UDC (UDK) 91.69:597(497.16Boka Kotorska)

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PARASITES OF GILLS OF SEA BREAM FARMED IN CAGE SYSTEM

SUMMARY

In the spring, summer and autumn of 2009. surveys were conducted with the aim to establish presence and intensity of parasitic fauna on sea bream *(Sparus aurata)* farmed in Bay of Kotor. The standard parasitological methods were used in the survey.

The following three parasites were found on the sea bream gills: *Sparicotyle chrisophrii, Amyloodinium ocellatum* and *Trichodina spp.* Sea bream was most frequently invaded by *Amyloodinium ocellatum* (20.00% of invaded fish), then *Trichodina spp.11.11%* and *Sparicotyle chrisophrii* 4.44%. The invasion extensity during period of survey varied, as regards most parasites it was highest in July and September when the sea surface temperature is the highest. The invasion intensity was generally low. The parasites caused no significant damage in the cage system and only minor changes were present in the invaded fish in the form of micro haemorrhages on the gill filaments and increase in mucous secretion.

Key words: cage, gills, sea bream, parasites.

INTRODUCTION

The parasites present significant problem in cage systems, both in the world and in our part of Mediterranean.

In relation to that particular problem, the aim of our survey was to follow appearances and development of parasitic fauna in sea bream gills (*Sparus aurata*), farmed in cage system in Bay of Kotor.

Many researchers and scientists have been dealing with the problem of parasitic fauna. Some of them have focused on researching of sea bream parasites. We will mention only some of them whose researches dealt with sea bream parasites and correspond with our studies.

Fioravanti et al. (2006) between 2002 and 2005 the parasitic fauna on sea bass and sea bream produced in Italy with different methods of cultivation was examined. The tests were performed on more than 458 individuals of sea bream. These studies showed that sea breams were infected in 49.8% of cases.

Mladineo Ivona (2005) studied from June 2001 until March 2002 parasitic fauna of sea fish in seven cage systems in the Adriatic Sea, aiming to determine types and dynamics of appearance of parasites. Among other fish the sea bream

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were also tested. The presence of parasites was detected in all the fish. Dominant parasitic fauna was the Monogenea class.

Mladineo Ivona and Marsić-Lučić Jasna (2007) conducted studies of Monogenea *Lamellodiscus elegans* and *Sparicotyle chrysophrii* in farmed fish from the family Sparidae in the Adriatic Sea. The authors detected presence of both of these species of parasites on the gills of sea bream and sharpsnout sea bream *(Diplodus puntazzo),* reared in cages in Adriatic Sea. *Sparicotyle chrysophrii*, which is usually parasite, found in sea bream in the open sea, was better adapted in cage systems to the sharp snout sea bream where it showed better reproductive capacity.

Reversat (1992) and his associates studied ectoparasites on sea bream in western part of the Mediterranean Sea near the French coast. Two ectoparasites from the class Monogenea were found: *Furnestinia echeneis* and *Sparicotyle chrisophrii.* Paperna (1980) deals with appearance of disease sampled with *Amyloodinium ocellatum* in cage systems of northern parts of the Red Sea, close to Eilat. During those studies the presence of protozoic parasites in fish was detected. Infestation of sea bream was such that it resulted in the appearance of the individual and sometimes mass mortality of fish.

Sitja-Bobadila Ariadna and Alvarez-Pellitero Pilar (2009) during an experiment infected sea bream with *Sparicotyle chrisophrii* in two ways: inserting eggs of parasites in cages with fish and putting infected fish in cages with healthy ones. During those studies it was found that infestation of fish was faster when in cohabitation with already infected fish, with a larger number of parasites per fish, than when inserting eggs.

MATERIAL AND METHODS

An assay on the occurrence and spread of parasitic fauna on the gills of sea bream (*Sparus aurata*), reared in cages "Cogi" located in the Bay of Kotor near Orahovac, Kotor, was carried out during spring, summer and autumn 2009.

The sampling and testing of specimens of the sea bream aged just before consumption was carried out three times: May 17 (30 individuals), with water temperature 22.1˚C; July 9 (24 individuals) with water temperature 26.2˚C and September 22, with water temperature 23˚C.

After sampling, material was put in plastic bags filled with sea water enriched with air by an aerator and transferred in small refrigerator to the Institute of marine biology in Kotor where tests were carried out. Weight and length of fish were measured with technical scale and tape measure. Isolation of parasites was carried out with parasitological needles of different sizes, standard microscopic plates, Petri dishes, cylinders, concave glasses, lenses, scissors, scalpel and various sizes forceps.

Determination of types of parasites was carried out with binocular stereo magnifier and microscope and inverted microscope. In addition, different chemicals were used for parasite staining. For enlightening helminths we used

glycerol. Tissue processor, microtome, water bath, parafinator, moulds, formaldehyde and dyes were used for histopathology diagnostic.

On the basis of health status of fish and pathomorphological and histopathological changes in the gills it was determined effects of the parasites presence.

Alcohol 70% was used for the preservation of isolated preparation (helminths), and they were placed in a dark glass bottle with a rubber stopper. Nikon camera was used for taking photographs.

After measuring, fish was clinically examined in order to determine visible parasites on the skin, fins and eyes. Then with the scissors and forceps gills were removed from both sides. The gills were placed in Petri dishes and poured over with hypertonic solution of NaCl. Gills were examined through magnifier using parasitological needles that passed between each branchial filament individually.

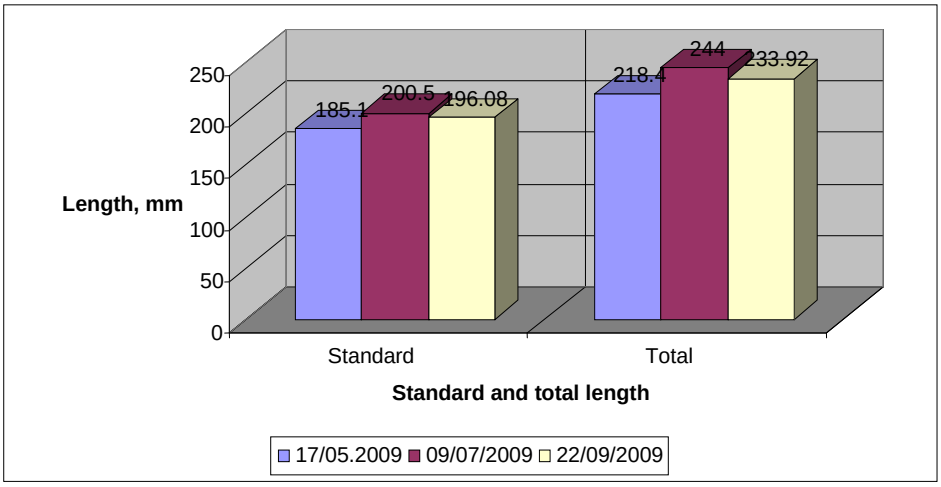
Smears of gills were made with the help of slides and examined under microscope natively with Giemsa and Lugol staining. Determination of ectoparasites was performed with microscope after enlightening with glycerol.

RESULTS AND DISCUSSION

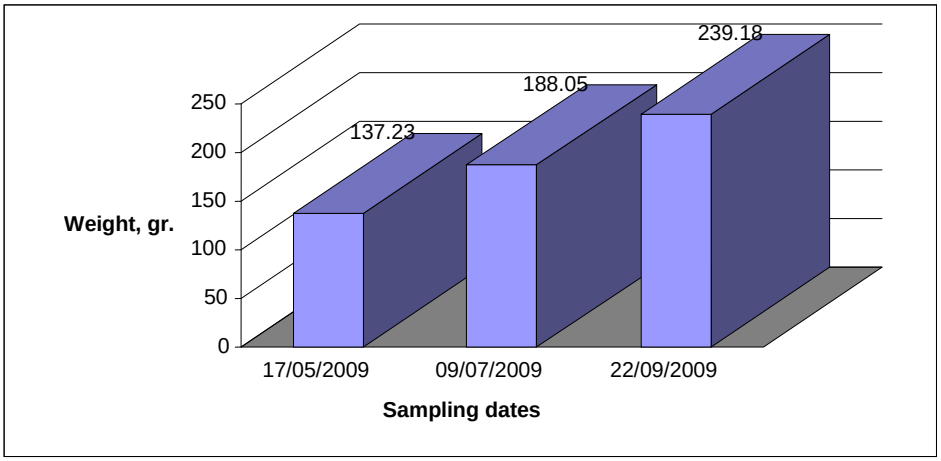
Morphometric characteristics (fish length and weight)

In order to determine the morphological characteristics of the experimental fish, shortly after sampling, measurements were performed in length (standard and total) and weight of 90 individuals.

It was found that the maximum length of the fish was found in summer period (standard 200,5mm and total 244,0mm), followed by autumn (standard 198,8, total 233,9), and the smallest in spring (standard 185,1, total 218,4mm), *graph 1*. When it comes to weight heaviest weight was in fish during autumn sampling (239,18gr), then summer (188,05gr), and the lowest during spring (137,23gr), *graph 2*.



Graph 1. Average length of fish in mm by sampling



Graph 2. Average weight of fish in gr by sampling

Number and types of isolated parasites

Next parasites were found during examination of gills: *Amyloodinium ocellatum*, *Sparicotyle chrisophrii* i *Trichodina spp.*

Table 1. Infestation of experimental fish with parasites, %

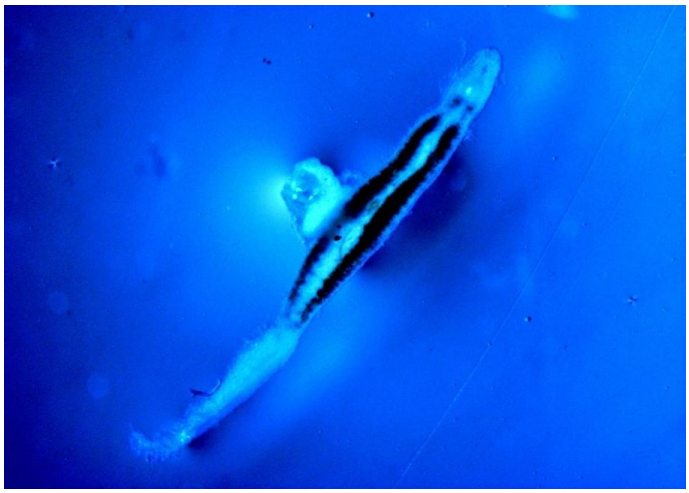
Type of parasite	Sampling date			Total
	17.05.2009.	09.07.2009.	22.09.2009.	
Sparicotyle chrisophrii	0.00	12.50	2.78	4.44
Amyloodinium ocellatum	0.00	25.00	33.33	20.00
Trichodina spp.	6.67	16.67	11.11	11.11

Monogenea *Sparicotyle chrisophrii* was found in three fish during summer (12,50%) and in one during autumn sampling (2,78%), while in fish from May sampling was found none. Total average number of infected individuals with that parasite is 4,44%. In all cases, from the gills of sea bream it was isolated only one parasite. Parasites were visible to the naked eye, about 4mm in length.

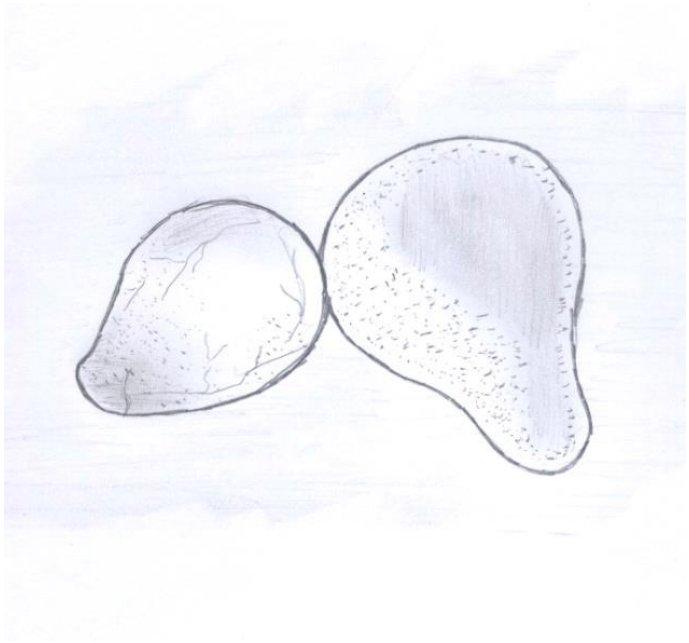
The highest percentage of infected individuals of sea bream with parasite *Amyloodinium ocellatum* was found during September sampling (33,33%), followed by July sampling (25,00%), while during May sampling the presence of that particular parasite was not detected. Totally, percentage of infected fish was 20%. Intensity of the invasion of infected fish was weak.

Ciliata *Trichodina spp.* was found in the gills of two individuals during May sampling (6,67%), four during July (16,67%) and four during September sampling (11,11%), while average infection with this parasite was 11,11%.

In fish infected by *Sparicotyle chrisophrii* was not found significant pathological changes beside blood on filaments of the gills and increased mucous secretion.



Picture 1. *Sparicotyle chrisophrii*



Drawing 1. *Amyloodinium ocellatum*

In fish infected by *Amyloodinium ocellatum* was not found significant pathological changes beside blood on filaments of the gills and slight increase of mucous secretion.

In fish infected by *Trichodina spp.* other than increased mucose secretion on the gills of the sea bream, no other pathological changes were noticed.

Comparative analysis

Three types of parasites were isolated from the gills of sea bream: *Sparicotyle chrisophrii, Amyloodinium ocellatum* and *Trichodina spp.*

The overall infection rate with parasites was 33,33% and ranged from 6.67% during May and over 50% in July and 44,44% in September (table 3).

The percentage of infected sea breams with parasites during our experiment was much lower than the percentage which was found by Fioravanti et al. (2006), which was 49,80%.

Mladineo (2006) notes a significantly higher number of parasitic species (8) in seven cage systems in north and central Adriatic Sea, among which are also types *Sparicotyle chrisophrii, Amyloodinium ocellatum* and *Trichodina spp.*, which we had found also.

Our research on parasitic fauna in cage system Cogi showed overall infection rate of sea bream gills with *Sparicotyle chrisophrii* of 4,44%. By sampling it ranged from 0% in May, over 2,78% in September and up to 12,5% in July. It should be emphasized that a significant increase in number of infected individuals had been noticed with the temperature increase.

The number i.e. percentage found during our experiment (4,4%) is significantly different from the one presented by the author Mladineo (2006) which stated 32,21%. Alvarez-Pellitero (2004) states that *Sparicotyle chrisophrii* was found in studies conducted by 5 out of 48 laboratories in the Mediterranean countries that are doing researches on fish parasites. Athanassopoulou et al. (2005.) noticed a moderate infection rate on sea bream gills with that parasite. Other authors such as Meneze (1992), Merella et al. (2004) and Reversat et al. (1991) found presence of this parasite on the sea bream gills.

In all cases when sampling is conducted during spring and autumn only one parasite *Sparicotyle chrisophrii* was found per infected fish, indicating that the intensity of invasion was weak. The parasite was found on the medial part of the gill filaments.

Changes on the gills of infected sea bream caused by parasite *Sparicotyle chrisophrii* were in the form of haemorrhages. This parasite can be seen with a naked eye length of about 4mm. Sitja-Bobadila and Alvarez-Pellitero (2009) are stating also shortening of lamellas and that was also noticed in our research. Absence of another parasite on the experimental sea bream from the class Monogenea (*Lamellodiscus elegans),* which Mladioneo mentiones, is due to the absence of sharpsnout sea bream in cage system Cogi. In the Croatian part of the Adriatic sea it is very common to rear that fish along with the sea bream and aforementioned parasite is in fact obligatory parasite on the gills of sharpsnout sea bream which adapted to parasitizing on sea bream (Mladineo and Maršić-Lučić, 2007).

Second parasite found in our research on the gills of sea bream was *Amyloodinium ocellatum*. Parasites were found in stage trofonta. Overall infection of sea bream with this parasite was 20%, and it went from 0% in May,

over 25% of fish in July and up to 33,33% in September (table 1). Intensity of infection on the gills was weak.

Mladineo (2006) notes a significantly higher percentage of infected individuals of sea bream with this parasite (74,67%). However, it is not recorded the presence of amiloodinium in all cage systems (5 out of 7). On the other hand, a much smaller percentage than what our research shows is stated by Carvalho-Varela at al. (1992), only 2,5% of infected sea breams.

The intensity of infection with *Amyloodinium ocellatum* was relatively weak during our research, and symptom noticed was white exudate.

Third parasite being isolated was *Trichodina spp.* Percentage of infected fish was 11,11% and similar to the percentage stated by Mladineo (2006) for one cage system in the Adriatic sea (10%). This is the only parasite found in all three samplings, and extensity was highest in July (16,67%), after that in September (11,11%), And the lowest in May (6,67%). The intensity of the invasion was weak, and only clinical change noticed was increased exudation, and therefore treatment in this case is not recommended.

When giving a general overview it is noted poverty in parasitic species. All three species found *(Sparicotyle chrisophrii, Amyloodinium ocellatum* i *Trichodina spp.)* are mentioned in the studies by other authors in similar studies in the region and in Mediterranean area. Nevertheless, it can be concluded that the number of parasitic species on the gills of the sea bream in our experiment is somewhat lower than those quoted by other researchers. Number of infected individuals varied according to sampling periods, and in that case during May, when the water temperature is lowest there was no infected fish. The ratio of infected fish in July (50%) and Septemeber (44,44%) was approximate, with a relatively high extensity of parasitic fauna in September which was conditioned by the increasing number of infected fish with *Amyloodinium ocellatum.* That was the only parasite found in fish in cage system Cogi which shows the highest abundance during autumn period.

Such a small number of parasites found during our research and the absence of significant pathological changes is indicating a relatively clean environment and healthy fish, which is also of an excellent quality. Taking all these facts in consideration, conclusion is that use of hemotherapeutics on cage system Cogi for treatment was not required at that point.

CONCLUSIONS

The results showed there is not much parasitic fauna on experimental fish - sea bream *(Sparus aurata).* This is related as much to the number of discovered species of parasites as to the intensity of infestation of fish with parasites.

Only three types of parasites were detected on the gills of experimental fish: *Sparicotyle chrisophrii*, *Amyloodinium ocellatum* and *Trichodina spp.*

The dominant species of parasites is *Amyloodinium ocellatum*. Extensity of infestation by this parasite during sampling ranged up to 33.3%.

The increase of water temperature in Bay of Kotor during experimental period was followed by an increase in the intensity of infection of fish with parasites. Damages to the fish were insignificant and the treatment was not necessary.

Research results about presence of parasitic fauna in sea bream farmed in cages in the waters of Bay of Kotor are significantly favourable in comparison to results from researches conducted in the Mediterranean Sea and even further. Results of our survey confirm the finding that the waters of Montenegrin part of the Adriatic Sea – Bay of Kotor are quite favourable for aquaculture.

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PARAZITI ŠKRGA ORADE GAJENE U KAVEZNOM SISTEMU

SAŽETAK

Tokom proljeća, ljeta i jeseni 2009.godine, vršena su istraživanja sa ciljem da se utvrdi prisustvo i brojnost parazitofaune na škrgama orade *(Sparus aurata)* gajene u kaveznom sistemu u Bokokotorskom zalivu. Prilikom ispitivanja korišćene su standardne parazitološke metode.

Na škrgama orade su nađena 3 parazita i to: *Sparicotyle chrisophrii, Amyloodinium ocellatum* i *Trichodina spp.* Orada je najčešće bila invadirana parazitom *Amyloodinium ocellatum* (20.00% invadiranih jedinki), zatim *Trichodina 11.11%* i *Sparicotyle chrisophrii* 4.44%). Ekstenzitet invazije tokom istraživanja je varirao, ali je kod svih parazita bio najveći u julu i septembru, kada je i temperatura mora najveća. Intenzitet invazije je uglavnom bio slab. Paraziti nisu izazvali značajniju štetu na ribnjaku, a na invadiranim ribama su bile prisutne samo manje promene u vidu mikrohemoragija na škržnim filamentima i povećanje mukozne sekrecije.

Ključne riječi: kavez, škrge, orada, paraziti