

# DEFINITION OF RESIDUAL AMOUNTS OF PESTICIDES IN MEAT OF GUPPI FISH IN EXPERIMENTAL CONDITIONS

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## ABSTRACT

The article presents the results of study of pesticide residues in meat of guppy fish in experimental conditions. The study determined the content of pesticide residues in meat of studied fish, which yielded the following results: there were significantly higher content of pesticides in meat of fish in experimental groups compared to controls. In the experimental group, the concentration of chlorpyrifos ranged from 0.0071 to 0.0099 in the first group, from 0.0048 to 0.0054 in the second group, from 0.0012 to 0.0009 in the third experimental group. Research data suggests that pesticides can be accumulated in meat in fairly large quantities.

**KEY WORDS:** guppy fish, pesticide, chromatography, Dursban, chlorpyrifos.

## INTRODUCTION

Providing the population with food and healthy food – is an important and actual problem of the state value. Without its decision, social stability of society and population health is impossible. In recent years in the country in connection with change of character of domestic market, measures for integration of Kazakhstan economy in the world are taken. At the solution of this important state task, requirements of environmental and sanitary control assigned to Kazakhstan by the countries - participants of the World Trade Organization are considered. Prompt growth of consumption of production of agro-industrial complex demands increase in productivity and decrease in product cost which are reached at the expense of rational application of herbicides, insecticides, fungicides (in plant growing, veterinary science and medicine).

Domestic producers of agricultural production using pesticides according to the production schedules, are obliged to guarantee safety of received production for population health. Residual maintenance of these potentially dangerous chemical compounds in finished goods shouldn't be above the maximum permissible levels defined by standard documentation.

Pesticides - is the collective name of chemical means of protection of plants from diseases, wreckers and weeds, and also regulators of growth and other substances used for fight against harmful organisms. In rural and wood farms, wide range of pesticides is applied, forms and methods of their introduction are improved (Zhulenko, et al., 2011).

Preparations which are brought directly in reservoirs or used for processing of coastal zones are the most dangerous to hydrobionts: algicides, some herbicides, molluscicides, ichthyocides, and means of fight against water stages of blood-sicking insects. Intermediate situation is occupied by means applied in rice growing and irrigated agriculture, and also for land reclamation which arrive with exhaust waters through certain time after application. Significant amount of pesticides arrives in reservoirs with rain and thawed snow (superficial drain), at aviation and land processing of agricultural grounds and woods, and also with drains of enterprises for production of pesticides (Grishchenko et al., 1989).

At synthesis and production of separate pesticidal preparations together with pesticides, intermediate products and fillers of preparative forms can get into reservoirs.

Main reasons for sharp and chronic poisonings of fishes with pesticides are connected with violation of rules of their application (excess of norms of expense and increase in

frequency rates of introduction), their losses at transportation and storage, wrong utilization of used preparations, and also descent of crude sewage from chemical companies.

According to official reports, in Kazakhstan about 500 tons of not identified pesticides are stored. In 1986 - 1995 volumes of chemical means of protection of plants were reduced to 1.8 thousand tons. Pesticidal load of 1 hectare of arable land decreased as well. Since 1998 volumes of pesticides increased and now make 9 - 11 thousand tons. The most part of means of protection of plants — is herbicides and fungicides. In spite of the fact that DDT in the USSR in 1971 was forbidden, till 1990th years it was applied in Kazakhstan in veterinary science and medicine. In 1985 at piece the Syr-Darya River from boundary branch with Uzbek SSR till Kazalinsk town, DDD and DDE contained in water. Then cases of death of fish and bird in which bodies DDT and its metabolites was found were noted here (Speranskaya, 2004).

Dursban is organophosphorus insectoacaricides of wide range of action, which active ingredient chlorpyrifos. It destroys wide range of different types of gnawing, mining and sucking insects – wreckers of cultivated cultures. Perfectly influences equally against any stage of wreckers, whether it be adult individuals (imago), larvae of different age or eggs. It is active in wide range of temperatures: excellently operates as at rather low temperatures (during early-spring period, at exit of wreckers from winter diapause), and very high (late spring and in summer, in their mass development) when pyrethroids practically don't work. Not phytotoxic for all protected cultures in any phase of their development. It is moderately toxic for warm-blooded, it is toxic for bees therefore at its application it is necessary to observe the standard security measures (Muller, 2000).

At coming of FOS with forage, intoxication comes at achievement of lethal level of their contents in bodies of fishes that is proved on experimental model of cumulative toxicosis (Grishchenko, 1989).

According to Agnieszka Tomza-Marciniak and Agata Witczak researches, concentration of FOS in sexual glands of fishes was much higher, than in muscular fabric (Tomza-Marciniak, Witczak, 2010).

On the basis of five years' monitoring (1992 - 1997) of toxicological condition of haarder in Azovo-Chernomorsky pool it is revealed that all studied its copies contain residual number of organochlorine connections which basis in equal shares is made by DDT both its metabolites and polychlorinated biphenyls. Prevailing component in DDT group is its final metabolite — DDE. In interannual plan, tendency to decrease in maintenance of total organochlorine compounds in soft fabrics of fishes is noted; interseasonal changes are synchronized with intensity of food. Factor of biological accumulation of studied toxicants at fishes to age 2 + is much higher, than at fishes of senior age groups (Voronenko et al., 1998).

Purpose of our researches was studying of toxic influence of pesticide of Dursban on guppies fish in experimental conditions, with subsequent definition of residual amounts of studied pesticide content in meat of fish.

## **MATERIAL AND METHODS**

Experiment was carried out in summer period of 2011 - 2012 at the department “Veterinary and sanitary examination and hygiene”, Kazakh National agrarian university and at Kazakh research institute of protection of plants and quarantine. For experiment, clinically healthy guppies fish in number of 60 heads and 4 aquariums in capacity of 20 l, and also Dursban's preparation (with recommended norm of 1 l on hectare of land) having wide application in agro-industrial complex, were taken. For determination of sharp toxicity of tested preparation, guppy fish were contained for two days in water. Solutions of preparations

prepared directly ahead of experiment on the basis of acetone. Experience carried out according to the methodics (Zharikov, 2002).

Table 1

<b>№</b>	<b>Groups</b>	<b>Dose of solution of Dursban pesticide ml/l</b>
1	1 experimental	0,001 ml/l
2	2 experimental	0,003 ml/l
3	3 experimental	0,005 ml/l
4	Control	0

Solution of Dursban pesticide was introduced to fishes of the first skilled group which active ingredient chlorpyrifos in a dose of 0.001 ml/l, the second group was dripped with Dursban in a dose of 0.003 ml/l, the third group – in a dose of 0.005 mkg/l (tab. 1). Extraction of substances was made by techniques described by RK State Standard 2011 - 2010 “Water, food, stern and tobacco products”. At chemical analysis, quantitative content of active ingredients in meat of fish poisoned with pesticides in experimental conditions by method of liquid chromatography was determined. For chromatography, liquid chromatograph Agilent 1100 was used. Thermostating at 40 C, mobile phase – acetone, speed of movement of stream – 0.3 ml/min, volume of extract of test entered into chromatograph – 5 mkl. Statistical data processing carried out with use of package of applied Microsoft Excel 2000 programs. Reliability of distinctions of the received data was defined by Student's test program.

## **RESULTS AND DISCUSSION**

In each aquarium, during the experiment, 3 times per day control of temperature measurement, pH, turbidity, conductivity of water environment and contents of dissolved oxygen was conducted. And also salinity of water on chlorine was watched. Daily made care of fish, water purification and oxygen pumping by means of compressors and filters was made.

At research of processes of toxicants accumulation in body of fish in aquarian conditions, besides contents and feeding mode, central place is occupied by works on studying of their functional condition which help to open mechanisms of impact of toxic impact on fish and to receive necessary data for recommendations of nature protection and biotechnical character.

During supervision over environment, conditions in experimental capacities were stable and actually didn't differ. So, for example water temperature throughout all test period fluctuated within 18.0 - 23.0 °C. Maximum indicators were registered at 19 o'clock. Concentration of oxygen dissolved in water in all capacities was up to standard of 6.7 - 10.1 mg/l, pH within neutral environment: 6.8 - 7.3.

Salinity on chlorine which was defined daily also remained in narrow range, rising from 5.57 % in the first half of test, to 6.73 % at the end of it.

Fishes died within 72 hours from pesticidal intoxication. Then small fishes investigated on the content of residual amounts of pesticides by method of liquid chromatography.

During research, the following results were received: raised content of pesticides in meat of fish in test groups in comparison with control was appreciable. In test group, concentration of chlorpyrifos ranged from 0.0071 to 0.0099 in the first group, from 0.0048 to 0.0054 in the second group, from 0.0012 to 0.0009 in the third test group (fig. 1). Data obtained as a result of research showed that pesticides collect in fabrics and bodies, in muscles in quite significant amounts.

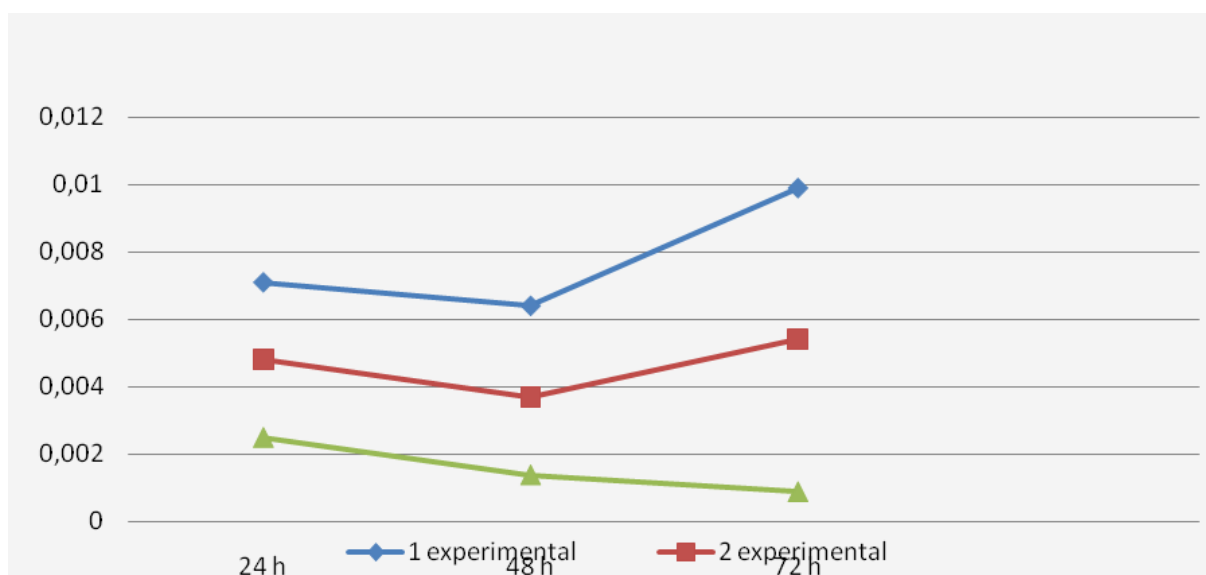


Figure 1. Dynamics of Dursban pesticide content in meat of fish

Thus, on the basis of data on dynamics of residual amounts of Dursban pesticide content in various concentrations testify to existence of cumulative properties of pesticide of Dursban in meat of fish at addition in water undoubtedly:

1. Maximum of pesticides is collected within 24 and 72 hours;
2. Pesticides collecting in meat of fish cause intoxication of organism of fish causing them to die.

## CONCLUSIONS

Thus, on the basis of carried-out researches on the residual amounts of Dursban pesticide content, and also analyzing data of foreign it is established that Dursban pesticide has ability to collect in meat, bodies of fish and in process of accumulation it causes intoxication and death of fish.

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