

RESEARCHES REGARDING THE EVALUATION OF THE BIOLOGICAL CONTAMINANTS – PARASITES ON THE CULTURED CYPRINIDS IN SOME ROMANIAN FARMS

A. VASILE*, I. METAXA, A. POPESCU

Faculty of Food Science and Engineering, 'Dunarea de Jos' University, Galati, Romania

E-mail: aida.vasile@ugal.ro; isabelle.metaxa@ugal.ro

Abstract. This paper presents an evaluation of the contamination degree by parasites on the cultured cyprinids in some Romanian farms. Knowing the biological contaminants and tracing them in time, allow us to avoid their expansion and their transmittance to humans and warm-blooded animals as a result of fish consumption. Following the research, measures of preventing the spreading of the evaluated biological contaminants were recommended.

Keywords: biological contamination degree, cultured cyprinids, fish farms.

AIMS AND BACKGROUND

In aquaculture, as in any sector where it is working with living organisms, obtaining control of the biomass production is organically conditioned by knowing and maintaining unaltered the fish health. To achieve this knowledge use is made of certain specific physiological and biochemical indicators. In the light of these indicators, a practitioner can assess the extent to which he applied or not adequately the growth technological norms. Thus, it becomes possible maintaining stocks outside stressful incidents, both in terms of nutrition and other elements of the echo-physiological comfort, like: density, flow, health, etc.^{1,2}

The cultured fish contamination induced by the biological contaminants – parasites to the cultured cyprinids – is frequent at the open system fish farms, the loss through mortality and qualitative and quantitative decrease reaching sometimes alarming levels^{3,4}.

This paper presents an evaluation of the biological contaminants in the aquaculture farms: Sarinasuf – the Tulcea county, Malina – the Galati county and Cirja – the Vaslui county in the vegetative period (May–October 2008).

Also prophylactic measures must be considered in order to obtain fish as a safe food of aquatic origin.

* For correspondence.

The aim of this paper was the identification of the biological contaminants from different species of the cultured cyprinids.

EXPERIMENTAL

The fish came from the following farms: Sarinasuf – the Tulcea county, Cirja – the Vaslui county, Malina – the Galati county and were represented by the cyprinids species as carp (*Cyprinus carpio* L.), silver carp (*Hypophthalmichthys molitrix* V a l.), bighead carp (*Aristichthys nobilis* R i c h.) and grass carp (*Ctenopharogodon idella* V a l.), of different ages, preferred mainly for consumption fish of 2–3-year old.

The fishes were collected in May at the moment of their introduction in the growing ponds/pools, and in October before their insertion in the hibernation pools. The collected fish was brought to the laboratory in fresh state (in plastic bags within a refrigeration box).

The parasitological examination consisted in wet mounts (scrape mounts and squash mounts). The scrape mounts were made both superficial and profound from gills, tegument, flippers and intestinal mucus. The squash mounts were made from cellular tissue of organs such as: liver, reins and swim bladder. The dry mounts were studied at the microscope using lenses with magnification starting from $\times 5$ and ending with $\times 100$ (Refs 5 and 6).

The acquired results were analysed by means of extension degrees (E – the extension degree of the parasites among a sample of fishes) and intensity degrees (I – the parasitic degree of an individual host). The interpretation of the intensity degrees: L – low – less than 5 parasites per microscopic field; M – medium – 5 ÷ 10 parasites per microscopic field; H – high – over 20 parasites per microscopic field.

RESULTS AND DISCUSSION

Fish farm Sarinasuf, the Tulcea county. The fish derived from fish farm the Sarinasuf (10 to 15 specimens from each species, of 2 to 2+ years old) caught in May and October presented biological contamination with protozoa, monogenic worms, trematodes and crustaceans. The biological contaminants of the cultured cyprinids were represented by the following types of parasites: *Trichodina* sp. – protozoa; *Dactylogyru* sp. and *Diplozoon* sp. – monogenic worms; *Posthodiplostomum* sp. – trematode worm; *Argulus* sp. and *Sinergasilus* sp. – crustaceans.

In Table 1 is shown the biological contamination level of cyprinids from the fish farm Sarinasuf, the Tulcea county.

Table 1. Biological contamination degree of the cultured cyprinids from the fish farm Sarinasuf, the Tulcea county

Farm/collec- tion date	Fish spe- cies	Biological contaminants/contamination degree											
		<i>Trichodi- na</i> sp.		<i>Dactylo- gyrus</i> sp.		<i>Diplozoon</i> sp.		<i>Post- hodiplos- tomum</i> sp.		<i>Siner- gasilus</i> sp.		<i>Argulus</i> sp.	
		E (%)	I	E (%)	I	E (%)	I	E (%)	I	E (%)	I	E (%)	I
Sarinasuf	carp	15	L	50	M	-	-	-	-	-	-	15	L
Tulcea/April 2008	silver carp	-	-	-	-	-	-	100	M	100	H	-	-
	bighead carp	-	-	75	M	-	-	-	-	-	-	-	-
	grass carp	-	-	100	M	-	-	-	-	-	-	-	-
Sarinasuf	carp	-	-	30	L	50	M	-	-	-	-	-	-
Tulcea/ Oc- tober 2008	silver carp	-	-	30	M	-	-	50	M	100	H	-	-
	grass carp	-	-	-	-	-	-	-	-	100	H	-	-

In Table 1 may be observed that:

– the carp species *Cyprinus caprio* L. was with low contamination by 3 biological agents at the moment of their insertion in the growing pools (the *Trichodina* sp. protozoa, the *Dactylogyrus* sp. monogenic worm and the *Argulus* sp. crustacean) and low and medium contamination by 2 biological agents at the moment of their insertion in the pools for hibernation (*Dactylogyrus* sp. and *Diplozoon* sp. monogenic worm) (Figs 1 and 2);



Fig. 1. *Dactylogyrus* sp. scraped on the carp gills, Sarinasurf farm, April 2008 (original photo)

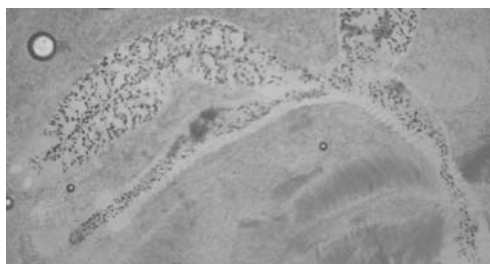


Fig. 2. *Diplozoon* sp. on the carp gills, Sarinasurf farm, April 2008 (original photo)

– the silver carp species *Hypophthalmichthys molitrix* V a l. was highly contaminated with *Sinergasilus* sp. crustacean (Fig. 3), at the both sampling points, and medium contaminated with the *Posthodiplostomum cuticola*, a biological contaminant responsible for the inadequate commercial aspect of the consumer fish, presenting black spots on the entire body (this contaminant produces the parasitic disease known as the ‘ink spots’ disease);



Fig. 3. *Sinergasilus major* highly diffused on the grass carp gills, Sarinasurf farm, April 2008 (original photo)

– the bighead carp species *Aristichthys nobilis* R i c h. was with medium contamination by *Dactylogyrus* sp. monogenic worm at the moment of their insertion in the growing pools;

– the grass carp species *Ctenopharingodon idella* V a l. was with medium contamination by *Dactylogyrus* sp. monogenic worm at the beginning of the growing period and high contamination by *Sinergasilus* sp. crustacean at the moment of their insertion in the pools for hibernation.

Thus we can conclude that the highest contamination was given by the *Sinergasilus* sp. crustacean with its two species: *S. lieni* – silver carp and *S. major* – grass carp. High contamination with this parasite can lead to massive piscine production loss (Fig. 3).

From a qualitative point of view the *Posthodiplostomum* sp. depreciates the commercial aspect of silver carp species for consumption.

Fish farm Malina, the Galati county. In the farm Malina there were parasitologically examined 3 species of cyprinids (carp, silver carp and bighead carp) for each species a number of 10 exemplars. The sampling of the fish was made in May and October⁷. The biologic contaminants, parasites on cultured cyprinids, were represented by: *Trichodina* sp. – protozoa; *Dactylogyrus* sp. – monogenic worm; *Posthodiplostomum* sp. – trematod worm.

The cyprinids parasitic contamination level in farm Malina, the Galati county, is shown in Table 2.

Table 2. Biological contamination degree of the cyprinids in the fish farm Malina, the Galati county

Farm/ collection date	Fish species	Biological contaminants/contamination degree					
		<i>Trichodina</i> sp.		<i>Dactylogyrus</i> sp.		<i>Posthodiplostomum</i> sp.	
		E (%)	I	E (%)	I	E (%)	I
Malina – Galati/ May 2008	carp	–	–	–	–	–	–
	silver carp	–	–	–	–	–	–
	bighead carp	–	–	–	–	–	–
Malina – Galati/ October 2008	carp	10	L	50	M	–	–
	silver carp	–	–	10	L	50	M
	bighead carp	10	L	20	L	–	–

There was no biological contamination of the fish in May because they were preventively treated before the insertion in the growing pools.

At the end of the vegetative stage, before inserting of the fish into the pools for hibernation, the following contaminations were observed:

– the carp species *Cyprinus caprio* L. was contaminated with 2 biological agents: low contamination with the *Trichodina* sp. protozoa (Fig. 4) and medium with the *Dactylogyrus* sp. (Fig. 5) monogenic worm;



Fig. 4. *Trichodina* sp. scrape mount from carp tegument, Malina farm, October 2008 (original photo)

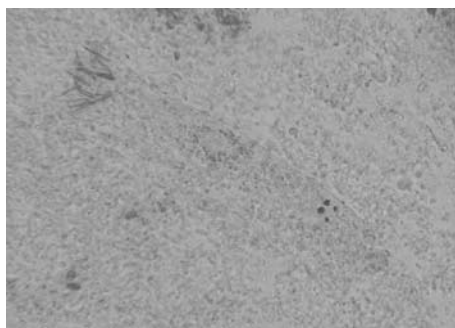


Fig. 5. *Dactylogyrus* sp. scrape mount from carp gills, Malina farm, October 2008 (original photo)

– the silver carp species *Hypophthalmichthys molitrix* V a l., was with medium contamination by *Posthodiplostomum cuticola*, a biological contaminant responsible for the inadequate commercial aspect of the consumer fish, presenting black spots on the entire body, and low contamination by *Dactylogyrus* sp. monogenic worm;

– the bighead carp species *Aristichthys nobilis* R i c h., was with low contamination by 2 biological agents: the *Trichodina* sp. protozoa and the *Dactylogyrus* sp. monogenic worm;

Thus we can conclude that the fish from the farm Malina, the Galati county was with low contamination by parasites, each studied species has been contaminated only with two biological agents.

Fish farm Cirja, the Vaslui county. The fish derived from Cirja farm (10 specimens from each species of 2 to 2+ years old) caught in May and October has been contaminated with biological agents as: monogenic worms, trematodes and crustaceans.

The biologic contaminants, parasites on cultured cyprinids, were represented by: *Dactylogyrus* sp. – monogenic worm; *Posthodiplostomum* sp. – trematode worm; *Argulus* sp., *Ergasilus* sp. and *Sinergasilus* sp. – crustaceans.

In Table 3 the biological contamination degree of the cultured cyprinids from the fish farm Cirja, the Vaslui county, is presented.

Table 3. Biological contamination degree of the cultured Cyprinids in the fish farm Cirja, the Vaslui county

Farm/ collection date	Fish species	Biological contaminants/contamination degree									
		<i>Dactylogyrus</i> sp.		<i>Posthodiplostomum</i> sp.		<i>Ergasilus</i> sp.		<i>Sinergasilus</i> sp.		<i>Argulus</i> sp.	
		E (%)	I	E (%)	I	E (%)	I	E (%)	I	E (%)	I
Cirja	carp	100	M	–	–	50	M	–	–	10	L
Vaslui/ May 2008	silver carp	–	–	10	L	–	–	100	H	–	–
	bighead carp					not catch					
	grass carp					not catch					
Cirja	carp	–	–	–	–	–	–	–	–	–	–
Vaslui/ October 2008	silver carp	–	–	50	M	–	–	–	–	–	–
	bighead carp	–	–	–	–	–	–	–	–	–	–
	grass carp	–	–	–	–	–	–	–	–	–	–

From Table 3 we can conclude that:

– the carp species *Cyprinus caprio* L., was contaminated with 3 biological agents: medium contamination with *Dactylogyrus* sp. monogenic worm and

Ergasilus sp. crustacean, and low contamination with *Argulus* sp. crustacean (Fig. 6);



Fig. 6. *Argulus* sp. scrape mount from carp tegument, Cirja farm, May 2008 (original photo)

– the silver carp species *Hypophthalmichthys molitrix* V a l. was with low contamination by the *Posthodiplostomum cuticola* trematode worm, a biological contaminant responsible for the inadequate commercial aspect of the consumer fish, presenting black spots on the entire body, and high contamination by the *Sinergasilus lieni* crustacean (Fig. 7);

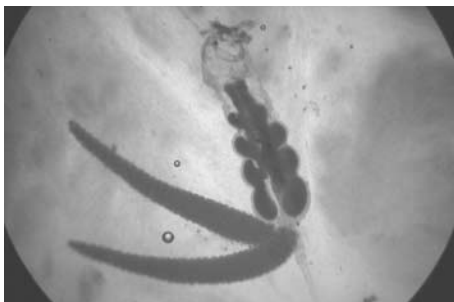


Fig. 7. *Sinergasilus lieni*, scrape mount from silver carp gills, Cirja farm, May 2008 (original photo)

– due to the preventive treatment of the fish, before the insertion in the pools for hibernation, the biological contamination missed in October.

CONCLUSIONS

After researches regarding the parasitic biological contamination of the cyprinids from the three fish farms (Sarinasuf – the Tulcea county, Malina – the Galati county, Cirja – the Vaslui county) the following conclusions can be drawn:

– the fish is with low contamination with biological agents of number of parasites;

- the fish farm Sarinasuf has the biggest number of biological contaminants (six) followed by the farm Cirja (five) and farm Malina (three);
- the crustaceans *Sinergasilus* sp., *Ergasilus* sp. and *Argulus* sp. which are present in the farms Sarinasuf and Cirja are responsible for the piscine production decrease;
- the biological contaminant *Posthodiplostomum cuticola* is present in all three farms being responsible for the decrease of the qualitative aspect of the silver carp.

PROPHYLAXIS RECOMMENDED MEASURES

The following prophylactic ways against the biological contamination of the cyprinids are recommended:

- the feeding water for the pools must come from trusted clean sources;
- the seeding fish brought from other locations must be free from parasites;
- the periodic vacuuming of the pools, the drying and freezing exposure;
- chlorine, lime, copper sulphate treatment for the destruction of the parasite and snails eggs;
- control of the aquatic vegetation which constitute a base for aquatic snails;
- location of the piscine establishments in places free of aquatic gastropods;
- avoiding the growth and the crowding of the ichthyophagous birds.

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