sexes weighing 160-190 g were taken for the experiment. The first group of animals received the drug at a dose of  $1/10 LD_{50}$ , the second group served as a control. In dynamics, blood samples were analyzed to study biochemical parameters every 2 weeks of experiments. In the first group, there were statistically significant changes in integral biochemical parameters. Since no deaths occurred in the animals, there was no need to calculate a cumulation factor. It was found that the drug has a weak functional cumulative effect.

Chronic toxicity. At the level of 14.0 and 2.8 mg/kg, the drug doses are defined as threshold and maximum threshold levels, respectively. ADD (acceptable daily dose) of 3.36 mg/day for humans has been scientifically justified and calculated.

During the standardization of the biologically active complex in environmental objects, the permissible coefficient of the complex in water and air was determined. Since the complex gives a small amount of odor to the water, experiments were conducted to determine the threshold

concentration of the biologically active complex. Determination of the odor threshold was carried out in water at different initial concentrations of the drug (0.3-3.5 mg/l). According to the results of most odorators, the odor threshold is usually 1.5 mg/l. As a result of the statistical processing of the results, the sense of smell is determined to be 1.6 mg/l. The graphical method of determining the limit concentration allowed to set the limit concentration at the level of 1.5 mg/l, and the practical limit was set at 3.2 mg/l. In the studied concentrations, the drug did not affect the sanitary regime of water bodies. Analyzing the data obtained on the study of the effect of the drug on the organoleptic properties of water and the sanitary regime of water reservoirs, it was determined that the limiting sign of harmful effects is the organoleptic (odor) limit at the level of 1.5 mg/l. Taking into account the results of the sanitary-toxicological experiment, the (fixed coefficient) in water bodies is recommended at the level of 1.5 mg/l.

The following are recommended for standardization of harmful substances in the air that are widely used in practice, taking into account the parameters of toxicometry and physico-chemical properties of the drug, according to calculations and scientific bases: 0.05 mg/m<sup>3</sup> in atmospheric air, 2.5 mg/m<sup>3</sup> in the working air space.

According to the maximum permissible amount for food products, the approximate acceptable concentration in the soil - according to the standards approved for food, this drug is "not allowed" in cottonseed oil. The recommended standard in soil is 1.15 mg/kg.

Summarizing the obtained results, the hygienic standards and rules for the use of this complex in agriculture are presented in table 1.

Table 1

Hygienic standards and rules for the use of the complex in agriculture

№	Indicators	Value
1	Permissible coefficient in water bodies, mg/l	0,3
2	Permissible coefficient in the air of the working zone, mg/m <sup>3</sup>	5
3	Permissible coefficient in atmospheric air, mg/m <sup>3</sup>	0,05
4	Permissible value in soil, mg/kg	1,15
5	Maximum permissible amount in food products, mg/kg	«not allowed»
6	Sanitary-protection zone , m	100
7	Return to work period, day	7

### CONCLUSION

Based on the received data, it was determined that the this biologically active complex belongs to substances of the III hazard class in terms of acute toxicity - low-risk compounds. This drug has a slow functional cumulative effect, has a weak irritating effect on the mucous membrane of the eye, and does not have a negative effect on the skin. All the identified indicators show that this biologically active drug can be widely used in agriculture.

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