Innovative Romanian Food Biotechnology *Vol. 2, Issue of June 30, 2008*

Received March 24, 2008 / Accepted April 25, 2008

RESEARCH ARTICLE

THE IMPLICATIONS OF WATER CHEMICAL PROPERTIES FROM THE BREEDING NURSERY POND ON THE FISH PATHOLOGICAL STATE

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Abstract

Fish population from various breeding systems may be affected by other diseases than the infections or the parasitical ones, the so-called unspecific diseases. At the roots of the ….. lie either physical and chemical ambient or nutritional and constitutional agents.

The present work shows the evolution of the main chemical parameters in the pound water for breeding cyprinids of the 2nd year ECP of the Brates farm during the year 2004.

Key words: fish, chemical parameters, pathological state, cyprinids

Introduction

Fish population from various breeding systems may be affected by diseases other than those infections or parasitical ones, namely unspecific diseases. Physical and chemical ambient, nutritional and constitutional agent causes these.

Water chemistry is defined by a multitude of parameters, from which more important for fish life are pH, dissolved gasses (oxygen and carbon dioxide), organic matter in suspension, its concentration in ammonia, nitrites, nitrates, phosphates, chlorides, sulfates, hydrogen, sulfides, metals, detergents, pesticides and phenols.

Starting from this reason, in the present work it is shown the evolution of the main chemical parameters in the pond water for breeding cyprinids of 2nd year EC1 from Brates farm during the year 2004.

There were examined water pH, dissolved oxygen content (mg/l), decomposing organic matter (mg of KmnO4/l of water), ammonia (mg of NH_3/l of water) and nitrites (mg of NO_2/l of water), parameters that indicate that there are some possible pathological states for fish.

Materials and methods

In order to monitor water chemicals parameters, there have been drawn monthly samples from the breeding (nursery) pond for cyprinids of second (2nd)

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year from Brates farm, in the period May-October, 2004, according to Romanian STAS 2852-87.

The sample analyses were made at the laboratory for chemical analyses from ICPP Galati, according to Romanian standards, specific for each kind of analysis:

- STAS 6325-75 – pH;
- STAS 8683-70 - ammonia nitrogen in surface waters;
- STAS 6536-88 – dissolved oxygen in surface waters;
- STAS 9887-74 – chemical oxygen consumption in surface waters, through the method of potassium permanganate;
- STAS 8900/2-71 - nitrites in surface water.

Results and discussions

The researches that were done allowed the identification of main water physical and chemical parameters and their evolution, during the whole breeding period of the culture cyprinids, on the 2nd year, on the Brates farm.

Table 1. *Values of main chemical parameters of EC1 pond water, during the breeding period of the cyprinids 2nd year*

The chemical parameter	The month					
	May	June	July	August	September	October
pH	7.5	8.0	8.2	7.6	7.6	7.7
Dissolved oxygen, O_2, mg/l	8.93	13.04	15.22	6.04	4.55	10.86
Concentration in organic matter , mg $KMnO_4$/l	35.78	52.24	60.99	24.21	18.23	43.49
Ammonia nitrogen , NH_3, mg/l	0.044	0.032	0.184	0.001	0.002	0.001
Nitrites , NO_2^-, mg/l	0.132	0.231	0.007	0.066	0.066	0.013

The admissible pH values for culture cyprinids may vary between 6 and 9, the optimal being between 7 and 8.3.

Figure 1 shows that in the water of the studied breeding pond there were found pH values between 7.5 and 8.2 thus resulting that water quality is placed in pH field which does not cause pathologies in the fish population.

The concentrations of dissolved oxygen in water, ensuring the physiological normal necessities of culture cyprinids vary with species, age, and fish population density.

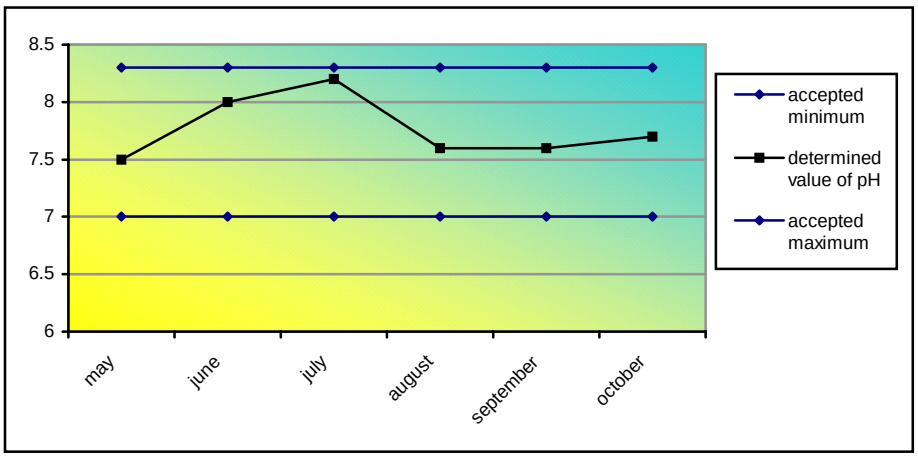

Figure 1. *The evolution of pH in the EC1 pond water*

Values between 6 and 8 mg/l ensure good life conditions for cyprinids.

The data shown in figure 2 indicate that the lowest value of the concentration of dissolved oxygen was 4.55 mg/l in September, and it is due to the phenomenon of algal blowing, which, during the daylight, enriches water with oxygen resulted from photosynthesis and during the night, that content

considerable falls, on account of its consumption in the process of breathing of living organisms and in that of decomposing organic dead matter.

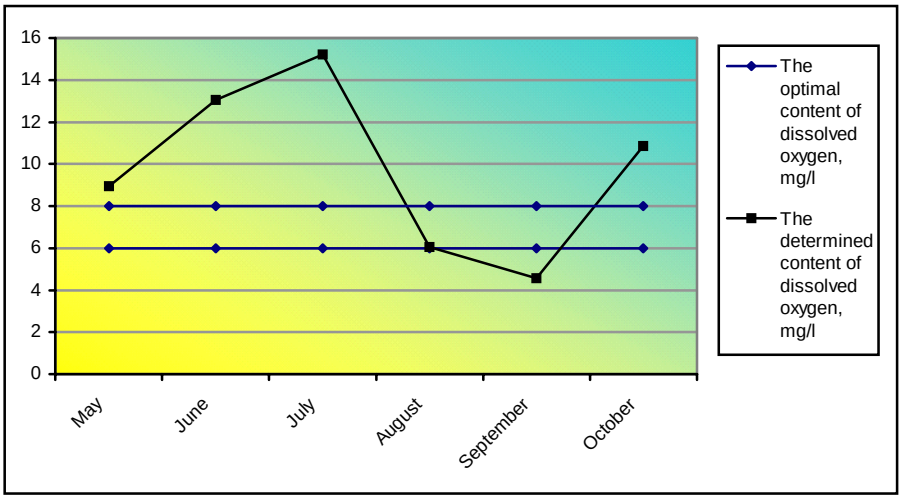

Figure 2. *The evolution of dissolved oxygen (mg/l) in the EC1 pond water*

The highest value was recorded in July - 15.22 mg/l.

These values have not brought about severe damages to the cyprinids from the breeding pond, because of prompt technological interventions: adding $CuSO_4$ - 3 mg/ha of pond's surface and washing algal mass by increasing the removal water-flow.

The content in organic matter from water - optimal for culture cyprinids - should be between 20-30 mg of $KMnO_4$/l of water.

Figure 3 shows that the highest value was 60.99 in July (with 0.99 mg/l higher than the maximum admissible for culture-fish waters, while the lowest value was 18.23 mg/l of culture fish waters.

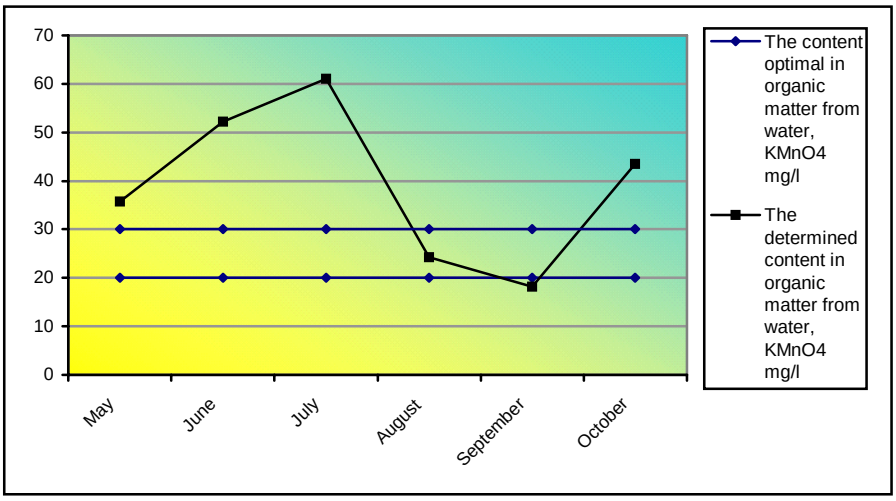

Figure 3. *The evolution of concentration in organic matter (mg/l) in the EC1 pond water*

The increase of the rate of concentration of organic matter was due to the presence of the blooming algae and the encreta derived from the metabolism of fish.

By technological measures like cessation of feeding and intensification of the water flow - that parameter was brought to optimal values, without recording pathologies caused to it.

The maximal admissible value for the concentration in nitrites of the culture cyprinids water is 0.2 mg/l, until the fish is protected against the toxic effects of that chemical parameter.

Figure 4 shows that the maximal admissible value outrun in June by 0.03 mg/l, without damages to fish culture-stock

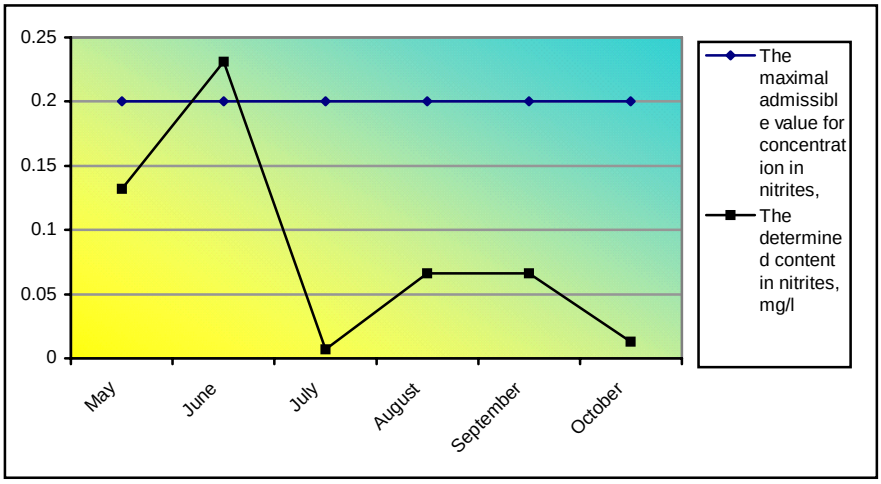

Figure 4. *The evolution concentration in nitrites (mg/l) in the EC1 pond water*

The maximal admissible concentration in undissociated ammonia in water is 0.05 mg/l for cyprinids.

Figure 5 shows that this maximum concentration was outrun in July when a value of 0.184 mg/l was recorded, explained by the high fish density, high temperature, and the more intense metabolic activity, but also by ammonification of dead algal matter.

There have not been recorded losses in fish culture-stock, on account of cessation feeding, water flow intensification, and pH diminution by adding $CaCl_2$ ($1g/cm^3$ of water).

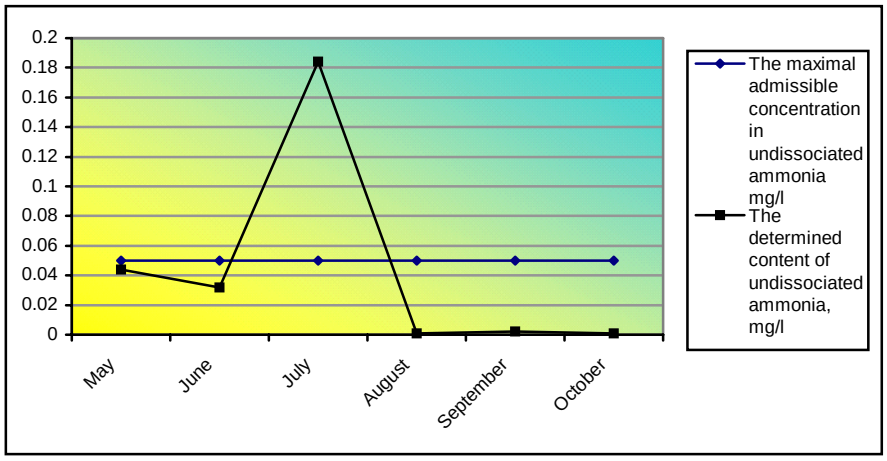

Figure 5. *The concentration evolution in ammonia (mg/l) in the EC1 pond water*

Conclusions

The result of the analysis of the main chemical parameters of the pond water during the breeding period in the 2nd year of the culture cyprinids on Brates farm, are the following:

- The pH value of the breeding pond water has remained between the admissible limits, without causing pathological damages to fish.
- The dissolved oxygen concentration of the breeding pond water registred the lowest value

of 4.55 mg/l in September; the preventive measures made use of protected the fish stock against of algal blowing.

- The content of organic decomposing matter recorded the highest value in July (60.99) due to the presence of such substances in the feeding water, the algae blowing, the uneaten fodder and the excreta resulted from fish metabolism it was ceased the feeding and intensified the water flow, and the fish stock remained unaffected.
- The concentration of ammonia exceeded the maximal admissible value, 0.184 mg/l in July – on account of the high fish density, the high temperature and the more intense metabolic activity as well as the ammonification of dead algae stock; fuding ceased, water flow was intensified and the pH deceased by adding $CaCl_2$ ($1g/m^3$ of water).
- On Brates farm, in the period of May-October, corresponding to the breeding of the culture cyprinids in the 2^{nd} year, there have not been recorded pathologies at fish caused by physical and chemical agents of water, because of their monitoring and the application of some prophylactic suitable measures.

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