

**DETERMINATION OF THE CONTENT OF ORGANOCHLORINE PESTICIDES IN  
THE FISH FROM THE ALAZANI RIVER**

1 Tea Mchedluri

Professor. Doctor of Biological Sciences  
Iakob Gogebashvili Telavi State University. Georgia.  
E-mail: t.mchedluri@yahoo.com

2 Lali Koptonashvili

PhD Student (Biology). Batumi Shota Rustaveli State University. Georgia

3 Tinatin khokhobashvili

Doctor of Biology. Jumber Lezhava Multi Profile International Academy of Sciences.

4Neli Goginashvili

Professor. Doctor of Agricultural Sciences. Gori State University, Georgia

**Abstract:**

One third of global environmental pollution comes from fertilizers and pesticides used in agriculture. One of the real ways to provide food for mankind is to intensify the use of pesticides in agriculture. It is necessary to achieve minimization of damage to the environment and its protection.

In November 2023, we conducted research to determine the content of organochlorine pesticides in the water and fish of the Alazni River. We measured the content of eight organochlorine pesticides in the water whilst in the fish body, we measured hexachlorocyclohexane  $\alpha$ ,  $\beta$  and  $\gamma$  isomers. Although the river Alazani flows through an area rich in agricultural fields and the population uses pesticides to fight pests, the results of the analysis showed that Decachlorobiphenyl, Endrin, and endosulfan-beta were not found in the water of the Alazani River. The content of discovered organochlorine pesticides (endosulfan-alpha 0.002mg/l, Dieldrin, DDE, and DDD<0.001mg/l. DDT<0.002mg/l) is much smaller than MAC. As for fish (barbel), hexachlorocyclohexane  $\alpha$ ,  $\beta$  and  $\gamma$  isomers were not found in the samples taken from its body. That is the water of the river is not a dangerous environment for fish. To maintain the desired ecological condition of the Alazni river, it is necessary not only to monitor it, but also to use pesticides by the population in order to fight against pests and to increase the yield, following strict norms.

**Keywords:** Organochlorine pesticides, hexachlorocyclohexane, DDD, DDT DDE, Decachlorobiphenyl, Dieldrin.

**Research object and methods:** We selected Alazani river and the fish inhabiting it - Barbel as the research object. Determination of organochlorine pesticides in river water was carried out by gas chromatography method, and in fish - by thin-layer chromatography method of organochlorine pesticides in food products.

**Research results:** Organochlorine pesticides are characterized by stability against the influence of various environmental factors. They do not break down for a very long time. Their degradation products are more toxic than the drugs themselves. They dissolve well in fats. They are characterized by the ability to accumulate in the tissues of living organisms. Their compounds enter the human body mainly through food. Due to their ability to firmly establish themselves in the soil, most of them are still in a nondegradable state. They are involved in different cycles of the earth's rotation and can be found in areas where they have never been used [2].

In Georgia, including Kakheti, safety precautions for their storage have not been followed for years. Industrial, communal and agricultural runoff flows into Alazani river. As a result, it is possible for water quality to deteriorate with various toxic substances, including pesticides. All this has a negative impact on the ecological condition of the river. Therefore, it is relevant to determine the content of organochlorine pesticides in the water and fish of the Alazni River. The Alazani is a main river of Eastern Georgia. It originates from the Caucasus at an altitude of 2750 m. It exits the Alazni plain, drains and joins the Mingechauri reservoir in the territory of Azerbaijan. Its length is 390 km. The river flows through an area rich in agricultural fields. Uncontrolled and unqualified use of pesticides by the population can lead to deterioration of water quality. All this has a negative impact on the river ecosystem, fish and hydrobionts. Of all the pesticides, organochlorine compounds are particularly dangerous due to their persistence and various effects. They affect aquatic ecosystems not only directly, but also indirectly. The water environment creates the best conditions for bioaccumulation of substances. The fish filter and carry the largest amount of water in their bodies, as a result of which, toxins dissolved in water accumulate in the body [6].

Organochlorine compounds enter the human body mainly through food, in most cases as a result of fish consumption. Therefore, we considered it important to detect organochlorine pesticides in the water of the Alazani River and in the fish (barbel) living in it. We conducted research in November 2023. The river water was tested for the following pesticides: endosulfan-alpha, Dieldrin, DDE DDD DDT Decachlorobiphenyl Endrin endosulfan-beta. The results of the study are given in table No.1

Table №1 Content of organochlorine pesticides in the Alazani river

№	Names of Pesticides (mg/l)	Results of measurement	Methods used
1	endosulfan-alpha	0,002	METHOD 8081BGAS CHROMATOGRAPHY
2	Dieldrin	<0.001	
3	DDE	<0.001	
4	DDD	<0.001	
5	DDT	<0.002	
6	Decachlorobiphenyl	N.D	
7	Endrin	N.D	
8	endosulfan-beta	N.D	

The results of the research show that the concentrations of DDE, DDD and Dieldrin in water are <0.001 mg/l, DDT - <0.002 mg/l respectively, and endosulfan-alpha is 0.002 mg/l, which is much less than MAC (Maximum Admissible Concentration).

We determined the content of pesticides in the bodies of fish living in the water of the Alazani River. Studeis were carried out in November 2023, 6 pieces of fish - Barbel were taken out the Alazani River for analysis. Their body length was 40 cm, weight 0.4 - 0.5 kg. The results of the research on the content of hexachlorocyclohexane  $\alpha$ ,  $\beta$  and  $\gamma$  isomers in the fish body are presented in Table No2

Table №2 Content of hexachlorocyclohexane  $\alpha$ ,  $\beta$  and  $\gamma$  isomers in the body of Barbel

Fish Barbel				
Study indicator	Sampling time	measurment unit	results	Studt method
hexachlorocyclohexane $\alpha$ , $\beta$ and $\gamma$ isomers	15.11.2023	mg/kg	Not detected	ISO 2142-80

**Conclusion:**

Thus, the results of the analysis show that Decachlorobiphenyl, Endrin, endosulfan-beta were not found in the water of the Alazani River. The content of discovered organochlorine pesticides (endosulfan-alpha 0.002mg/l, Dieldrin, DDE, and DDD<0.001mg/l. DDT<0.002mg/l) is much smaller than MAC.

As for the fish, hexachlorocyclohexane  $\alpha$ ,  $\beta$  and  $\gamma$  isomers were not found in the samples taken from its body. That is the water of the river is not a dangerous environment for fish. On the contrary, it is environmentally friendly.

The detection of small concentrations of pesticides in the Alazani River, in our opinion, is caused by the population's excessive and non-compliant use of pesticides to fight pests and increase yields. All of this can lead to the accumulation of pesticides in water, soil and sediments. Therefore, it is necessary not only to conduct monitoring, but also to make the population aware that the pesticides introduced by them in violation of certain norms may accumulate in the soil and bottom sediment, which will lead to their inclusion in the food chain of living systems in water bodies. Therefore, it is necessary to observe strict norms when using pesticides

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