

### Assessment of the stress induced by decays within a system of intensive rearing of the Asian cyprinids

Adina Popescu, Victor Cristea, Angelica Docan, Săndița Ion,  
Maria D. Dicu, and Ionica Enache

Aquaculture, Environmental Sciences and Cadastre Department,  
"Dunarea de Jos" University of Galați, Galați, Romania, European Union.  
Corresponding author: A. Popescu, adina.popescu@ugal.ro

**Abstract.** In intensive fish farming systems in the recent years, under the multiplication of stressor factors, there is a trend of gradual increase in pathological disease whose etiologic agents are not appreciated at their real pathogenic value by fish farmers. Technological performance in classical aquaculture depends largely on the efficiency of disease control as well as stressful conditions. The subject of this paper was aimed at reducing losses in intensive aquaculture by applying efficient prophylactic and therapeutic measures, a good knowledge of parasitological diseases, their length, intensity degree and also the influence on the fish population being necessary. For these reasons, a complete ichthyopathological examination was done in the case of Asian cyprinid species, during 2007-2008 in the Carja 1 (Vaslui County, Romania) farm conditions, identifying the following parasitofauna: protozoa (ciliophora), plathelminthes worms (monogenea and trematoda) and crustaceans.

**Key words:** stressor factors, parasitological diseases, length, intensity.

**Rezumat.** În sistemele de creștere intensivă a peștilor, în ultimii ani, în condițiile multiplicării factorilor stresanți, se observă o tendință de creștere treptată a afecțiunilor patologice ale căror agenți etiologici nu sunt apreciați la valoarea lor patogenă reală de către acvacultori. Performanța tehnologică în acvacultura clasică depinde în cea mai mare măsură de eficiența controlului îmbolnăvirilor precum și a condițiilor stresante. Studiul ce a făcut obiectul prezentei lucrări a avut drept scop diminuarea pierderilor din acvacultura intensivă prin aplicarea de măsuri profilactice și terapeutice, fiind necesară o bună cunoaștere a bolilor parazitare, a gradului lor de extensivitate și intensivitate, precum și influența lor asupra populației de pești. Din aceste considerente, s-a realizat examen ihtiopatologic complet la speciile de ciprinide asiatice, în perioada 2007-2008, în condițiile fermei Cârja 1 (jud. Vaslui, România), identificându-se următoarea parazitofaună: protozoare (ciliofore), viermi platelminți (monogeni și trematozi) și crustacee.

**Cuvinte cheie:** factori stresori, boli parazitare, extensivitate, intensivitate.

**Introduction.** Life conditions, as well as their variations, at which the fish adapted during their phylogenesis, are for these organisms normal life conditions. Oscillations in these conditions lead to appropriate changes in fish organism. This change is considered normal or physiological and labels the fish health status.

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 (Munteanu & Bogatu 2003; Petrescu-Mag & Petrescu-Mag 2010). Infectious and parasitic diseases usually appear by exposing an animal to contamination with harmful organisms that exist in a particular environment (Gelnar & Lux 1991; Conte 1992; Rahmati-holasoo et al 2011) and they play an important role in phylogenetics, evolution and conservation (Balog et al 2008; Yaman et al 2008; Lotfalizadeh 2008; Molnar et al 2009; Pricop 2009; Nowak et al 2010).

The subject of this paper was aimed at reducing losses in intensive aquaculture by applying efficient prophylactic and therapeutic measures, a good knowledge of parasitological diseases, their length, intensity degree and also the influence on the fish population being necessary (De Kinkelin et al 1985; Roberts 1989; Billard 1995). For these reasons, a complete ichthyopathological examination was done in the case of Asian cyprinid species, during 2007-2008 in the Carja 1 (Vaslui County, Romania) farm conditions, identifying the following parasitofauna: protozoa (ciliophora), plathelminthes worms (monogenea and trematoda) and crustaceans.

**Materials and Methods.** The biological material that was under parasitological research was represented by the three most important Asian cyprinid species, native to big rivers in South-East Asia, but very well acclimatized in Romania, obtained by extensive culture in the Carja 1 (Vaslui County) farm conditions. These fish are the grass carp or white amur *Ctenopharyngodon idella* (Valenciennes, 1844) that consumes macrophyte aquatic vegetation, the silver carp *Hypophthalmichthys molitrix* (Valenciennes, 1844) that generally consumes phytoplankton and the bighead carp *Hypophthalmichthys nobilis* (Richardson, 1845) or mottled carp that consumes mainly zooplankton.

For establishing the biological material's sanitary condition in the vegetative period of the year 2007 and the cold season in the year 2008, we took 10 individuals from each species of 4-5 years Asian cyprinids from the rearing pool in Balta Mare (Romania).

The sanitary evaluation of the biological material was made in the Ihtiopatological laboratory form Aquaculture, Environmental Science and Cadastre Department, "Dunarea de Jos" University of Galati. For identifying the sick species, we used usual methods of research (clinical and parasitological examination). The results were analysed with the extensivity (E %) and intensity parasitic degrees (I-weak, average, intense).

**Results and Discussion.** In the first table (1), it is presented the sanitary situation status of the cyprinids from Carja 1 Farm, Vaslui. The results obtained were analysed with the extensivity (E %) and intensity parasitic degrees.

The specimens from Carja farm, captured in the cold and vegetative season, presented protozoa (ciliophora), plathelminthes worms (monogenea and trematoda) and crustaceans inflicted diseases.

The results obtained put in highlight a small number of parasitic species from various organs of the host. The biological material was infested with the parasites presented below:

- *Trichodina* sp.- ectoparasitic protozoan;
- *Dactylogyrus* sp. - monogenea worm;
- *Posthodiplostomum* sp. - trematoda worm;
- *Sinergasilus* sp. - crustacean.

Table 1

The degree of biological infestation in the Asian cyprinids

Data sampling	Species	Biological contaminants / degree of damage							
		<i>Trichodina</i> sp.		<i>Dactylogyrus</i> sp.		<i>Posthodiplostomum</i> sp.		<i>Sinergasilus</i> sp.	
		E%	<sup>1</sup> I	E%	<sup>1</sup> I	E%	<sup>1</sup> I	E%	<sup>1</sup> I
26.05.07	silver carp	-	-	-	-	10	S	30	S
	bighead carp	-	-	-	-	-	-	-	-
22.10.07	grass carp	-	-	-	-	-	-	-	-
	silver carp	-	-	-	-	50	M	20	S
	bighead carp	-	-	-	-	-	-	10	S
9.03.08	grass carp	-	-	-	-	-	-	-	-
	silver carp	-	-	50	M	-	-	40	S
	bighead carp	10	S	50	S	-	-	20	S
	grass carp	-	-	10	S	-	-	-	-

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

Black spot disease is observed in Figure 1 by the presence on the body surface (to an individual collected in October 2007 infected silver carp) of pigmented spots around the cysts with *Posthodiplostomum cuticola*.



Figure 1. Black spot disease on silver carp, October 2007

Figs 2-3 present direct and microscopic examination of gills in silver carp harvested in March 2008.



Figure 2. Macroscopic examination of the gills in silver carp, March 2008



*Sinergasillus* sp. on the silver carp gills



*Dactylogyrus* sp. on the silver carp gills

Figure 3. Microscopic examination of the gills in silver carp, March 2008

Figs 4-5 present direct examination of the gills of bighead and grass carp, biological material collected in March 2008, and in Figure 6 is presented microscopic examination of the gills of bighead carp.



Figure 4. Macroscopic examination of the bighead carp gills, March 2008

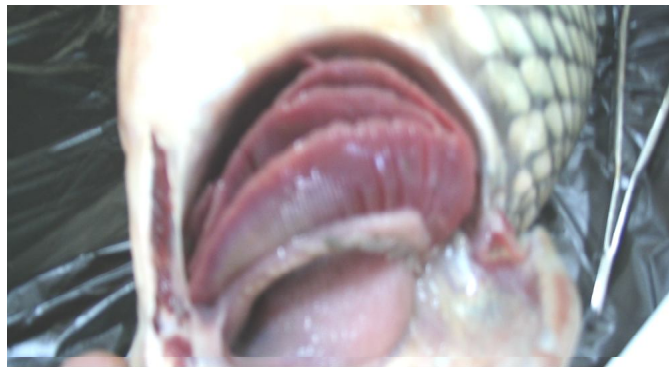
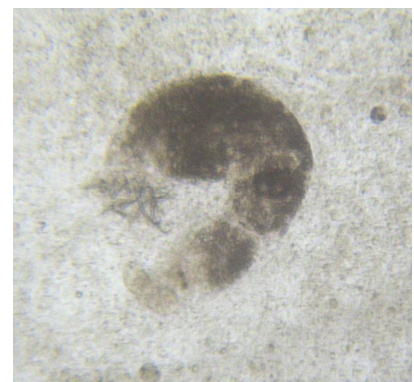
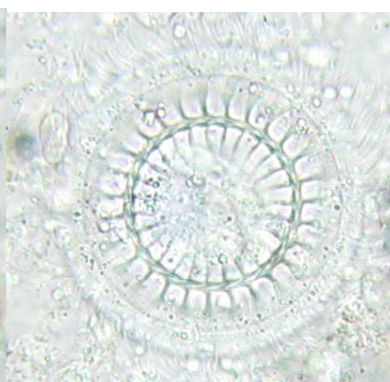


Figure 5. Macroscopic examination of the gills in grass carp, March 2008



*Trichodina* sp. on the bighead carp gills, lateral and ventral view



*Dactylogyrus* sp. on the bighead carp gills

Figure 6. Microscopic examination of the bighead carp gills, March 2008.

**Conclusions.** From the data analysis registered in Table 1, we can notice the following biological infestations with parasite issues of the fish material from the Carja 1 farm:

- At Carja farm the condition of the fish material in the vegetative season is good.
- At the end of May, the specific diseases in this farm are: black spots disease, sinergasilosis, when favourable conditions are met for the sinergasilosis to spread on silver carp (weak degree of extensivity and intensity);
- In October, the specific diseases are black spots disease (medium degree of extensivity and intensity) and sinergasilosis (weak degree of extensivity and intensity) for the silver carp specimens and for bighead carp specimens is sinergasilosis (weak degree of extensivity and intensity)
- In March, the specific diseases are: trichodiniasis, dactylogyrosis and sinergasilosis. It was notable that silver carp shown a large parasitic with the monogenea *Dactylogyrus sp.*, because of the decreased resistance after being parasite with *Sinergasilus lienii* all through 2007 until the collecting in 2008. The bighead carp showed a weak parasitic both with *Trichodina sp.* protozoa and with *Dactylogyrus sp.* monogenic worm and also with *Sinergasilus sp.* crustacean. Grass carp showed a slight parasitic with *Dactylogyrus sp.* worm.

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.

**Acknowledgements.** Research was conducted in the framework of the projects POSDRU "Efficiency of PhD Students Activity in Doctoral Schools no.61445 - EFFICIENT" and "Quality and continuity of training within the doctoral cycle no.76822 - TOP ACADEMIC", funded by the European Union and Romanian Government. The authors thank to the management staff of the project for their support.

## References

- Balog A., Marko V., Ferencz L., 2008 Patterns in distribution, abundance and prey preferences of parasitoid rove beetles *Aleochara bipustulata* (L.) (Coleoptera: Staphylinidae, Aleocharinae). North-West J Zool **4**(1):6-15.
- Billard R., 1995 La biologie des cyprinides - Les carpes, biologie et élevage, INRA, Paris.
- Conte F. S., 1992 Evaluation of a freshwater site for aquaculture potential. Publication WRAC no.92-101. Western Regional Aquaculture Center, USA, p.35.
- De Kinkelin P., Michel C. H., Ghittino P., 1985 Précis de pathologie des poissons. INRA-OIE, Paris.
- Gelnar M., Lux E., 1991 On the dissemination of 2 Far-East monogenean parasites (*Dactylogyrus achmerovi* Gussev, 1955 and *Gyrodactylus kherulensis* Ergens, 1974), of carp (*Cyprinus carpio* L) in Czechoslovakia. Folia Parasit **38**:131-132.
- Lotfalizadeh H., 2008 New distribution records for Eucharitidae (Hym.: Chalcidoidea) in Iran. North-West J Zool **4**(1):134-138.
- Molnar K., 2009 Data on the parasite fauna of the European common carp *Cyprinus carpio carpio* and Asian common carp *Cyprinus carpio haematopterus* support an Asian ancestry of the species. AACL Bioflux **2**(4):391-400.
- Munteanu G., Bogatu D., 2003 [Treaty of ichthyopathology]. Excelsior Art, Timișoara. [In Romanian]
- Nowak M., Szczerbik P., Klaczak A., Epler P., Popek W., 2010 Diversity of lampreys and fishes of the Upper Vistula River drainage, Poland: present state and future challenges. AACL Bioflux **3**(5):325-332.

- Petrescu-Mag I. V., Petrescu-Mag R. M., 2010 Heavy metal and thermal stress in fishes: The implications of HSP in adapting and acclimation to different environments. *Metalurgia International* **15**(10):107-117.
- Pricop E., 2009 Preliminary studies of the Mymaridae (Hym., Chalcidoidea) from Neamț county, Romania, species distribution, vascular flora/vegetation, an ecological approach. *AES Bioflux* **1**(1):13-29.
- Rahmati-holasoo H., Hajimohammadi B., Ahmadiara E., Ebrahimzadeh Mousavi H., Rostami-bashman M., Haghighi khiabani asl A., Haghdooost I. S., Shokrpour S., Ghorbanalipour A., 2011 A study of infestation of *Alburnoides bipunctatus* with *Ligula intestinalis* in Latian reservoir Dam Lake, Tehran province, Iran: A histopathological study. *HVM Bioflux* **3**(1):18-24.
- Roberts R. J., 1989 Fish pathology. Bailliere Tindall, London.
- Yaman M., Tosun O., Aslan I., 2008 On the occurrence of a gregarine parasite from *Psylloides cupreus* Koch 1803 (Coleoptera, Chrysomelidae) of Turkey. *North-West J Zool* **4**(1):167-172.

Received: 10 December 2010. Accepted: 20 April 2011. Published online: 21 April 2011.

Authors:

Adina Popescu, Aquaculture, Environmental Sciences and Cadastre Department, "Dunarea de Jos" University of Galați, Domnească Street 47, Galați 8000087, Romania, European Union, e-mail: adina.popescu@ugal.ro

Victor Cristea, Aquaculture, Environmental Sciences and Cadastre Department, "Dunarea de Jos" University of Galați, Domnească Street 47, Galați 8000087, Romania, European Union.

Angelica Docan, Aquaculture, Environmental Sciences and Cadastre Department, "Dunarea de Jos" University of Galați, Domnească Street 47, Galați 8000087, Romania, European Union.

Sandita Ion (Placinta), Aquaculture, Environmental Sciences and Cadastre Department, "Dunarea de Jos" University of Galați, Domnească Street 47, Galați 8000087, Romania, European Union.

Maria Desimira Dicu, Aquaculture, Environmental Sciences and Cadastre Department, "Dunarea de Jos" University of Galați, Domnească Street 47, Galați 8000087, Romania, European Union.

Ionica Enache (Bancu), Aquaculture, Environmental Sciences and Cadastre Department, "Dunarea de Jos" University of Galați, Domnească Street 47, Galați 8000087, Romania, European Union.

How to cite this article:

Popescu A., Cristea V., Docan A., Ion S., Dicu M. D., Enache I., 2011 Assessment of the stress induced by decays within a system of intensive rearing of the Asian cyprinids. *AACL Bioflux* **4**(2):193-198.