

MAIN CHEMICAL PARAMETER WITH PATHOLOGICAL INFLUENCE CONDITION IN FISH

Aida Vasile, George Vasilescu, Valeriu Gheorghe

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

INTRODUCTION

Fish population from various breeding systems, may be affected by diseases other than those infection or parasitical, 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 fishes' life are pH, dissolved gasses (oxygen and carbon dioxide), organic mater 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 first year EC3A 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 NH₃/l of water) and nitrites (mg of NO₂/l of water), parameters which indicate, in the situation of exceeding of the admissible limits for culture cyprinids, which may cause pathological conditions in fish.

From May to October 2004, as a result of the conducted research, there have been 7 parasitic diseases registered on the cyprinids of the first summer from the EC3A growth pond.

MATERIAL AND METHOD

In order to monitor water chemical parameters, monthly samples from the breeding (nursery) pond for cyprinids of first year from Brates farm, in the period May-October 2004 according to Romanian STAS 2852-87 have been drawn (Popa and Patriche, 2001; Popa et al., 2001).

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

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.

The fish came from the Brates farm, 15 individuals from each species: common carp (*Cyprinus carpio* L.), silver carp (*Hypophthalmichthys molitrix* Val.) and big head (*Aristichthys nobilis* Rich.), each of them being one year of age, being examined right after the wintering period.

For the purpose of identifying the illnesses, the usual research methods have been utilised (clinical, micological, parasitical exams have been conducted). The results have been analysed with the extent degree (E%) and parasitic intensity degree (I - low, medium, high) (Munteanu, G. et al., 2003).

RESULTS AND DISCUSSIONS

The researches that were made allowed the identification of main water physical and chemical parameters and their evolution, during the whole breeding period of the culture cyprinids, in the first year, at the Brates farm.

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 were found pH values between 7.5 and 8.2, thus result that water quality is placed in pH field which does not causes pathologies in the fish population.

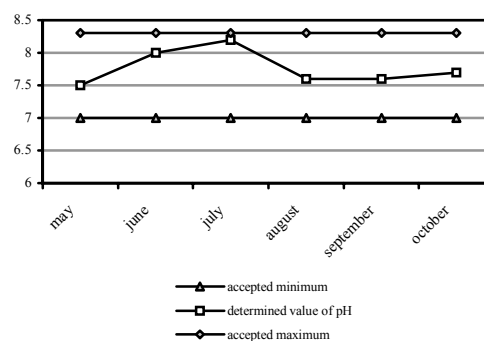


Fig. 1. The evolution of pH in the EC3A pond water

The concentrations of dissolved oxygen in water, ensuring the physiological normal necessities

of culture cyprinides vary with species, age, and fish population density.

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

The data showed in figure 2 indicate that the lowest value of the concentration of dissolved oxygen has been 4.77 mg/l in September due to the phenomenon of algae blowing. This phenomenon enriches the water with oxygen resulted from photosynthesis during the daylight, and during the night, the content considerable falls, due to its consumption in the process of breathing of living organisms and in that of decomposing of the organic dead matter. The highest value has been recorded in July: 16.10 mg/l.

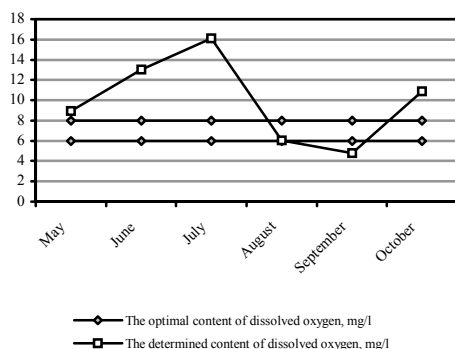


Fig. 2. The evolution of dissolved oxygen (mg/l) in the EC3A pond water

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

The figure 3 shows that the highest value was 61.17 mg/l in July (with 1.17 mg/l higher over than maximum admissible for fish-cultural waters), while the lowest value was 18.23 mg/l of waters.

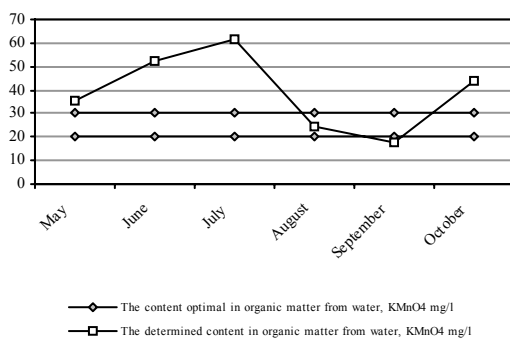


Fig. 3. The evolution of concentration in organic matter (mg/l) in the EC3A pond water

The increasing of the concentration in organic matter was due to the presence of such supplying of the feeding water, the algae getting bloomed and the excreta from the fish metabolism.

By technological measures like cessation of feeding and intensification of the water flow – this parameter has been brought to optimal values.

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

figure 4 shows that the maximal admissible value outrun in June with 0.031 mg/l, without damages to fish cultural stock.

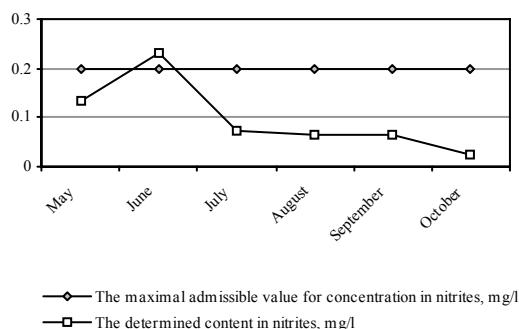


Fig. 4. The evolution concentration in nitrites (mg/l) in the EC3A pond water

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

The figure 5 shows that this maximum concentration was outrun in July when there have been recorded a value of 0.173 mg/l, explained by the high populating density, high temperature, and the more intense metabolic activity, but also by ammonification of dead algae matter.

There have been not recorded losses in fish cultural stock, because of cessation feeding, water flow intensification, and pH diminution by adding CaCl_2 (1g/cm³ of water).

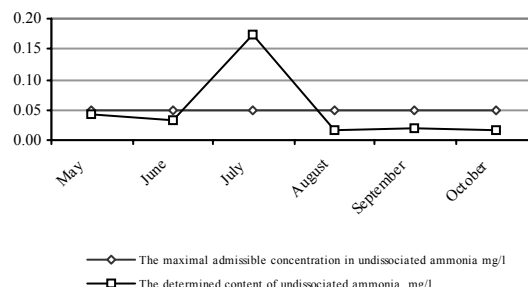


Fig. 5. The evolution concentration in ammonia (mg/l) in the EC3A pond water

CONCLUSIONS

The result of the analysis of the main chemical parameters of the pond water during the breeding period in the first year of the culture cyprinids at Brates farm, are the followings:

- The pH value of the breeding pond water has remained between the admissible limits.
- The dissolved oxygen concentration of the breeding pond water has known the lowest value of 4.77 mg/l in September.
- The content of organic decomposing matter has recorded the highest value in July (61.17 mg/l). Due to the presence of such substances in the feeding water, the algae blowing, the uneaten fodder and the excreta resulted from the fish metabolism it was ceased the feeding and intensified the water flow.

- The concentration of ammonia has exceeded the maximal admissible value 0.173 mg/l in July. Due to the high populating density, the high temperature and the more intense metabolic activity as well as the ammonification of dead algae stock; it was ceased the feeding, it was intensified the water flow and decreased the pH by adding CaCl_2 ($1\text{g}/\text{m}^3$ of water).
- In the Brates fish farm, from May to October, the time of the first summer cyprinids' growth, the exceeding of the minimum and maximum values has favored the development of the following parasitic diseases of different percentages extensivity on the fish: myxosporidiosis 5%, trihodiniasis 90%, ichthyophthiriosis 15%, infestation with *Glosatella* 50%, dactylogiriosis 15%, gyrodactilogiriosis 10% and hepaticolosis 30%.

REZUMAT

Populațiile piscicole din diferitele sisteme de creștere, pot fi afectate atât de boli specifice (boli infecțioase și parazitare) cât și de boli nespecifice. Apariția bolilor este favorizată pe lângă factorii biotici și de factorii abiotici. Din categoria factorilor abiotici fac parte și parametrii fizico-chimici ai mediului acvatic.

Pornind de la acest considerent în lucrarea de față este prezentată evoluția principalilor parametri chimici ai apei din heleșteul de creștere a ciprinidelor de vara a I-a din ferma Brateș care au favorizat apariția bolilor parazitare în anul 2004.

REFERENCES

1. BOTNARIUC N., VĂDINEANU A., 1982 - Ecologie, Editura Didactică și Pedagogică București.

2. CIOLAC A., 1997 - Elemente de ecologie acvatică, p. 15-22 Editura Pax Aura Mundi Galați.
3. MUNTEANU G., DUMITRU BOGATU, 2003 - Tratat de Ihtiopatologie, p. 542-549 Ed. Excelsior Art.
4. POPA P., PATRICHE N., 2001 - Chimia mediului acvatic p. 10-37 Editura Ceres, București.
5. POPA P., PATRICHE N., MOCANU R., SÂRBU C., 2001 - Calitatea mediului acvatic p. 5-33 Editura Ceres, București.
6. VASILESCU G., 1986, - Hidrobiologie p. 3-21 Editura Universității Dunărea de Jos, Galați.
7. *** STAS 8683-70 Ape de suprafață. Determinarea azotului amoniacal.
8. *** STAS 6536-88 Ape de suprafață. Determinarea oxigenului dizolvat.
9. *** STAS 9887-74 Ape de suprafață. Determinarea consumului chimic de oxigen prin metoda cu permanganat de potasiu.
10. *** STAS 89001/2-71 Ape de suprafață. Determinarea azoților.
11. *** The testing of water (1982) - E. Merck.
12. *** Water analysis handbook (1989) - Hach Company.

AUTHORS' ADDRESS

AIDA VASILE, GEORGE VASILESCU – “Dunărea de Jos” University, Faculty of Food Science and Engineering, Domnească Street, No 47, 800008 Galați, România, phone: +40236-414871.

VALERIU GHEORGHE - ICDEAPA, Portului Street, No 4, Phone: +40236-414270, 800008 Galați, România.