

The Influence of Seasonal Specific Fish Diseases on Cyprinid Culture in South-Est Region of Romania: A Study Case

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Abstract

In the food production field, aquaculture is the fastest growing sector, becoming an important source of protein production according to FAO report.

Romania has a legacy in pond aquaculture production and the total estimated produced fish biomass is approximately 10 000 tones per year. In order to ensure economic efficiency and sustainability through the reduction of fish mortality, disease management and control is imperative.

The South-East Region of Romania is characterized by the practice of aquaculture in extensive production systems, such as pond. The pond aquaculture systems in the South-East of Romania is supplied with water from the hydrographical basin of Danube River.

The purpose of this study is to assess disease status on 3 different fish populations from the South-East Region of Romania and identify differences in disease clinical signs. The biological material (carp, silver carp, bighead carp, prussian carp) was collected by control harvesting from 3 different aquaculture pond units.

Fish were transported to the ichthyopathology laboratory at the Institute of Research and Development for Aquatic Ecology, Fishing and Aquaculture of Galati and analyses were carried out. All studied populations presented seasonal specific disease signs that may cause mortality in fish population between the range of 20 and 80%. A decrease of fish mortality rate can be obtained by early diagnostic establishment and fast treatment application. In order to avoid the occurrence of the bioresistance phenomenon administration of antibiotic substances should be administrated exclusively in case of secondary bacterian infection and following a antibiogram test.

Keywords: fish disease, cyprinids, seasonal diseases, bioresistance phenomenon

1. Introduction

According to the most recently FAO report, the aquaculture sector continues to manifest the fastest growth, compared to other major food production sectors, by providing an important source of protein at a global level [1].

Aquaculture is a highly dynamic production system and it is characterized by high diversity in

both the farmed species range and the production systems features [2].

The availability of inland waters provides optimal conditions for fish farming. As a result, the total estimated produced fish biomass in Romania is approximately 10.000 tonnes per year. The aquaculture activity confirms its importance by the fact that in the South - East region there are the largest areas for aquaculture.

Most of the production is obtained in extensive production systems such as ponds. Ponds are the most common aquaculture system in the world, and also the most ancient way of fish rearing.

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They play an important role in strengthening the ecological balances, in taking over water, in ensuring and maintaining large areas of wetlands. Characteristics of the extensive production systems of carp and other species farming favour the frequent occurrence of mixed infections and superinfections [3].

In the South-East region of Romania, the pond aquaculture systems are supplied with water from the hydrographical basin of Danube River. One of the most prominent features of the region's aquaculture is that it is based on the rearing of cyprinids, particularly the common carp.

In extensive aquaculture systems, fish are constantly exposed to a wide variety of diseases caused by various viruses, bacteria, fungi protozoa or copepods, which could cause fish high mortality [4].

Diseases caused mainly by viruses and bacteria are a major constraint to aquaculture production, causing production losses due to mortalities and decreased growth rate of cultured fish [5].

The determination of fish diseases and associated pathogens in fish ponds is very important to ensure economic efficiency and sustainability of aquaculture [6].

The aim of this study was to assess and present the pathognomic symptomatology of the diseases in 3 different fish populations reared in ponds situated in the South-East Region of Romania (Galați and Brăila counties) and identify the differences in disease clinical signs.

2. Materials and methods

The biological material (carp, silver carp, bighead carp, prussian carp) was collected by control harvesting from 3 different aquaculture pond units from Galați and Brăila county. Fish were transported to the ichthyopathology laboratory at the Institute of Research and Development for Aquatic Ecology, Fishing and Aquaculture of Galati and analyses were performed. For diagnosis, the anamnesis, clinical signs, macro- and microscopic exam were taken into consideration.

Macroscopic examination consisted of assessments of tegument, fins, gills, oral cavity, eyes, general appearance of organs and abdominal cavity, as well as the presence of parasites, macroscopic cysts or fungi.

Microscopic examination consisted of the use of fresh scraps and squash preparations between the blade and lamella, the evaluation of the presence of parasites in the tissues and organs and the analysis of the scraped samples from skin, gills, eyes, liver, spleen, kidney, brain and muscles, as well as intestinal contents.

As well, intestine samples were collected longitudinal sections, in order to identify possible present parasites, and also the pathophysiological changes that occurred in the tissues, the gall bladder fluid and the blood smear.

Clinical signs caused by infectious, parasitic, or non-specific diseases were followed.

The ectoparasitic forms have been analysed by direct microscopic examination of skin and gill scrapings.

Scraped mucus from skin and gills, were spread on a dry clean glass slide with a drop of water, mounted with a coverslip and examined under (40X) lens of the OxionEuromex microscope with a Ccmex 3.0MP camera.

3. Results and discussion

Research and Development for Aquatic Ecology, Fishing and Aquaculture of Galati examined the health status of biological material (carp, silver carp, bighead carp, prussian carp) and the diagnosis was made based on the general symptomatology of the fish, without further laboratory investigations, respectively bacteriology or virusology analyzes.

All studied populations presented seasonal specific disease signs that may cause mortality in fish population between the range of 20 and 80% [7].

From fish farm no.1 fish specimen prelevated were taxonomically identified as *Carassius auratus gibelio* (Bloch, 1783) and the presumed stability diagnosis in this was SVC.

Spring viraemia of carp (SVC) is caused by the pathogen rhabdovirus carpio [8] and is responsible for the highly economic losses in aquaculture affecting mainly of all varieties of common carp and several other cyprinid species [9].

Clinical signs in SVC pathology include behavior changes of infected specimen such as reduction of respiration rate, loss of balance, erratic swimming movements, fish congestion near pond inlet and outlet.

External morphological changes of infected specimen: skin petechial hemorrhages, edema and exophthalmia. (Fig 1.)

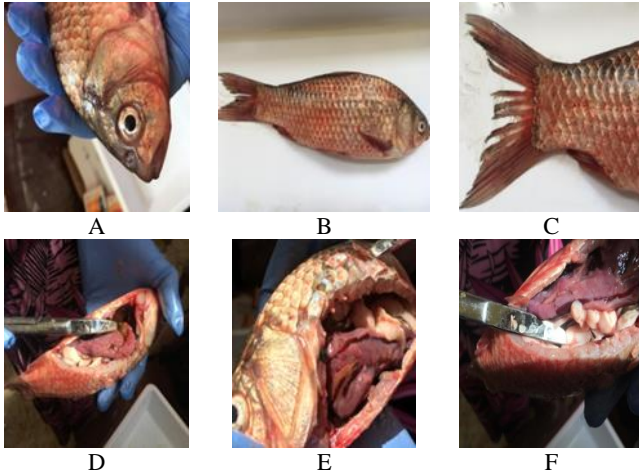


Figure 1. Performing the dissection and the anatomopathological examination of *Carassius auratus gibelio* species. A. High hyperemia and cephalic hemorrhages. B. Subcutaneous hemorrhage on the body. C. Hemorrhages at the level of caudal fin. D. Internal organs hemorrhages, enlarged gallbladder. E. Hemorrhagic liver. F. Hemorrhages at the level of gonads

Fish specimen prelevated from fish farm no.2 were taxonomically identified as *Hypophthalmichthys molitrix* (Valenciennes, 1848) and the presumed diagnosis was established as swim bladder inflammation (SBI).

SBI is known also as air-bladder disease or aerocystitis, which is an acute and severe disease caused by *Rhabdovirus IV*, with major economic impact in Central Europe [10].

The symptoms of SBI include behaviour changes of infected specimen, loss of reflexes, loss of balance, erratic swimming movements (head in downward position or lying on one side near the water surface), emaciation. External morphological changes of infected specimen include darkening of skin, loss of rotation reflex of one of the eyes, distension of the abdomen in the anal region, exophthalmia, tumefied and hyperemic anus (Fig.2).

Fish specimen prelevated from fish farm no.3 were taxonomically identified as *Carassius auratus gibelio* (Bloch,1783) (Valenciennes, 1848) and the established presumed diagnosis was carp erythrodermatitis (CE).

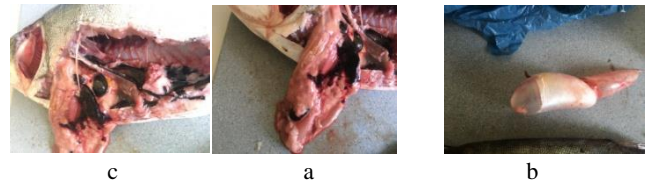


Figure 2. Dissection and anatomical-pathological examination of *Hypophthalmichthys molitrix* species
a. Liver necrosis
b. Enlargement of gallbladder.
c. Thickening of swim bladder

Clinical signs in CE pathology include behaviour changes of infected specimen such as swimming at the water surface and signs of hypoxia.

External morphological changes of infected specimen include: skin and paired fins hemorrhages, muscular-cutaneous ulcers on the dorsal part of the body, in the back of the head, at the base of the caudal fin, pale liver, enlarged spleen and swollen intestine.

The ulcers (up to 3 cm diameter) are invaded by bacteria and are surrounded by a whitish ring (Fig. 3.II.). In course of the healing process, the whitish ring darkens in color. In the septicemic phase of the disease, bacteria spread through the blood and internal organs (Fig.3).

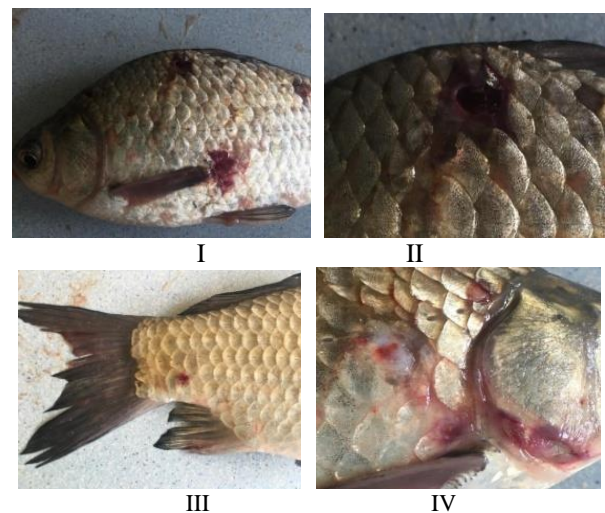


Figure 3. External and internal macroscopic examination of *Carassius auratus gibelio* species. I.Skin ulcers. II. Cutaneous ulcers surrounded by a whitish ring. III. Ulcers highlighted in the caudal peduncle. IV. Fungal wound infection with *Saprolegnia sp.*

Prophylaxis and treatment

For diseases with viral ethology, there is no treatment, however in some cases, in order to reduce mortality and considering the secondary infections caused by bacteria, a broad spectrum of antibiotics can be administered, following the microbiological exam and antibiogram test.

At present, only the general prophylactic measures, such as drying and disinfection of ponds, disinfection of equipment, improvement of nutrition and specific resistance, collection of dead fish material, prevention of wild infested-fish invasion in the aquaculture rearing units, continuous monitoring of fish health status, for disease control and protection.

The disinfection of the pond technological water is recommended, by administering an amount of 4-6 kg/ha of lime chloride for ten days, alternatively administered one day treatment with one day break. In the case of the outbreak of infectious-contagious diseases in the ponds, the obligation of strict monitoring until the complete extinction of the outbreak of disease is instituted.

4. Conclusions

A general conclusion of this research is that a decrease of fish mortality rate can be obtained by early diagnostic establishment and fast treatment application.

Administration of antibiotic substances should be applied exclusively in case of secondary bacterial infection and following an antibiogram test, in order to avoid the bioresistance phenomenon.

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