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COMPARATIVE ANALYSES CONCERNING PARASITIC DIVERSITY OF COMMON CARP AND KOI CARP

ANALIZE COMPARATIVE PRIVIND DIVERSITATEA PARAZIȚILOR LA CRAPUL COMUN ŞI CRAPUL JAPONEZ

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The experiments carried on ponds of CCDP Nucet, researches being axled on comparative and comprehensive analysis of pathologic incidences on common and Japanese carp. This researches present theoretical and empirical convenience, because allow to elaborate of prophylaxis and disease control on. The ichthyo-pathologic exam was carried on for 271 exemplars of common carp, subspecies Cyprinus carpio carpio and 31 exemplars of ornamental carp (koi carp). There were identified 30 species of allogenic parasites, 9 species of parasites characteristic for carp as well as some common species of parasites with broad dissemination on cultured fish. All analyzed exemplars of showed parasitic infestation, but with a different extent of extensively and intensively. The most important epidemiologic factors from the analyzed ponds that increase the parasitic invasions were represented by the presence of infested fish, rearing in policulture of species and ages, as well as by the high density, water quality, thermic and flow fluctuations,

Key words: common carp, koi carp, parasitofauna, ponds**.**

Introduction

The carp – *Cyprinus carpio carpio L.*, one of the most general fish in aquaculture ponds of Romania, represent the main cultured.

The koi carp (*Cyprinus carpio*), an ornamental race with many varieties of color, is cultured as a decorative species in special prepared tanks from parks and gardens. It is also use for interbreeding experiments and to achieve the heterosis effect. The koi carp population of C.C.D.P.

Nucet genetic stock grows from a larvae import from Fish Culture Research Institute of Szarvas – Hungary, accomplished at 1990 year and present more color varieties.

The Fish Culture Research and Development Center Nucet (C.C.D.P.) – Dambovita County, the oldest aquaculture research institution from Romania, is concerned about researching for a long time the carp and other cultured species by a fully and comprehensive research program referring to selection and improvement, hybridizing, conservation of genetic stock, enhancement and acclimate new species of fish. The ponds are described by variation of environmental conditions and diversity of species and ages reared in monoculture or polyculture, many times on increasingly densities (experiments for intensification of aquaculture production).

On CCDP Nucet, the study of carp parasites and diseases is achieving for a long time, but the literature avail a few dates about that, the most are referring to the agents of infectious diseases. Information referring to other groups of carp parasites is limited [Angelescu, Macoveschi, 1980; The Annual papers of CCDP Nucet], because missing of special researches on that direction. On that meaning, we believe that it is usefully to initiate some researches on that direction, specifying that the data from this item have a preliminary condition. Against the stress of intensive aquaculture and changing of aquatic environmental condition, in fish, the resistance of organism decrease and that sometimes bring about the appearance of parasitic diseases (including associative). The study of parasites on fish from these ponds is not a novel research area.

Materials and Methods

The investigations were made on fishy material from CCDP Nucet ponds (experimental bases Nucet, Mircea-Voda, Cazaci-Marata) in all seasons between years 2004 – 2006. The assay of fishy material was performed on time of spring and autumn fishing campaigns and concurrent with intendancy fishing performed ones or two times per month depending on technological requirements.

The ichthyo-pathologic exam was made for a total number of 271 common carp (*Cyprinus carpio carpio*) individuals belonging to following breeds: Frăsinet - 52, Ropşa - 67, Ineu - 64 and their half-breeds Ropşa x Ineu - 32 and Ineu x Ropşa - 56. The same parasitological analyze was also carried on for a number of 31 Japanese carp (*Cyprinus carpio koi*) individuals. The fish had different ages from – 0 to 3 years, preponderant were fingerlings $0\text{-}0^{+}$.

The ichthyo-pathological examination was absolute for all specifying individuals, including exams like necropsy and parasitological. The examination of fish, the assay and treatment of ichthyo-pathological matter were accomplished in accordance with ichthyo-pathological common

methods – practiced [Musselius et. al., 1983; Bâhovskaia-Pavlovskaia, 1985; Lom, Dykova, 1992]. For taxonomic identification of parasites had been used the existing exponents [Opredeliteli parazitov presnovodnâh râb faunî SSSR, 1984-1987, Vol. I-III] and advices of ichthyo-pathologist experts.

Results and Discussions

The analyses of ichthyo-pathological matter showed the existence of an abundant fauna of parasites summing up 58 species on carp lots, the most frequent were taxons of protista (61%) followed by metazoans (30%): Algae – 1, Fungus – 3, Protista – 38 (*Sarcomastigophora* – 4, *Ascetospora* – 1, *Apicomplexa* – 2, *Cnidosporidia* – 10, *Ciliophora* – 21), Plathelminthes –10 (*Trematoda* - 8, *Cestoda* - 2), Nemathelminthes – 3, Annelida – 1, Arthropoda – 4 şi Mollusca – 1.

The parasites that had been determined on carp by ichthyo-pathological analyses are bringing into table 1 specifying the affected organs and maximum parasitical intensity.

Table 1

The identified parasitic species on common carp (races and half-breeds) and Japanese carp from ponds of C.C.D.P. Nucet – Dâmbovița

Nr. crt.	Species	Localization	Common Carp (races and half-breeds)					Carp koi
			F	R	I	R x I	I x R	
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
1	*Mucophilus cyprini*^{sp}	**gl**		+	+		+	+
2	*****Saprolegnia parasitica***!**	**gl, fn, tg**			+			
3	*****Achlya sp.***!**	**tg, gl**			+			
4	*****Branchiomyces sanguinis***!**	**bd,gl**			+			
5	*Ichthyobodo necator***!**	**gl, tg**		+	+			
6	*****Cryptobia branchialis*	**gl**	+	+	+		+	
7	*Trypanosoma carassii*	**bd**		+	+	+		
8	*****Trypanoplasma borelli***!**	**bd**		+	+	+	+	
9	*****Dermocystidium cyprini*^{sp}	**gl**						+
10	*Goussia carpelli***!**	**gt**	+	+	+	+	+	+
11	*Myxobolus cyprini***!**	**gl, kd, ms, vc**	+		+			+
12	*****M.basilamellaris*^{sp}	**gl**		+				
13	*****M.encephalicus*^{sp}**!**	**en**	+	+	+	+	+	+
14	*M.pseudodispar*	**kd, gl**		+				
15	*****Sphaerospora molnari*^{sp}**!**	**gl**		+	+			

16	**S.carassii*	**gl**		+				
17	**S.renicola*[sp]**!**	**kd**	+	+	+	+	+	+
18	**Hoferellus carassii*[sp]	**kd**			+			
19	**Thelohanellus nikolskii*[sp]**!**	**fn**			+	+	+	+
20	**T.hovorkai*[sp]	**tg, kd, gl?**			+			
21	**Amphyleptus branchiarum*	**gl, tg**			+			
22	**A.disciformis*	**gl**		+	+			+
23	*Ichthyophthirius multifiliis***!**	**tg, gl, nc**	+		+		+	+
24	*Tetrahymena pyriformis*	**tg, gl, nc**			+			
25	**Chilodonella piscicola***!**	**tg, gl, nc**	+	+	+			+
26	**C.hexasticha***!**	**tg, gl, nc**						+
27	**Ambiphrya ameiuri***!**	**fn, tg, gl**		+	+			+
28	*Epistylis lwoffi*	**tg, fn, gl,**	+	+	+	+	+	+
29	*Apiosoma piscicola***!**	**fn, tg, gl, nc**	+	+	+	+	+	+
30	**A.carpelli*	**gl, tg, fn, nc**		+	+	+		+
31	*A.capmanulata*	**gl, tg, fn**	+	+	+			
32	**Trichodina acuta***!**	**tg, gl, fn, nc**		+	+		+	+
33	*T.nigra***!**	**tg, gl, fn, nc**	+	+	+	+	+	+
34	**T.pediculus***!**	**tg, gl, fn, nc**	+	+	+	+	+	+
35	*T.reticulata*	**tg, fn, nc**			+			+
36	*T.mutabilis*	**gl**	+	+	+		+	++
37	**T.rectangli*	**nc**	+	+	+		+	+
38	**T.nobilis*	**tg, gl, gt**						+
39	**Tripartiella copiosa*	**gl**			+		+	
40	*Trichodinella epizootica***!**	**gl, tg?**	+	+	+	+		+
41	*Gyrodactylus katharineri***!**	**gl, tg**	+	+	+		+	+
42	*G.medius*	**gl, tg**			+		+	
43	*G.sprostonae*	**tg**		+	+		+	+
44	*Dactylogyrus vastator***!**	**gl**		+	+		+	+
45	*D.extensus***!**	**gl**	+	+	+		+	+
46	**D.anchoratus*	**gl**						+
47	*Diplozoon paradoxum*	**gl**	+	+			+	
48	*Diplostomum spathaceum***!**	**ln**			+		+	+
49	**Botriocephalus acheilognathi***!**	**gt**		+	+			+
50	**Kawia sinensis***!**	**gt**					+	

51	**Schulmanella petruschewskii!*	**lv**			+			
52	**Philometroides lusiana*!	**tg**		+				
53	*Capillaria tomentosa*	**gt**						+
54	*Lernaea cyprinacea*!	**tg, fn**	+		+			
55	**L.elegans*	**tg, fn**		+				+
56	*Argulus foliaceus*!	**tg**	+	+	+			+
57	*Piscicola geometra*	**tg, gl**						+
58	*Unio sp., larvae*	**gl, fn**	+	+	+	+	+	+
	TOTAL:		**21**	**35**	**45**	**13**	**25**	**35**

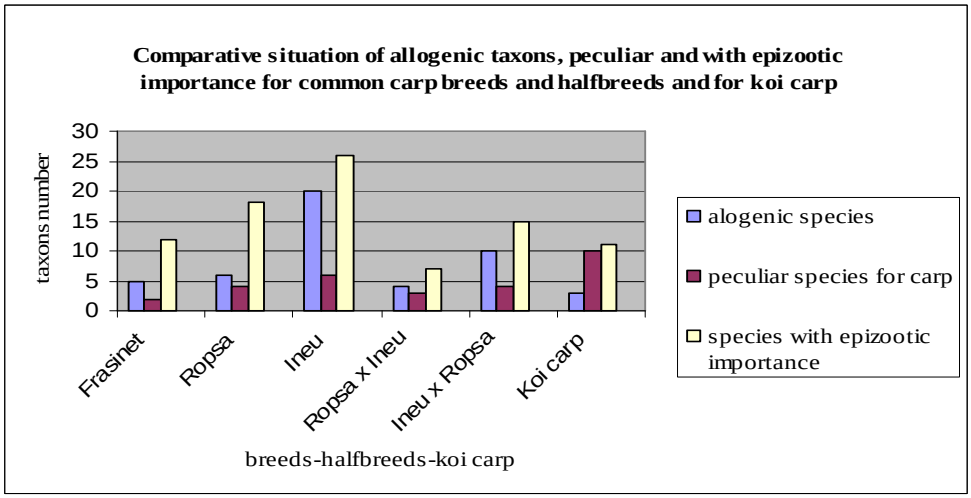
Note: * - allogenic species; ^{sp} – characteristic species for carp; **!** – species with epizootic concernment; F – Frăsinet, R – Ropşa, I – Ineu, R x I – half-breeds among Ropşa and Ineu; I x R - half-breeds among Ineu and Ropşa; intensity of invasion: + - single specimens, ++ - many specimens, +++ - so many specimens; localization: **tg** – tegument, **fn** – fin, **nc** – nasal cavity, **bd** – blood, **gl** – gill, **ln** – lens, **en** – encephalon, **gt** – gut, **lv** – liver, **kd** – kidney, **ms** – muscle, **vc** – viscera.

From all identified parasites 40 species (61%) were external parasites, and 26 species (39%) were internal parasites. Pursuant to achievement studies it was observed that from organic location point of view, the gills represent the most parasitized organ with 44 taxons being followed by tegument with 39 taxons, fins 14 taxons, nasal cavity 11 taxons, kidney 8 taxons, intestine 6 taxons, blood 4 taxons, and muscles, liver, lens, viscera a single taxon.

From the total number of dignified parasites, 30 species are allogenes and came in CCDP Nucet ponds along with acclimated fish. For carp were characteristic 9 species of parasites, rest of them are common species with broad diffusion along the culture fish (chart 1).

C

hart 1



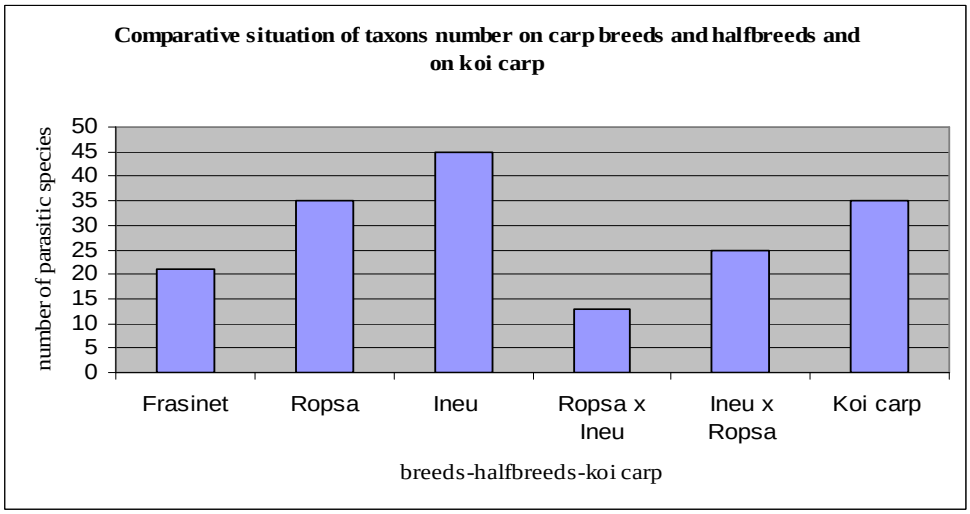
Carp parasitic fauna have a mixed character. More frequently, in one carp specimen are present 2 – 3 parasitic species (maximum 16 species in the same time) where by, ordinarily predominate the cilia. Rearing of carp in polyculture, on high densities increase the reciprocal exchange of parasites and enrich the parasitic fauna with unspecific elements.

There were observed differences on common carp comparatively with koi carp regarding the diversity of parasitic fauna (47 and 35 species respectively), extensively, intensively invasion and the evolution of affections made by parasites. Also had been emphasized the factors that concur to emergence of these differences: density, polyculture, water flow, stress.

Specific structure, the ferret out frequency and numerical density of parasites represent major differences from a breed to another. The most affected by parasites was Ineu breed with 47 species of parasites, being follow by Japanese carp – 35 and Ropsa breed – 35. Less affected were: Frasinet breed – 21 and the half-breed Ineu × Ropsa – 25 and Ropsa × Ineu – 13. Parasitic species common for both carp breeds (common and Japanes) are 34 (51 %) specific taxons (chart 2).

C

hart 2



Partial, this owns to aquatic environmental particularities, biotopes and difference of the number of examinate fish.

The results acquired after the study indicate a considerable baldness of parasites fauna with anfractuous germination cycle and can confirm the conclusion unclosed by other researchers that the main factor of parasitic fauna depletion is mildness diffusion and density of host agents from the ponds, and that on Japanese carp exist an unspecific parasitic fauna.

The infestation board of these fish species (predominant plankton and benthos consumers) concludes with their nutritional characteristics. At parasitic fauna of analyzed fish, the protista group have the best figured and like other groups (monogenee) have a direct germination cycle and an ample diffusion thru the local population of fish.

The situation of parasitic fauna on native carp is conformable with that relieved in technical literature.

The investigations also conducted to identification of some parasitic invasions on carp, with high intensively, appearance and clinical action of affections. It was especial signalized a high frequency of gill and tegument invasions (skin and fins) on spring-summer time produced by protista (*Myxobolus, Sphaerospora, Trichodina, Trichodinella, Ichthyophthyrius, Ambiphrya, Apiosoma*) and monogenee (*Dactylogyrus* şi *Gyrodactylus*). Among the finded parasites, *Myxobolus cyprini, M.muelleri, Trichodinella epizootica, larvele Unionoidea spp* present grievously pathological affections for analyzed carps. We consider that at the encouragement of parasitic invasions evolution, also concurred the epidemic factors – immunity (conditionally by forage and water quality) and the temperature as one of the most important factor that modulate the invasions. Most

parasitic invasions had under clinical evolution with the possibility to appear the clinical evolution on different variations of epidemic factors.

Conclusions

- On common carp (*Cyprinus carpio* L.) and ornamental Japanese carp (koi) fishing from CCDP Nucet ponds it was observed the presence of 58 species of parasites belonging to the next systematic groups: *Algae* (1), *Fungus* (3), *Protista* (38), Metazoa: *Plathelmintes* (10), *Artropoda* (4), *Nemathelmintes* (3), *Mollusk* (1) and *Anellida worms* (1)

- On methodical groups, predominant are ciliates (21), mixosporides (13), plathelmintes (10), arthropods (4). Low figured are nematodes (3), mollusks (1) and annelid worms (1)

- According to diffusion and abundance (qualitative and quantitative), at parasitic fauna of analyzed fish the parasites of *Peritricha* and *Monogenea* classes are predominante.

- For picked carp, Ineu breed and Japanese carp appears qualitatively the highest parasitic fauna, followed by the half-breed (Ineu × Ropsa), Ropsa and Frasinet carp and the least infested is half-breed (Ropsa × Ineu).

- The specific and numerical abundance of parasitic fauna on carp from ponds of experimental base Nucet is due to the rearing system in policulture and on the other hand to the higher level of organic matter from water during the investigations.

Bibliography

1. Moşu A., Cecilia Dumitru, (1998) - *Contribuții la studiul parazitofaunei peştilor din bazinele Staţiunii de Cercetări pentru Piscicultură Nucet, judeţul Dâmboviţa* - Simpozion Internațional Aquarom`98 ,Galați, 303-305.

2. Moşu A., Cecilia Dumitru (1998) - *Unele aspecte ale sferosporozei branhiale (Myxozoa: Sphaerosporidae) la peştii de cultură*, J. of Romanian Parasitology ,. V.8. N.1. P.47-50.