ОҚДАРЁ СУВ ОМБОРИНИНГ РЕДУЦЕНТЛАРИ

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АННОТАЦИЯ

Оқдарё сув омборида микробиологик усулларга асосланган ҳолда олиб борилган тадқиқотлар натижасида редуцентларининг азотсиз муҳитда яшовчи - аммонификатор бактериялари, фосфор парчаловчи бактериялари, олигонитрофиллар, азотфиксаторлар, микромицетлар учраши аниқланди. Улар ўлик организмларнинг (ўсимлик ва ҳайвонларнинг) парчаланишида иштирок этиб, биорганик моддалардан минерал моддаларга айланади.

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ABSTRACT

As a result of research conducted in the Akdarya reservoir based on microbiological methods, it was found that the reductants are ammonifying bacteria, phosphorus-decomposing bacteria, oligonitrophils, nitrogen-fixers, and micromycetes living in a nitrogen-free environment. They participate in the decomposition of dead organisms (plants and animals) and turn from inorganic substances into mineral substances.

Keywords: Reductant, oligonitrophil, nitrogen fixer, micromycete, actinomycete, Akdarya reservoir, benthos, plankton.

INTRODUCTION

The Akdarya reservoir receives water from the Akdarya network in the middle reaches of the Zarafshan river. Launched in 1989. The water reservoir is important for irrigating agricultural land and providing water to the population of Ishtikhan district of Samarkand region, as well as for the formation and development of hydrobionts

consisting of plankton, benthos, periphytonecogroups in the water. Looking at the reservoir and its biological diversity from a biological point of view, three ecosystem units can be seen in the reservoir, i.e., hydrochemical environment of water, producers, consumers, and reducers. These ecosystem units are connected to each other by a food chain along with the hydrochemical environment of the water. They cannot live in the reservoir without each other.

Producers - Carbon dioxide gas and water produced by consumers are needed for photosynthesis of micro- and macrophytes. In turn, consumers need oxygen produced by producers to breathe. In addition, for the food of herbivorous consumers, producers need organic matter - biomass, formed in the process of photosynthesis. From this point of view, these two units are closely related to each other.

In the last days of the life of the representatives of these two units, that is, in order to sink the lifeless bodies of the representatives of the two units, consisting of organic substances, to the bottom of the water, so that there are not many heaps formed there, the reductants that break down the organic substances come to work. As a result, the organic matter of dead dead bodies at the bottom of the water is constantly transformed into mineral substances due to reductants and enriches the water again with carbon dioxide gas, nitrogen, phosphorus, potassium and other elements. As a result, permanent and comfortable living conditions in the aquatic environment will be stable for the producers [8-9].

MATERIALS AND METHODS

Akdarya reservoir is located at 390995’N (north latitude) and 0660382’E (east longitude), 485 m above sea level, on the Akdarya River of Samarkand Viloyat of Ishtikhan district, and has been in operation since 1989. It is fed by water from the Akdarya River. The water volume is 131.8 million m3. The maximum height of the dam is 20 m, water permeability is 70 m3/s, pH ranges from 6.5 to 7.0 and total mineralization is - 500 - 612 mg/l.

In 2014-2022, more than 150 algological samples were collected and processed from the Akdarya reservoir according to generally accepted methods of algology and hydrobiology [3-5], which are stored in the collection of "Flora of algae of water bodies of Uzbekistan" of the Institute of Botany of the Academy of Sciences of the Republic of Uzbekistan. In laboratory conditions, preparations were prepared from algological samples, the species composition of algae was determined, and the frequency of occurrence in one field of view of the lens was established. A light microscope of Carl Zeiss type, micrometer eyepiece +7, dyes were used in the study. With the help of determinator [4-11] and monograph [1-6] the species composition of algae, systematics and their taxonomy were determined. The chemical composition of water was analyzed according to the data of UzHMNII (Uzbek Hydrometeorological Research Institute).

In this work, we want to focus on the composition of the species of reductants of the Akdarya ecosystem. Part 3 of the water reservoir ecosystem. The reductants of the Okdarya reservoir were studied together with S.I. Zikryaeva, a senior researcher at the Laboratory of Soil Microbiology and Biotechnology, Institute of Microbiology, Academy of Sciences of the Republic of Uzbekistan.

ANALYSIS AND RESULTS

For this, the following stages of research were carried out: 6 samples were taken from the reservoir from two replicate three monitoring stations. Microbiological research methods were used. Ammonifiers, phosphorus-decomposing bacteria, oligonitrophilic bacteria, nitrogen fixers, micromycetes, and actinomycetes were identified.

MATERIALS

Sample size - 6 water samples

Sampling site - Okdarya reservoir, May 2021;

1. Monitoring point 1, benthos samples No. 3;
2. Monitoring point 1, plankton samples No. 6;
3. 2nd monitoring point, 8 benthos samples;
4. Monitoring point 2, plankton samples No. 11;
5. Monitoring point 3, plankton samples No. 13;
6. 3 - monitoring point, benthos samples No. 17;

Methods of microbiological analysis of waters (conducted in August 2021). The microbiological analysis of water was carried out according to the generally recognized microbiological research method (Zvyagintsev D.G. Method of soil microbiology and biochemistry. Moscow, 1991, Yojef Segi Method of soil microbiology and biochemistry. Budapest, 1986, Senior workshop on microbiology G.L. Selibera, Moscow, 1962.)

Phytobenthos and phytoplankton samples were taken from the water during the study of reductants of this reservoir. Planting materials and nutrient media were prepared for the study of microorganisms: ammonifying bacteria (media - MPA), phosphorus-decomposing bacteria (media - Pikovsky solid nutrient medium), oligonitrophils (media - Ashby), Micromycetes and actinomycetes (Chapeka medium). Bacteria were studied on solid agar medium.

Procedure: A suspension was prepared from water samples taken for microbiological analysis. For this, 1 ml was taken from the water sample using a pipette and put into 9 ml of water in a sterilized test tube. This process was continued serially, diluted to 1:1000 and repeated.

1 ml of the liquid in the test tube was inoculated into special solid selective nutrient media in a Petri dish in three replicates, that is, ammonifiers in the meat

peptone nutrient medium, phosphorus-degrading bacteria in the Pikovski nutrient medium, oligonitrophils in the Ashby nutrient medium, actinomycetes and micromycetes in the Chapeka nutrient medium were cultured on the basis of "dilution" and examined.

Composition of Ashby environment:

sucrose 20 g
potassium phosphate 0.2 g
magnesium sulfate 0.2 g
Sodium chloride 0.2 g
Potassium sulfate 0.1 g
Calcium carbonate 0.5 gsh
Agar 20 g
Water 1000 ml

Composition of chapeka environment:

Glucose 20 g
Sodium nitrate 2.0 g
Potassium hydrogen phosphate 1.0 g
Magnesium sulfate + 7 water 0.5 g
Potassium chloride 0.5 g
Calcium carbonate 3 g
Agar 20 g
Water 1000 ml
The result is shown in Table 5

Table 5

The number of the main physiological groups of microorganisms in a water sample, in 1 ml of water

№ Samples	Types of microorganisms					
	Ammonifiers	Phosphorus-decomposing bacteria	Oligonitrophiles	Nitrogen fixers	Microcytes	Actinomi-cytes
1.	$4,3x10^4$	did not meet	$4,0x10^3$	$1x10^2$	$1x10^1$	did not meet
2.	$1,7x10^5$	$2x10^3$	$7,0x10^3$	$2x10^2$	did not meet	did not meet
3.	$3x10^2$	did not meet	$5x10^2$	did not meet	did not meet	did not meet
4.	$2x10^2$	did not meet	did not meet	did not meet	$1x10^2$	did not meet
5.	$2x10^2$	did not meet	$4x10^2$	did not meet	did not meet	did not meet
6.	$1,0x10^4$	$1x10^3$	$3x10^2$	did not meet	did not meet	did not meet

№ Samples	Types of microorganisms					
	Ammonifiers	Phosphorus-decomposing bacteria	Oligonitrophiles	Nitrogen fixers	Microcytes	Actinomi cytes
1.	$4,4x10^5$	$1,2x10^3$	$2,2x10^5$	$2x10^3$	$1x10^2$	did not meet
2.	$6,2x10^5$	$3,0x10^3$	$1,6x10^5$	did not meet	did not meet	did not meet
3.	$2,9x10^5$	did not meet	$1,0x10^5$	did not meet	did not meet	did not meet
4.	$9,8x10^5$	$2,5x10^3$	$2,8x10^5$	did not meet	did not meet	did not meet
5.	$4,5x10^5$	$3,2x10^3$	$2,1x10^5$	$3x10^3$	$3x10^2$	did not meet
6.	$7,8x10^5$	$7,0x10^3$	$2,4x10^5$	$4,0x10^3$	did not meet	did not meet
7.	$1,1x10^5$	$1,0x10^3$	$1,9x10^5$	did not meet	$1x10^2$	did not meet
8.	$1,2x10^5$	$2x10^2$	$1,5x10^5$	did not meet	did not meet	did not meet
9.	$1,1x10^6$	did not meet	$1,9x10^5$	$6x10^2$	did not meet	did not meet
10.	$4,2x10^5$	$1x10^2$	$1,8x10^5$	did not meet	$1x10^2$	did not meet

CONCLUSION

As a result of the conducted microbiological analysis, the amount of ammonifying bacteria in 1 ml of water was found to be higher in 2 samples compared to other samples and was 1.7x105 KHB cells/ml. In samples 1 and 6, the amount of ammonifying bacteria was found in the same order and was 1.0-4.3x104 KHB cells/ml in 1 ml of water. In samples 3, 4 and 5, these bacteria were found in the lowest amount, 2-3x102 KHB cells/ml.

Phosphorus-degrading bacteria were found only in samples 2 and 6 and amounted to 1-2x103 KHB cells/ml. It was observed that they were not found in other samples.

The amount of oligonitrophilic microorganisms growing in nitrogen-free medium was observed to be one order higher in samples 1 and 2 compared to other samples and was 4.0-7.0x103 KHB cells/ml. In samples 3, 5 and 6, their amount was in the same order and was 3-5x102 KHB cells/ml. Nitrogen-fixing bacteria were found only in samples 1 and 2 (1-2x103 KHB cells/ml).

Micromycetes were found in samples 1 and 4. In 1 sample, it was observed that the amount of micromycetes was 1x101 KHB cells/ml, and in 2 samples it was one

order higher (1x102 KHB cells/ml). Micromycetes were not found at all in other samples.

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