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PRELIMINARY ASPECTS CONCERNING PHYTOPLANKTON STRUCTURE IN ECOSYSTEMS OF THE FISH FARMS

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Abstract. This paper focuses on the fish ponds phytoplankton structure and its evolution during a vegetative season in three Romanian cyprinids farms which grow out table fish in poly-culture. The technical differences among the studied fish farms are represented by the source of ponds water supply and the size of the ponds. To establish the structure and the dynamics of the phytoplankton, there were collected two sets of biological samples, at the beginning and at the end of vegetative season, from 6 sampling stations in each fish pond. The vegetal plankton was analysed from a qualitative (the number of individuals and species) and quantitative (the relative taxa density and the numerical abundance) points of view. The phytoplankton was representative in all sampling stations during the entire vegetative season. The number of taxa and exemplars from the same algal species identified in the structure of phytoplankton emphasises a small trophic level of the pond, which is cumulated with a reduced phytoplankton biodiversity during the studied period.

Keywords: phytoplankton, taxa density, numerical abundance, pond ecosystem.

AIMS AND BACKGROUND

This paper shows the results of the algological investigation carried out in the frame of the CIPRINAQUASIG Project. The main goal of the paper is to give a general picture on the status of the phytoplankton structure from the fish ponds and its evolution during the vegetative season of year 2008 in three Romanian cyprinids farms specialised in growing out table fish in poly culture.

There are few publications focused on the diversity of the phytoplankton communities of cyprinid fish farms. In case of the fish farms from our study there are no data on the species occurring in these ecosystems. Phytoplankton, for many aquatic ecosystems are the main primary producer of organic substances[1].

EXPERIMENTAL

The development of the vegetal plankton was analysed in 3 different ponds, belonging to three cyprinids farms: farm Carja 1 (the Vaslui county), farm Malina (the

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Galati county) and farm Sarinasuf (the Tulcea county). The largest pond is located in farm Carja 1 (297 ha), followed by the pond in the farm Sarinasuf (56 ha) and pond in the farm Malina (30 ha).

The cyprinids farms used in this paper are located in the soth-eastern part of the country and have different water supply sources.

Each analysed pond has different water supply sources. Farm Carja 1 receives water from the Prut river, farm Malina – from the Siret river and farm Sarinasuf – from the Danube Delta channel, named the Lipoveni channel.

To establish the structure and the dynamics of the phytoplankton there were collected two sets of biological samples, in first and in the second part of the vegetative season, from 6 stations established per each pond from the analysed farms. The sampling stations were kept constant during the study by using the Garmin GPS 72 navigation system.

The phytoplankton samples were collected from the water surfaces in bottles (500 ml) and immediately fixed with Lugol solution in a ratio of 1:100 (1 ml of solution for 100 ml of sample). Previous to microscopically analyses, the samples were centrifugated for 5 min at 1200 rpm.

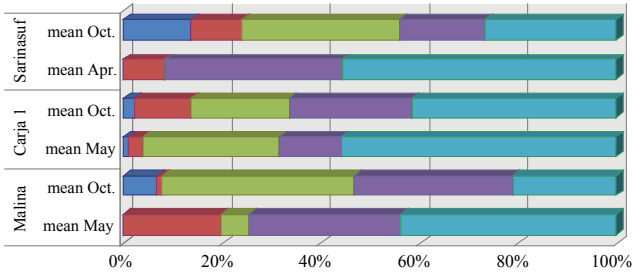
The vegetal plankton was evaluated from the qualitative (the number of individuals and species) and the quantitative (the density and the numerical abundance) points of view.

RESULTS AND DISCUSSION

In the freshwater vegetal plankton, population algae of the following main taxonomic groups are present: Chlorophyceae, Bacillariophyceae, Euglenophyceae, Pyrrophyceae and Cyanophyceae[2,3].

Chlorophyceae are authentic green algae, the chloroplast of green clean[4]. Bacillariophyceae represent an important group of single-cell algae known as diatoms. Euglenophyceae are microscopic flagellate, unicellular, who prefer aquatic ecosystems wealthy in organic substances[5]. Pyrrophyceae are mobile unicellular algae, usually with an external shell, prefer nutrient dense foods waters. Blue algae which prokaryotes capable of photosynthesis are cosmopolitan forms with high ecological plasticity[6].

Figures 1 and 2 show the analysed ponds phytoplankton structure with same complexity in each farms, but with different intensity. From the quantitative point of view, it can be noticed the numerical abundance of the micro-green algae in all samples analysed during the vegetative period.



	Malina		Carja 1		Sarinasuf	
	mean May	mean Oct.	mean May	mean Oct.	mean Apr.	mean Oct.
Chlorophyta	43.8	21.1	55.7	41.4	23.7	26.6
Bacillariophyta	30.8	32.1	12.7	25.1	15.6	17.3
Euglenophyta	5.6	38.9	27.6	19.7	0.0	32.0
Pyrrophyta	19.9	1.3	2.8	11.5	3.6	10.4
Cyanophyta	0.0	6.7	1.2	2.3	0.0	13.7

Fig. 1. Numerical abundance (%) of phytoplankton in the ponds of the cyprinids farms

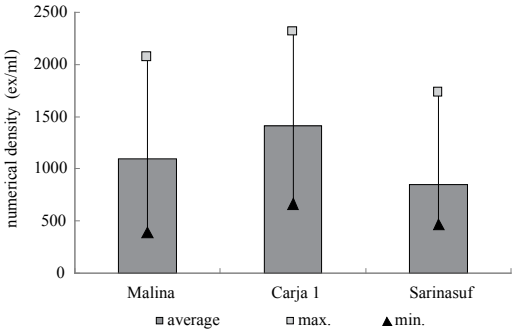


Fig. 2. Numerical density (ex/ml) of phytoplankton in the ponds of the cyprinids farms

At the beginning of the vegetative season in the pond of the farm Carja 1, the phytoplankton was present in all 6 stations that we analysed. The structure of it was consisted of 21 taxa and considered from our point of view a small number of taxa. From the quantitative point of view were predominant the micro green algae (79%), represented by the following species: *Scenedesmus acuminatus*, *Scenedesmus quadricauda* and *Tetrastrum staurogenieforme*. In the algae biomass, they were followed by the Euglenophyceae (53%) with the species: *Euglena acus*, *Euglena viridis*, *Euglena tripteris* and *Trachelomonas armata*. In the same phytoplankton samples were observed as rare Cyanophyceae, represented by the species: *Merismopedia punctata* and *Merismopedia glauca*.

In the second part of the vegetative season, the phytoplankton taxa numbers were maintained in relatively constant limits (760–1596 ex/ml) at each sampling station from the pond of the farm Carja 1. Also, the micro green algae predominated

(74%) the second set of phytoplankton samples and was represented mainly by the species: *Scenedesmus acuminatus*, *Trachelomonas armata*, *Crucigenia tetrapedia*. They were followed by the Euglenophyceae (36%) from the phytoplankton structural point of view.

The maximum abundance of phytoplankton in the first part of the vegetative season was registered at the collecting station situated close to the place of filling in the pond and then, during the second set of phytoplankton sampling, registered at the middle part of the pond.

In the farm Malina, phytoplankton is poorly represented by the number of taxa (7–22) and specimen density (380–2394 ex/ml).

In the first set of samples collected at the beginning of the season dominated phytoplankton the Chlorophyceae with species: *Crucigenia tetrapedia*, *Oocystis* and *Scenedesmus acuminatus elliptical* (48–70%), followed by Cryptophyceae, represented by: *Cryptomonas eros* and *C. ovata* (29–48%) and then followed by the diatoms: *Nitzschia sigmoid*, *N. linearis*, *Synedra acus*.

In the samples collected in the second part of the vegetative season diatoms prevail by the species: *Amphora ovalis*, *Navicula cuspidata*, *Synedra acus* in almost all stations (60–70%), followed by the Chlorophyceae (*Scenedesmus acuminatus*, *S. acutus*, *Coellastrum microporum*) and Euglenophyceae (*Euglena acus*, *E. oxyuris*, *E. viridis*, *Trachelomonas army*) in the sampling stations from the middle of the pond, mainly.

In samples collected from the farm Sarinasuf, in the first part of the vegetative season, were highlighted a small number of algal species (380–1368 ex/ml), dominated by the Chlorophyceae (78–88%) from the species: *Scenedesmus acutus*, *S. acuminatus*, *S. quadricauda*, *Monoraphidium contortum*, *Crucigenia tetrapedia* and by the diatoms (75%) with three species: *Nitzschia linearis*, *Rhizosolenia longiseta*, *Navicula rhynchocephala.*

In the samples collected in the second part of the vegetative season from the pond of farm Sarinasuf phytoplankton density ranging from 960 to 2090 ex/ml. In this period, Euglenophyceae had numerically predominant species: *Lepocinclis ovata*, *Euglena major* and *E. viridis* and were followed by the Chlorophyceae with species: *Tetraedron minimum* and *Scenedesmus acuminatus*.

CONCLUSIONS

The results of our investigations on the diversity and dynamics of the phytoplankton species in cyprinids farms have shown the following:

– From quality point of view, the phytoplankton structure reveals the presence of 5 major taxonomic groups at all the farms, presented in the descendent order of the relative numerical abundance as: Chlorophyta, Bacillariophyta, Euglenophyta, Pyrrophyta and Cyanophyta.

– The qualitative and quantitative analysis performed on fish farms ponds phytoplankton reveals low level of biodiversity in samples collected at the first part of the vegetative season and also at the end of the season. In this way, it was proved that installation of aquatic ecosystems biocenoses in the fish ponds took place in more than 20 days after the filling in the ponds at each fish farm studied.

– Also, to the end of the season the biological potential of the pond, mainly of the phytoplankton was significantly reduced.

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