CHARACTERIZATION OF PHYTOPLANKTON COMMUNITIES IN REARING PONDS OF ONE SUMMER OLD FISH FROM BRATES LAKE

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Abstract

The objective of this paper was to analyze the composition of phytoplankton communities in summer growth ponds, in the Brateș Experimental Base between April and September 2018. Sampling of phytoplankton was performed monthly. For the study of phytoplankton, the water was collected in glass bottles with a volume of 300 ml, from the surface horizon of the water (0 m). After sampling the samples were preserved with Lugol's fixative and sodium acetate (Utermöhl), in the following proportion 0.15 - 0.25 ml solution per 100 ml / sample. At the same time with the phytoplankton samples, water samples were taken to analyze the physico-chemical parameters of the water from the analyzed ponds. The interpretation of the results was done in accordance with the provisions of the Normative regarding the classification of surface water quality in order to establish the ecological status of the water bodies (MMGA Ord. no. 161/2006) and correlated with the data from the specialized literature for the waters with fish use.

Following the analysis of the composition of phytoplankton communities in the growth ponds in summer I, in the Brateș Experimental Base, we observe a seasonal dynamics both in number of species and in abundance. the stage in which the different groups of algae winter, the water temperature and the presence or absence of certain substances in the water winter.

Phytoplankton is represented by: diatoms, chlorophylls, cyanophyses and euglenophyses. Chlorophylls predominate quantitatively and qualitatively and develop throughout the year which reveals a high trophic level of the lake, during the hot period of the year the cyanophysics develop, sometimes with "flowering" phenomena. Diatoms have a smaller development compared to other groups of algae, and euglins are poorly represented throughout the study.

From a chemical point of view, the parameters analyzed in the water samples fall into the second class of surface water quality, according to Ord. 161/2006.

Key words: phytoplankton, pond, algal communities

INTRODUCTION

The phytoplankton community comprises all the photoautotrophic microorganisms in the planktonic layer of an fishpond. The biological components of a freshwater ecosystem are largely influenced by physico-chemical conditions [1]. The variability of the phytoplankton regarding the seasonal changes of the aquatic environment contributes to maintaining the quality of the water and also to maintaining a sustainable aquaculture in the pond.

The analysis and study of phytoplankton is of interest because it is the most important group in the whole algal flora, for the circuit of organic matter from primary to final production. Algoflora of freshwater aquatic environments is responsible for the vast majority of global primary aquatic production. In the aquatic environment, algae and macrophyte aquatic plants (together with heterotrophic organisms) support the entire

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trophic chain, being responsible for the overall fish production. This includes the possibility of exploiting the rapid growth of algae to increase fish production in fishponds, stimulating the flow of biomass in the food chain. The state of the aquatic ecosystem reflects its trophic status, self-purification property and water quality or its degree of pollution. Since the significance of many species of algae that are indicative of water quality is directly dependent on the conditions of their development, it is important to determine not only the presence or absence of the indicator species, but also their number and their weight in the process of estimating the status of aquatic ecosystems. with other species. Parameters such as phytoplankton biomass assessment, together with the estimation of the numerical density of the algal groups entering the phytoplankton composition and of the diversity of algal populations, are essential elements in assessing the ecological status of surface waters [2].

At the same time, the analysis of the plankton community in fish systems is an important tool for assessing water quality conditions, as changes in nutrient concentrations determine changes in species composition.

Because the significance of many species of algae that are indicative of water quality is directly dependent on the conditions of their development, it is important in the process of estimating the status of aquatic ecosystems not only the presence or absence of the indicator species, but also their number and their weight in the report. with other species.

MATERIAL AND METHODS

The phytoplankton samples were collected monthly from the 4 basins of the Brateș Experimental Base during April - September 2018. The study of this work was oriented in the sense of evaluating and analyzing the composition of phytoplankton communities in rearing ponds of one summer old fish. During the study, sampling was carried out from 4 collection points of the Experimental Base Brateș (BP1, BP2, BP5, BP6) to be analyzed in the Hydrobiology Laboratory of the Research-Development Institute for Aquatic Ecology, Fisheries and Aquaculture-Galati. Water collection was done in glass bottles with volume of 300 ml, from the surface horizon of the water (0 m). After sampling the samples were preserved with Lugol's fixative and sodium acetate (Utermöhl), in the following proportion 0.15 - 0.25 ml solution per 100 ml / sample. At the same time with the phytoplankton samples, water samples were taken to analyze the physico-chemical parameters of the water from the analyzed ponds. The interpretation of the results was done in accordance with the provisions of the Normative regarding the classification of surface water quality in order to establish the ecological status of the water bodies (MMGA Order no. 161/2006) and correlated with the data from the specialized literature for the waters with fish use.

RESULTS AND DISCUSSIONS

The productivity of algae in an ecosystem can be well appreciated if we analyze the density of biomass and its abundance on algal groups [3]. Therefore, following the processing of phytoplankton samples from the 4 fishponds of the Brateș Experimental Base, the following objectives were achieved: the numerical density of each taxonomic group, expressed in thousands exp./l and the biomass of each population, expressed in g / l.

From Table 1 we find that the highest algal biomass values were recorded in July, with algae in the systematic group Cyanophyta and Bacillariophyta having an average biomass of 10.099 g / l respectively 10.75g/l. Increasing the value of water temperature can lead to uncontrolled development of cyanophytes, a factor that determines the appearance of algal bloom (fig. 1). The extension of the phenomenon of flowering of water on the entire surface of pond can lead to the generalization of the phenomenon of hypertrophy. [4]. From the quantitative point of view it is observed throughout the experimental period that the values of biomass are generally proportional to the values of the numerical density. The greater diversity of algae in the summer

months indicates the presence of a higher trophic base during this period. [5] In the case of certain types of algae, for example chlorophytes and cyanophytes, there are inconsistencies in certain periods, between the proportions between biomass and algal density. This is due in particular to the algal forms whose weight is determined not only by their quantitative development but also by their large size.

Table 1 Mean biomass of phytoplankton in summer growth ponds Ifrom the Brateș Experimental Base

Systematic group	Biomass (g / l)					
	April	May	June	July	August	September
Chlorophyta	0.48703	0.59941	1.9639	1.2973	1.02348	0.51001
Cyanophyta	0.99491	0.99022	0.2331	10.099	9.7731	6.67555
Bacillariophyta	1.76024	1.07851	1.09053	10.75151	3.7511	0.90284
Euglenophyta	0.62721	1.69442	-	6.04656	0.08405	5.26535
Pyrophyta	0.08916	0.15713	0.35573	0.94388	0.85799	1.01415

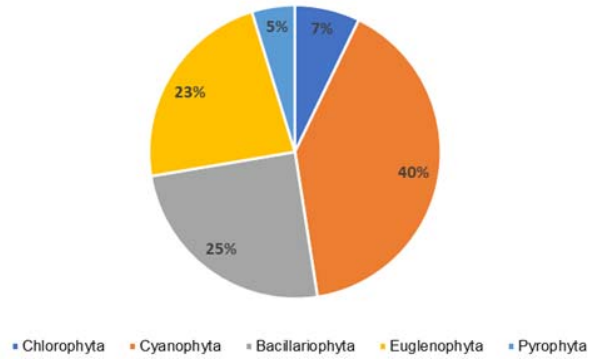

Fig. 1 The share of algal biomass between April and September 2018

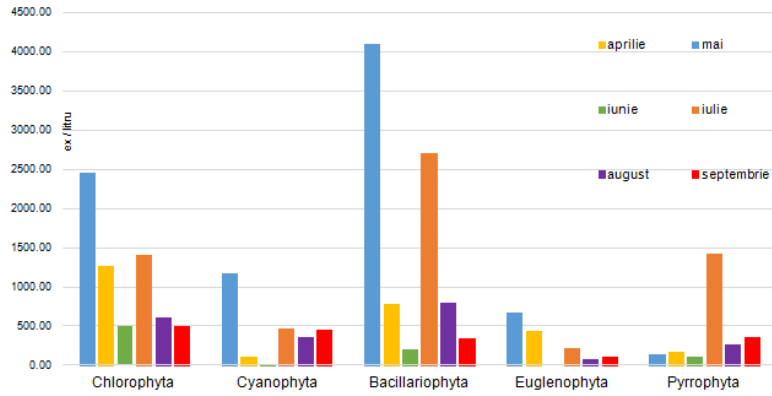

Fig. 2 Evolution of phytoplankton density during April-September 2018 in summer growth ponds in Brateș Experimental Base

Following the analysis of water samples it was found that the structure of phytoplankton communities was made up of representatives of the following taxonomic groups: Chlorophyta, Cyanophyta, Bacillariophyta, Euglenophyta and Pyrophyta. Analyzing the numerical density of the species we observe an increased development of phytoplankton towards the end of the spring period, more precisely in May, when the diatoms reach an average density value of 4099.45 thousands spec./l (fig. 2). Of the algae, diatoms have an increased frequency being present through the species *Cyclotella comta*, *Nitzschia dissipata* and *Synedra ulna*.

It is important to note that among these groups the most important role in feeding the fish populations is represented by chlorophylls, which is why the green algae community manifested itself through the abundance of the species *Ankistrodesmus augustus*, *Scenedesmus acuminatus*, Scenedesmus quadricauda, species that have been identified throughout the experimental period.

The blue algae during the experimental period showed an ascent in May, during which time they were noticed through the species: *Anabaena angstumalis* species that was identified only in the samples collected in April and the *Oscillatory limnetica*. Euglenophyses have been shown to have a lower frequency, and the species identified are: *Trachelomonas volvocina*, *Euglena pisciformis, Colacium vesiculosum.*

Pyrophytes were also identified in the collected samples, recording maximum values in July.

The pyrophytic algal community was less representative, both numerically and taxonomically. The highest numerical density was recorded in July, the representative species being *Cryptomonas marssoni*.

CONCLUSIONS

Following the study on the characterization of phytoplankton in rearing ponds of one summer old fish, a diversity of variations of phytoplankton communities was established. The seasonal succession of phytoplankton is determined by a complex of factors, the triggering element being the temperature, followed by the influence of light, precipitation and the degree of loading of the pond with nutrients. At the same time, it was observed that there are significant differences regarding the numerical density and the algal biomass in the analyzed ponds.

In order to fully exploit the trophic potential of the pond, the appropriate population with fish species is required to fully utilize the natural food.

If, at the beginning of the experimental period, in the spring season, an important contribution to the achievement of phytoplankton biomass had the populations of bacillophyses and chlorophylls. In the summer period, due to the high temperatures specific to July and August, higher values of blue algae were recorded. The tendency to replace the blue-green algae in the phytoplankton and chlorophyll communities by the phytoplankton communities is low, which does not indicate an alteration of the ecological balance in the ecosystem [4]. From the analyzes carried out during the research period, we observe the dominance of the diatoms, followed by the chlorophylls, cyanophytes, pyrophytes and euglenophytes. From the researches conducted on the investigated ponds, there is a well-seasoned dynamic dynamics of the structural-functional parameters of phytoplankton: the maximum values of the herd and the biomass being recorded during the summer period, and the minimum ones during the autumn period.

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