

Research about the Influence of Environmental Factors on Breeders Quality

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Abstract

Along the growth period of the breeders, the monitoring of environmental parameters is a fundamental condition to ensure the quality of the breeders used for reproduction. The results from the research presented in this paper were obtained following experimental type investigations developed in vegetation and cold season within Carja 1-Vaslui fish farm, on chemical and biological samples which were analyzed within the research laboratory of the Department of Aquaculture, Environmental Science and Cadastre. Were analyzed parameters which influence bio-productivity: temperature, oxygen, pH, the concentration of nitrites, nitrates, phosphates, the density and abundance of phytoplankton and zooplankton, the individual weight and health condition of breeders. Analyzed parameters included mean values recorded in the optimal range for fish waters, as reflected in the numerical density and abundance of plankton and the average weight of Asian cyprinids breeders with a plankton nutritional spectrum.

Keywords: breeders, health, phytoplankton, quality, zooplankton.

1. Introduction

We provide broodstocks a special treatment, their general physiological condition having a important influence over the quality and quantity of the seminal products. The reproduction success depends on the quality of the specimens. To ensure a good quality of specimens we have to provide a special treatment in raising them.

Life conditions as well as their variations at which the fish adapted during their filogenesis are for this organisms normal life conditions.

Oscillations in this conditions lead to appropriate changes in fish organisms. These changes are considered normal or physiological and label the fish health status.

2. Materials and methods

In vegetative and cold seasons we analyzed the water's physico-chemical and biological parameters in Balta Mare area. The biological and hydro-chemical samples were examined in May, October 2007 and Mars 2008 in 6 stations (5 stations in Craja-lake and one station in Carja-entrance/evacuation). In every station we determined in the field a series of physico-chemical parameters: temperature, dissolved oxygen, the ph with the HQ 40D device. We determined as well the ammonium and nitrite level in order with the Government's decision no. 202/2002.

For the hydro-biological ecosystem reference we analyzed the dynamic and structure of the plankton (animal and vegetal) in Hydro-biologic lab of the Aquaculture Department, Environment Science and Cadastre.

The biological material that was under creation was represented by the three big Asian cyprinids species breeders grass carp (*Ctenpharingodon*

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idella, Val. 1844), that consumes macrophyte aquatic vegetation, silvery carp (*Hypophthalmichthys molitrix*, Val. 1884) that consumes phytoplankton and bighead carp (*Aristichthys nobilis*, Rich. 1845) that consumes zooplankton.

We measured and weighted 15 males and 15 females of Asian cyprinids from every species in both seasons. Total length (TL) and total weight (WT) were measured by approximating to the nearest centimeter, 0,1 m and 0.1kg for 90 specimen. The average values were expressed by $M \pm SD$. For verifying the normal weight distribution of the biological material we used The Kolmogorov Test.

The sanitary evaluation status of the biological material was made in the Ihtyopatologic lab from The Department of Aquaculture, Environment Science and Cadastre. For identifying the sick ones we used usual methods of research.(clinical exam, parazitology). The results were expressed with extensivity (E %) and intensity degree of the parasites (I – weak, medium, intense).

3. Results and discussion

Water quality

Physico-chemical characteristics of water directly influences acting on the physiology of biological material culture fish (feeding, breeding, wintering, assimilation, Ca, etc) and indirectly through its action on other groups of organisms (plankton, benthos, macrophytes, etc) populating the pond and the mutual interdependence of physical and chemical factors.

The results obtained were interpreted from the point of view of the culture species echo physiological demand regarding the quality of water [1] and the regulations HG nr.202/2002 which includes the fish breeding use into II, III quality categories.

Water Temperature (°C). Temperature is one of the most important factors affecting fish behavior; breeding, feeding intensity had a normal evolution, the characteristic period which ran upward trend, with values that were within normal limits for fish water.

Average water temperature ranged between 18.9 to 19.3°C on 26.05.2007, 13.30 to 13.72°C on 13.10.2007 and between 7.18 to 7.20°C on 09.03.2008 (Figure 1).

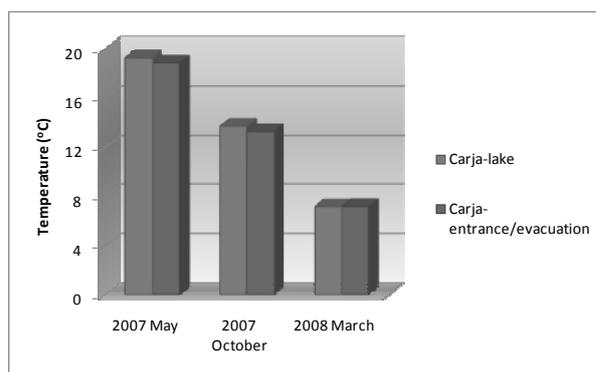


Figure 1. Variation temperature of water samples

Water reaction - pH (upH). Water pH affects other parameters, and the speed of many biological and chemical processes. During the reported period the average pH - the date varies in the range from 8.78 to 8.86upH on 26.05.2007, 8.39 to 8.43 upH on 10.13.2007 between 8.64 to 8.72upH on 09.03.2008, values are up to the upper limit of the optimal pH (Figure 2).

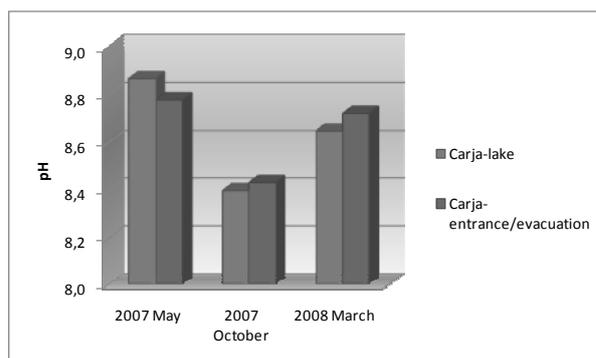


Figure 2. Variation pH of water samples

Dissolved oxygen (mg O₂/ l). The quantity of DO is indirectly proportional to temperature; in the case of high temperatures, the quantity of oxygen decreases. The necessary quantity of oxygen is being indicated by the species echo physiological requests, fish size, feeding rhythm and temperature.

Dissolved oxygen condition for aquatic flora and fauna and promote the processes of oxidation and mineralization of organic substances. The operating systems can take place daily fluctuations, leading to rapid deterioration in the DO, when developing excessive algae at high concentrations of nutrients, high temperature and salinity values [2]. In cyprinids basins to increase have provided at least 4 mg O₂/l water, and in summer between 5 and 6.5 mg O₂/l water. Average water DO ranged between 10.68 to

11.99mg O₂/l on 26.05.2007, 12.06mg O₂/l on 13.10.2007 and between 9.15 to 9.19mg O₂/l on 09.03.2008 (Figure 3).

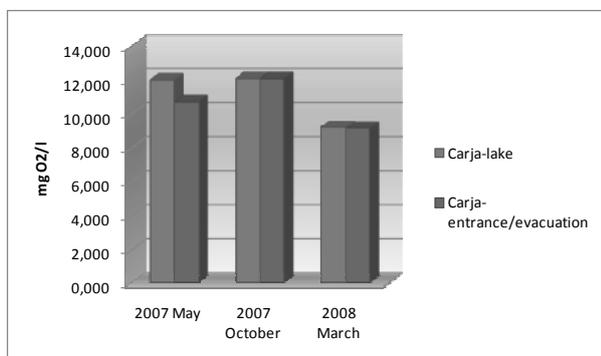


Figure 3. Variation DO of water samples

Nitrogen compounds. Ammonia is the main waste product, the result of metabolic activity of fish. In water, ammonia is found in two forms: ionized (NH₄⁺) and unionized (NH₃-N) which is in equilibrium with each other. Both the ionized form of ammonia and nitrite can be very toxic to fish, low concentrations. Nitrites are produced toxic to aquatic organisms [3], their presence is allowed at lower concentrations of 0.02 mg / l N-NO₂. Environmental factors affecting transformation of NO₂ site are pH, temperature, dissolved oxygen content, microbial density and inhibitory components [4, 5]. Nitrate is stable product, resulting from the process of nitrification. They are generally considered non-toxic products. The concentration of NH₄⁺ recommended fish waters shall not exceed 0.2 mg/l NH₄⁺ because of the possibilities of transformation, and the minimum value is 0.02 mg/l NH₄⁺. Us with reference to the required value, we found that there are breaches in the period analyzed, Figure 4.

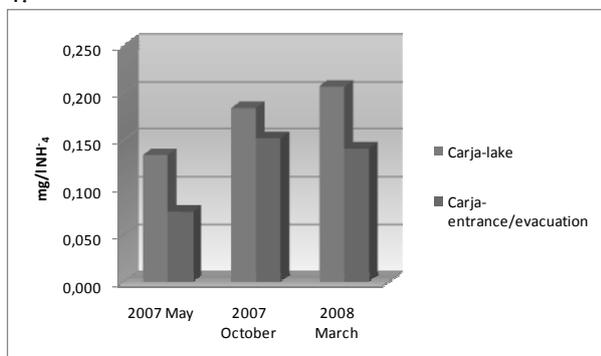


Figure 4. Variation NH₄⁺ of water samples

The concentrations of nitrites (NO₂⁻) were below the maximum allowed (0.2 mg/l) in all stations (Figure 5).

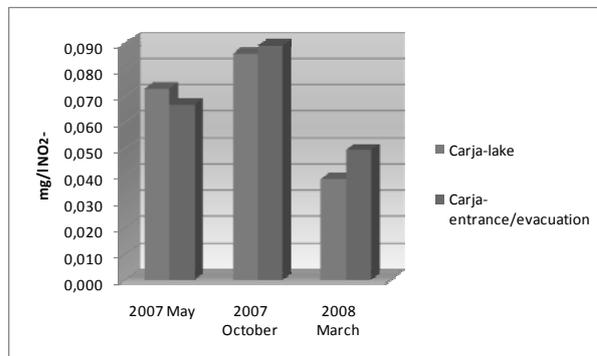


Figure 5. Variation NO₂⁻ of water samples

The structure of plankton

We analyzed the structure of phytoplankton and zooplankton as a tool for assessing trophic status of the ecosystem in the vegetation and winter season.

The structure of phytoplankton was identified five taxonomic groups, constantly prevailing chlorophyceae both winter and vegetative season. The share of representation in the phytoplankton taxonomic groups showed significant fluctuations. Number of exemplar varies between 576-3040 ex/ml in samples from May 2007, 760-1596ex/ml in samples from October 2007 and between 95-399ex/ml in samples March 2008 (Figure 6).

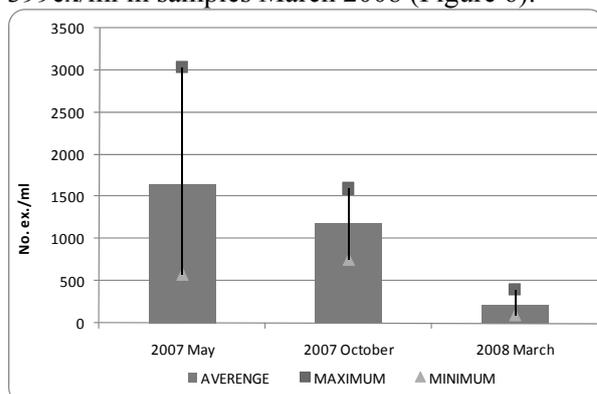


Figure 6. Numerical density of phytoplankton (ex/ml) in the two seasons (vegetation and cold)

In both seasons chlorophyceae quantitatively predominant (11-86%) of species: *Scenedesmus acuminatus*, *S. quadricauda*, *Tetrastrum staurogenieforme*, *Crucigenia tetrapedia*, *Tetraedron minimum*. A significant weight and had a euglenophyceae (below 53%) of species: *Euglena acus*, *E. viridis*, *E. tripteris*, *E. oxyuris*,

Trachelomonas armata, *Phacus longicauda*. A lower proportion had bacillariophyceae *Nitzschia linearis*, *Pinnularia viridis*, *Amphora ovalis*, *Synedra acus*. Isolated, they noticed the cyanophyceae with the species: *Merismopedia punctata* and *M. glauca*.

In terms of qualitative phytoplankton recorded a total of 21 species in samples from vegetative season and has 14 species in winter samples.

The **structure of zooplankton** was identified three taxonomic groups: Rotifera, Copepoda, Cladocera. Share number they had in all stations rotifers in May and October 2007 (*Asplanchna priodonta*, *Brachionus angularis*, *Brachionus rubens*, *Filinia longisaeta*, *Trichocerca* sp., *Keratella quadrata*). In March 2008 they had a numerical weight microcrustacean's embryonic and juvenile stage.

Cladocera were found in samples from May and October with species: *Daphnia longispina*, *D. cristata*, *Ceriodaphnia reticulata*, *Bosmina longirostris*, *Alonella nana* juvenile and adult stages.

Copepods appear in all stations in both May and in October with stages nauplii *Cyclops strennus* species.

In quantitative terms, the numerical density varies between 415-1737 ex/l in samples from October 2007 between 188-390 ex/l in samples from March 2008 and the last set of samples, in May, between 582-1635 ex/l (Figure 7).

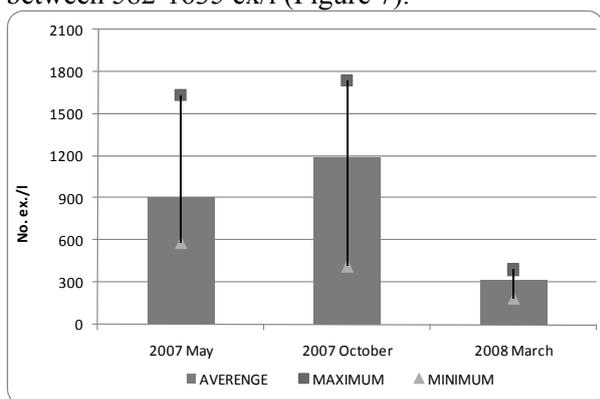


Figure 7. Numerical density of zooplankton (ex /l) in the two seasons (vegetation and cold)

In the first set of samples, numerical abundance rotifers 61-94% range, between 0-10% and copepods between 6-31% cladocera. In the second

set of samples, numerical abundance rotifers range 43-62%, of between 12-30% copepods and cladocera between 21-27%. The set of samples in March 2008, Numerical abundance varies between 11-29% rotifers, between 1-23% cladocera and 12-42% Copepods.

From a qualitative zooplankton is poorly represented in both seasons of 22 species recorded maximum.

Health condition

Technological performance in classical aquaculture depends mostly on effectiveness of disease control and stress conditions.

In the first table the average values are presented of weights and total length of the biological material taken from the growing pool the breeding of Asian cyprinids in Balta Mare.

To check the normality of distribution weights female and male Asian cyprinids collected vegetative season as cold as I applied the Kolmogorov-Smirnov test Z. It showed the value of a normal distribution both for females' $p > 0.05$ for males and $p > 0.05$, therefore accept the hypothesis of normality for biological material.

By stress status, we understand the condition of the aquatic animal organisms after consuming all the adaptive mechanisms, under the influence of life also known as stress conditions or stress. In this kind of situations, by modifying their hormonal balance, a low resistance is installed that encourages infectious, parasitic and any kind of disease [6, 7]. Infectious and parasitic diseases usually appear by exposing an animal to contamination with harmful organisms that exist in a particular environment [8, 9 and 10] and they play an important role in phylogenetics, evolution and conservation [11, 12].

Biological material taken in the warm season and cool, introduced diseases caused by protozoa (ciliophora) plathelminthes worms (monogeneans and trematodes) and parasitic crustaceans.

The results reveal a small number of parasite species parasitic on various organs (Table 2).

Table 1. Mean and standard deviations for weight and length of the biological material

Species		Vegetative season		Cold season	
		W (kg) (M±SD)	Lt (cm) (M±SD)	W (kg) (M±SD)	Lt (cm) (M±SD)
<i>H. molitrix</i>	♀	6,5±0.21	75.8±2.87	6±0.25	68.7±2.81
	♂	5.6±0.26	65.5±2.84	5.5±0.18	64.8±3.47
<i>Ct. Idella</i>	♀	5.7±0.23	80.3±2.89	5.5±0.17	77.7±3.57
	♂	5.20±0.18	76.5±2.78	5±0,11	75.7±2.81
<i>A. noblis</i>	♀	17±0.20	97±3.22	17.5±0.16	99.2±4.05
	♂	15.5±0.89	94.2±3.07	15±0.72	94±3.28

Table 2. The degree of biological infestation in the Asian cyprinids

Data sampling	Species	Biological infestation / degree of damage							
		<i>Trichodina sp.</i>		<i>Dactylogyrus sp.</i>		<i>Posthodiplostomum sp.</i>		<i>Sinergasilus sp.</i>	
		E%	I	E%	I	E%	I	E%	I
26.05.07	silver carp	-	-	-	-	10	S	30	S
	bighead carp	-	-	-	-	-	-	-	-
	grass carp	-	-	-	-	-	-	-	-
22.10.07	silver carp	-	-	-	-	50	M	20	S
	bighead carp	-	-	-	-	-	-	10	S
	grass carp	-	-	-	-	-	-	-	-
9.03.08	silver carp	-	-	50	M	-	-	40	S
	bighead carp	10	S	50	S	-	-	20	S
	grass carp	-	-	10	S	-	-	-	-

¹ Consider: *I weak* <5 microscopic parasites in field; *medium* -5-10 microscopic parasites in field; *intense* > 10 microscopic parasites in field.

Specific to the disease in late may in this fishery are; black spot disease, sinergasilosis when conditions are favorable for the bloody explosion sinergasilosis (low degree of extensivity and intensity);

Diseases specific to the fishery in October are black spot disease (average degree of extensivity and intensity) and sinergasilosis (low degree of extensivity and intensity) in specimens of silver carp and the bighead carp is sinergasilosis specimens (low degree of extensivity and intensity); trichodiniasis, dactylogyrosis and sinergasilosis

Diseases specific to the fishery in March, are: trichodiniasis, dactylogyrosis and sinergasilosis. So, silver carp shown a large parasitic with the monogenic *Dactylogyrus sp.*, because of the decreased resistance after being parasite with *Sinergasilus lienii* all through 2007 until the collectioning in 2008; and the bighead a weak parasitic bowth with *Trichodina sp.* protozoa and with *Dactylogyrus sp.* monogenic worm and also with *Sinergasilus sp.* crustacen; grass carp showed a slight parasitic with *Dactylogyrus sp.* Worm.

4. Conclusions

After the analysis of the physical-chemical parameters obtained, both regarding the optimum breeding values of the Asian species as well as the regulations concerning the classification of surface water in order to establish the ecological condition of water organisms (HG no 202/2002) and correlated with the data from the literature of speciality for fish breeding waters, the following conclusion unfold:

We have noticed that, during the experiment, the physical-chemical parameters monitored for waters used for fish breeding fitted into the optimal limits.

Qualitative and quantitative analysis of plant and animal plankton shows low level of biodiversity in samples from May whereas during installation biocenoses in aquatic ecosystems conducted last about 20 days after flooding basins.

Growth in the breeders of Asian cyprinids satisfactory values recorded following stimulation trophic base

Health status related to biological pest infestation of the material culture of the unit is generally good growth of vegetation and cold season.

Stress can be usually avoided or reduced by a good management:

- Ensuring optimum life conditions, both regarding the physical-chemical features of the environment and the feeding schedule.
- Rigorously respecting all the prophylaxis measures for fish and other edible aquatic organisms and foremost relating those measures referring to an optimum natural resistance insurance.

Increasing the pool of breeders and wintering asian cyprinids Balta Mare (296 ha) farm in Carja 1, provided optimal conditions for biological material life.

Acknowledgements

Researches were conducted in the project POSDRU no.107/1.5/S "The Quality and Continuity of Training as Part of a Doctoral Studies; ID -76 822 TOP ACADEMIC" and "Efficiency of PhD Students Activity in Doctoral Schools no.61445 - EFFICIENT" funded by the European Union and Romanian Government. The authors thank to the management staff of the project for their financial support.

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