

Taxonomic Composition and Physiological Activity of Phytoplankton in Biological Ponds of the Bukhara Region

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ABSTRACT

An important part of aquatic ecosystems is aquatic biota, represented by a mosaic of interconnected biocenoses that occupy all possible biotopes in streams and reservoirs: they inhabit the water column (plankton), the thickness and surface of the soil (benthos), overgrow the surface of solid rocky substrates washed by water or settling on the surface of macrophytes and in the turf of water moss (periphyton). Their species composition and structure are entirely determined by climatic and landscape conditions prevailing in drainage basins or directly in river corridors and coastal zones of lakes.

In conditions of low water under the influence of intensive anthropogenic impact in Uzbekistan, the rational use of water resources in the national economy is important. In this regard, continuous monitoring, assessment of the variability of the microbial, chemical composition, hydro biological parameters of water in reservoirs are of great importance [6]. Changes in the chemical and mineral composition of water affect the microbial composition of water in surface (open) water bodies. Pathogenic microorganisms transmitted by water, adapting to these conditions, change their biological properties [7].

Due to the vital activity of aquatic organisms, the chemical composition of water is formed, thereby determining its quality. The permanent microflora of water bodies performs the function of a primary oxidant or reductant of pollutants entering the water body [4]. Consequently, biocenoses can be considered as information systems that characterize the condition of not only specific water bodies, but also the surrounding natural complexes on the territory of which they are located [8].

Phytoplankton are microscopic plant organisms that freely hover in the water column and carry out photosynthesis, and are one of the important elements of aquatic ecosystems involved in the formation of water quality and the productivity of a reservoir [9, 10, 11]. As is known, the study of phytoplankton occupies an important place in biomonitoring, since algae assimilate solar energy, accumulating it in the form of organic compounds in the process of photosynthesis, while releasing oxygen necessary for the respiration of algae themselves and other inhabitants of the reservoir [5]. The organic matter synthesized by them serves as a source of energy for heterotrophic organisms - bacteria, animals. Therefore, the properties of the phytoplankton link of an ecosystem determine its condition.

The purpose of this research work was to study and evaluate the qualitative and quantitative composition of phytoplankton in the studied areas of surface reservoirs of the Bukhara region.

Research results and discussion During the reconnaissance trip, samples of phytoplankton were taken, in which 75 species, varieties and forms of algae were found: diatoms (*Bacillariophyta*) - 34 species; green (*Chlorophyta*) - 20 species; blue-green (*Cyanophyta*) - 15 species; dinophyta (*Dinophyta*) - 5 species; Euglenophyta (*Euglenophyta*) - 1 species.

The taxonomic structure of phytoplankton in water bodies of the Bukhara region is presented.

The dominant complex of phytoplankton communities in the studied areas of Lake Tudakul and the Kuyumazar reservoir was mainly represented by producers. Among them, diatoms, green and blue-green algae reach the greatest development and diversity, as well as dinophytic and euglenic algae with a low abundance (1-5 species).

Diatoms (*Bacillariophyta*) and green (*Chlorophyta*) algae in the samples from Lake Tudakul were detected more often than others - 13 (31.0%) and 14 (33.3%) species, respectively.

Blue-green algae (*Cyanophyta*) in phytoplankton samples of the studied areas of this reservoir are poorly represented, only 9 species, which amounted to 21.43% of the total number of species. The widespread planktonic colonial and filamentous forms of algae of the genera *Merismopedia*, *Microcystis*, *Gloeocapsa*, *Gomposphaeria* and species of the *Oscillatoriaceae* family prevailed.

The most indicative quantitative development of blue-green algae (*Cyanophyta*) was noted in a sample from Lake Tudakul. The number of blue-greens here in the sample was 6500.00x10³ cells / l, and the biomass - 58.694 mg / l. The least development of blue-green algae was noted in a sample from the Kuyumazar reservoir: the number was 706.250x10³ cells / l with a biomass of 11.150 mg / l (Table 2).

Table 2. Quantitative development of phytoplankton in the studied areas of water bodies in Bukhara region (number of cells x10³ / biomass mg / l)

Taxon	Lake Tudakul	Kuyumazar reservoir
<i>Cyanophyta</i> (blue-green)	6500,00 / 58,694	706,250 / 11,150
<i>Bacillariophyta</i> (diatoms)	162,500 / 61,344	193,750 / 187,800
<i>Euglenophyta</i> (euglena)	12,500 / 11,150	0
<i>Dinophyta</i> (dinophytic)	150,625 / 211,125	0
<i>Chlorophyta</i> (green)	756,250 / 188,400	87,500 / 31,500
Total number of cells x10 ³ cells / l / biomass, mg / l	7621,875 / 530,713	987,500 / 230,450

Note: in the numerator is the total number of phytoplankton (cells / l), in the denominator is the biomass of phytoplankton (mg / l).

In terms of taxonomic diversity, diatoms (*Bacillariophyta*) occupied a dominant position in phytoplankton samples (34 species, 45.33%) of the studied open water bodies.

In June phytoplankton samples from Lake Tudakul, planktonic freshwater-brackish-water forms of b-mesosaprobic species from the genera *Melosira*, *Cyclotella*, *Fragilaria*, *Synedra* prevailed. In the phytoplankton sample of the Kuyumazar reservoir, brackish-water (mesohalobes) b- and b-α-mesosaprobic forms of algae from the genera *Cocconeis*, *Achnanthes*, *Gyrosigma*, *Amphiprora*, *Navicula*, *Bacillaria*, *Nitzschia* prevailed.

With a single occurrence, diatoms (*Bacillariophyta*), due to the large cell size, made up a large biomass. The number of diatoms in the samples was 162,500x10³ cells / l and 193,750x10³ cells / l, and the biomass, respectively, was 61.344 mg / l and 187,800 mg / l.

Green algae (*Chlorophyta*) in the samples of the investigated water bodies are moderately represented - 20 species or 26.67%, forms and varieties, which are mainly represented by widespread b-mesosaprobic species from the genera *Ankistrodesmus*, *Oocystis*, *Chlorella*, *Chlamidomonas*, *Scenedesmus*, *Cosmarium*. The number of green algae in phytoplankton samples was 756.250×10^3 cells / l and 87.500×10^3 cells / l, and the biomass was 188.400 mg / l and 31.500 mg / l, respectively.

Analysis of the ecological characteristics found in the phytoplankton of algae indicates that under the conditions of modern water salinity in the studied water bodies, the species composition of summer phytoplankton was mainly freshwater-brackish water b-, b- and α -mesosaprobic, brackish-water forms of algae. The increased abundance of phytoplankton was created mainly by representatives of colonial and filamentous blue-green algae of the *Oscillatoriaceae* family, and widespread diatoms *Synedra*, *Fragilaria*, *Navicula*, *Nitzschia* and green desmidian, protococcal algae.

Conclusions

1. In the studied water bodies (Tudakul lakes and Kuyumazar reservoir) of the Bukhara region, the following types of algae are more often found: *Bacillariophyta* (34 species); *Chlorophyta* (20 species); *Cyanophyta* (15 species); less often - *Dinophyta* (5 species); *Englenophyta* (1 species).
2. It was revealed that the highest total phytoplankton abundance in water samples from both reservoirs was *Cyanophyta* (6500.00×10^3 cells / l and 706.250×10^3 cells / l, respectively), and the highest phytoplankton biomass was noted in *Bacillariophyta* (187.800 mg / l) and *Chlorophyta* (188.400 mg / l). At the same time, *Englenophyta* and *Dinophyta* were not found in water samples from the Kuyumazar reservoir.
3. It was proved that in the phytoplankton samples from Lake Tudakul, planktonic freshwater-brackish-water forms b-mesosaprobic predominated; brackish-water b- and b- and α -mesosaprobic species of algae prevailed.

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