Turk J Vet Anim Sci
26 (2002) 407-410

Research Article

A Report on Spontaneous Diseases in the Culture of Grass Carp (*Ctenopharyngodon idella* Val. 1844), Turkey

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Received: 03.07.2001

Abstract: As grass carp culture for vegetation control in freshwater is a new field in Turkey the disease problems of grass carp have not been well documented. Spontaneous disease occurrence in the course of grass carp culture was reported in the present study. During the culture of grass carp (*Ctenopharyngodon idella*) some disease problems occurred causing a high level of mortality. In two-month old fry (5.55±0.19 g) fed with alfa-alfa in out-door conditions bacterial disease and some ectoparasites on the gills and skin were detected. The bacterium was identified as *Aeromonas hydrophila* and the ectoparasites as *Trichodina* sp., *Dactylogyrus* sp. and *Chilodonella* sp. The mortality rate reached 70% in these two-month old fry. After this outbreak the remaining healthy population was transferred to in-door conditions for better controlled conditions. Following transportation to in-door conditions an ectoparasite identified as *Ichthyophthirius multifiliis* caused a high mortality rate of 80%. Additionally, one-year-old grass carp (52.67±0.88 g) fed with supplemental commercial carp feed in earthen ponds were examined for endoparasites. The cestods, *Ligula intestinalis* and *Bothriocephalus gowkongensis* existed in the abdominal cavity; dominantly *B. gowkongensis*. In one-year-old grass carp the mortality rate was low, although growth was impaired.

Key Words: *Ctenopharyngodon idella, Aeromonas hydrophila, Dactylogyrus* sp., *Trichodina* sp., *Chilodonella* sp., *Ichthyophthirius multifiliis, Ligula intestinalis, Bothriocephalus gowkongensis*

Türkiye'de, Ot Sazanı (*Ctenopharyngodon idella*) Yetiştiriciliğinde Karşılaşılan Bazı Hastalık Problemleri

Özet: Türkiye'de vejetasyon kontrolu için ot sazanı kullanımı yeni bir alandır ve ot sazanı yetiştiriciliğinde ortaya çıkan hastalıklar yeterince bilinmemektedir. Bu çalışmada ot sazanı yetiştiriciliğinde yüksek oranda ölümlere neden olan bazı hastalıklar tanımlanmıştır. Tanklarda doğal çevre sıcaklığına bırakılan ve yonca ile beslenen iki aylık ot sazanı yavrularında patojen bir bakteri ile solungaç ve deride ektoparazitler belirlenmiştir. Bakteri *Aeromonas hydrophila*, ektoparazitler ise *Trichodina* sp., *Dactylogyrus* sp. ve *Chilodonella* sp. olarak belirlenmiştir. Bu yavrularda ölüm oranı % 70'e ulaşmıştır. Bu yüksek oranlı ölüm olayından sonra kalan sağlıklı populasyon su sıcaklığının kontrol edildiği koşullara nakledilmiştir. Nakli takiben de %80'e ulaşan ölüm oranı gözlenmiştir. Bu ölüm olayının nedeni bir ektoparazit olan *Ichthyophthirius multifiliis* olarak saptanmıştır. Bundan başka, toprak havuzlarda ticari sazan yemi ile beslenen 1 yaşlı sazanlarda endoparazit incelemesi yapılmıştır. Bu balıkların abdominal boşluğunda Cestodlardan, dominant olarak *Bothriocephalus gowkongensis* ve *Ligula intestinalis* bulunmuştur. Bu 1 yaşlı balıklarda ölüm oranı düşük olmasına karşın büyümenin iyi olmadığı gözlemlenmiştir.

Anahtar Sözcükler: *Ctenopharyngodon idella, Aeromonas hydrophila, Dactylogyrus* sp., *Trichodina* sp., *Chilodonella* sp., *Ichthyophthirius multifiliis, Ligula intestinalis, Bothriocephalus gowkongensis*

Introduction

Because of its herbivorous feeding habits and exceptional rate of growth, the grass carp (*Ctenopharyngodon idella*, Val. 1844) is being given worldwide attention for use as a biological control agent for aquatic vegetation and as a source of food (1). For grass carp to be used for biological control of vegetation fish must be large enough to feed on vegetation and avoid predation (2). Thus, it is essential to stock with fingerlings to control the vegetation, and the culture of grass carp is mainly oriented to a fry size that could be utilized for this purpose. The primary interest in grass carp in Turkey is especially for aquatic weed control rather than for consumption as food. However, it is known that one of the main factors limitating intensive culture, from spawning to fingerling size, is possible disease problems (2,3). Further, the grass carp has a rich parasite fauna, hence grass carp introduced into new

bodies of water may carry dangerous parasite species such as *Bothriocephalus gowkongensis* and *Sinergasilus major*. Extensive transport of the grass carp from its native waters to other countries has resulted in the simultaneous transport of dangerous parasites (3).

In the present paper, the results of our investigation into unexpected losses caused by bacterial disease and some parasites during the nursing period of grass carp culture are reported.

Materials and Methods

Fish and the experimental conditions

Grass carp fry were obtained from the State Water Works. In out-door conditions, two-month-old grass carp fry with a mean body weight of 5.55±0.19 g were fed on alfa-alfa *ad libitum* and kept in 3 tanks each with a 200 l capacity. Stocking density was 0.35 fish per liter. Grass carp fry were maintained from August to November in out-door conditions. Water temperature varied between 8°C (November) and 24°C (August). After unusual mortalities in out-door conditions the remaning clinically healthy population was transported and stocked in in-door conditions to enable a stable water temperature (25°C). Stocking density was 0.35 fish per liter for each tank.

One-year-old grass carp (52.67±0.88 g mean body weight) kept in an earthen pond (1.3 ha) were examined for parasites. The stocking density was 2 fish per m^2 and grass carp were fed with supplemental commercial carp feed. In the earthen pond, water temperature was about 27°C, dissolved oxygen content, above 7 mg/l and pH 6.75.

Clinical examination

A standard post-mortem examination was carried out according to Austin and Austin (4). Samples taken from the skin, kidney and heart were streaked on TSA. Plates were incubated at 23°C for 48 hours. Bacteria were identified using phenotypical and biochemical characteristics.

Hematocrits were determined by the method described by Siwicki and Anderson (5). Blood was collected by severing the caudal pedincle and centrifuged at 12500 rpm for 4 min.

Conventional parasitological techniques were employed in the dissection of all fish and in preparation of the parasites. Parasites were identified according to Roberts (6) and Stoskopf (7). Parasite density was given as per microscope field at 40 magnification.

Results and Discussion

In two-month-old grass carp, the mortality rate increased unexpectedly and reached 70%. Affected fish were lethargic and inactive. Externally, fin degeneration as well as caudal fin erosion, excess mucus on both skin and gills were apparent. Some hemorrhage and discoloration on the skin were seen. An agent which caused an outbreak of disease was isolated and identified as being *Aeromonas hydrophila*. Characteristics of a strain of *Aeromonas hydrophila* pathogenic to fish are shown in Table 1.

In two-month-old grass carp fry, hematocrit values ranged between 8.7% and 20% in infected fish and 21.43% in clinically healthy fish.

As well as bacterial disease, some parasites, including *Trichodina* sp., *Dactylogyrus* sp. and *Chilodonella* sp., were seen on the gills and skin mucous. The total count of these parasites was about 10-20 parasites per microscope field at 40 magnification in both gills and skin preperations. *Chilodonella* sp. were dominant in skin preperations.

Table 1. Biochemical characteristics of *A. hydrophila*

Test	*Aeromonas hydrophila*
Gram reaction	neg. Rods
Motility	+
Oxidase	+
Growth at 37°C	+
Indole reaction	+
Aesculin	+
Arginin dihydrolase	+
Mannose	+
Arabinose	+
Salicin	+
Saccharose	+
Mannitol	+
Inositol	-
Production of gas from glucose	+
VP	+

The isolation of motile Aeromonad bacteria from two-month-old grass carp fry in the present case suggests they have a role as the primary cause of mortality. However, it could be stated that stress resulting from low water temperature out-door conditions and feeding with a territorial plant (alfa-alfa) are very important factors in outbreaks of infectious disease in grass carp fry. It is known that only under poor conditions can *Aeromonas hydrophila* overcome the fish's defence mechanisms and invade tissues (8). The heavy presence of protozoon parasites such as *Trichodina* sp., *Chilodonella* sp. and *Dactylogyrus* sp. may also have played a significant role in occurrence of bacterial disease related to deterioration of fish condition. Often more severe bacterial disease problems are associated with an increased number of ectocommencal protozoa, as stated by Stoskopf (7). The decreases in hematocrit values of two-month-old grass carp fry support results previously obtained in carp infected with *A. hydrophila* (9) and are in agreement with the statement of Barham et al. (10) that hemopoiesis is severely affected in bacterial diseases.

Following the transportation of two-month-old grass carp to in-door conditions the mortality rate increased and reached 80%. The cause of the outbreak was found to be a protozoan parasite, *Ichthyophthirius multifiliis*. White spots were common on the body surface of fish and on the gill filaments. The parasite count ranged between 30 and 95 per microscope field at 40 magnification.

It is known that the physical disturbances associated with transporting fish from one location to another can result in mortality or some diseases induced by the stress (11). In Ichthyophthirius infection of two-month-old grass carp, transport stress possibly had an effect.

In the earthen pond conditions, the mortality rate was generally low; however, in some one-year-old grass carp poor growth was observed. Examination of fish revealed that the poor growth resulted from cestods, *Ligula intestinalis* and dominantly, *Bothriocephalus gowkongensis* (Table 2). Ligula and Bothriocephalus are known to be common parasites in grass carp (3). Hoffman (12) reported that these parasites generally cause minimal pathology although heavy infestations may retard growth.

In conclusion, as grass carp is not a native species for Turkey, risk factors regarding dangerous parasite extension with its culture must be considered.

Table 2. The prevalance and intensity of cestods in one-year-old grass carp.

Parasite	Number of fish examined	Number of fish infected	Number of parasites	Parasite weight, g	Parasite lenght, cm
Ligula intestinalis	75	22	2	0.83-1.90	17-23
Bothriocephalus gowkongensis			20	0.025-1.60	24-27

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