contained an average of 7, 9 and 32 parasites. Comparison of treatment means revealed that the redear was effective in significantly reducing infection of *P. minimum* in bluegills, and that the presence of aquatic vegetation did not reduce the effectiveness of the redear.

SOME HOST RESPONSES OF WHITE CATFISH

to *Ichthyophthirius multifiliis*, Fouquet*

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Introduction

The causative organism of white spot disease or ichthyophthiriasis, *Ichthyophthirius multifiliis* Fouquet, may reach epizootic proportions where fish are held under crowded conditions. Experiments were conducted with fingerlings of white catfish, *Ictalurus catus*, to determine some of the host responses to this parasite at various infection rates and at different temperatures.

Effect of Infection Rates on Survival

An experiment was designed to determine the effect of the rate of the initial infection with *I. multifiliis* on the survival of white catfish fingerlings. Eighteen 40-liter aquaria were stocked with one white catfish each at a water temperature of 78°F. Infection rates of 1, 10, 50, 100, 500, and 1000 trophozoites per fish were used. Each infection rate was replicated three times. Re-infection by second-generation tomites was prevented by periodic treatments with 5 p.p.m. formaldehyde. The water was changed every twelve hours after the formaldehyde applications to insure the presence of enough formaldehyde to control all amoebulae. At infection rates of 1 and 10 mature trophozoites per fish, there were no mortalities. At infection rates of 50 and 100 trophozoites per fish, 33.3 per cent of the fish died. Infection rates of 500 and 1,000 trophozoites per fish resulted in a 100 per cent mortality of the fish ten days after the initial infection.

Immune Response to Ichthyophthirius at Four Challenge Levels

In a second experiment the degree of immunity of white catfish to *I. multililiis* at different challenge levels was studied. An immune population was produced by exposing 190 white catfish fingerlings, 10 per aquarium, to 10 trophozoites per fish in 40-liter aquaria. The water temperature was 78°F. Symptoms of infection appeared four days later. All fish were then treated with 0.10 p.p.m. Malachite Green. Three days after treatment the fish were transferred to a feeding trough and fed a prepared fish feed at the rate of three per cent of their body wieght per day. Fifteen days after their initial exposure

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to the parasite, 160 fish were stocked into 16 aquaria and the presumed immunity was challenged by exposing them to 10, 30, 50, and 100 trophozoites per fish. As controls, 10 fish from the original population from which the infected population was taken were exposed to the four challenge levels. Each challenge level was replicated three times. Four days later, all controls showed signs of an infection. Seven days after challenge there was a 100 per cent mortality in all controls except at the level of 10 trophozoites per fish where only a mild infection occurred.

Table 1. Host Response of White Catfish to *I. multifiliis* at Different Challenge Levels

Initial Exposure Level (trophozoites/fish)	Challenge Level (trophozoites/fish)	Symptoms at 4 days after challenge	Per Cent Mortality at 7 days after challenge
0	10	All fish mildly infected	0*
0	30	All fish mildly infected	100
0	50	All fish heavily infected	100
0	100	All fish heavily infected	100
10	10	None	0
10	10	None	0
10	10	None	0
10	30	3 fish mildly infected	0
10	30	4 fish mildly infected	10
10	30	5 fish heavily infected	20
10	50	None	0
10	50	None	0
10	50	None	0
10	100	None	0
10	100	None	0
10	100	4 fish mildly infected	30
10	100	4 fish mildly infected	40

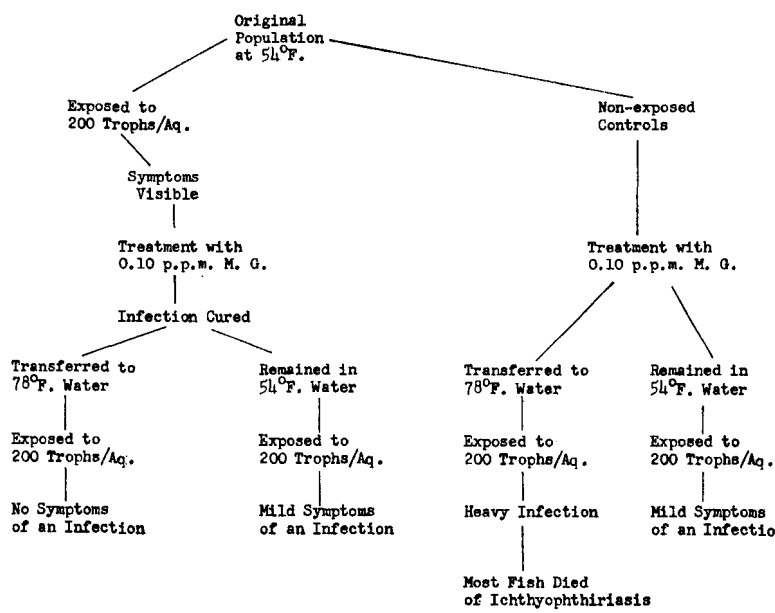
* Mild visible infection.

In the exposed population at the challenge leve of 10 trophozoites per fish, no symptoms of an infection were evident and no mortality occurred. At the challenge level of 30 trophozoites per fish, less than one-half of the population showed signs of a mild infection and 10.0 per cent of the population died. The challenge level of 50 trophozoites per fish produced no symptoms and no mortality. At the challenge level of 100 trophozoites per fish, 20 per cent of the population showed signs of a mild infection and 17 per cent of the fish died (Table 1).

Immune Response at Two Temperatures

A population of 120 white catfish fingerlings was infected with 20 trophozoites per fish at a water temperature of 54°F. and subsequently cured of the infection with 0.10 p.p.m. Malachite Green. An unexposed population of 40 fish was maintained at this temperature as controls. One-half of the previously infected population and one-half of the controls were transferred to water of 78°F. and were challenged with 20 trophozoites per fish. Six days after challenging the immunity, all controls exhibited a heavy infection while the previously exposed fish were not affected. One day later, 90 per cent of the controls died of ichthyophthiriasis. None of the previously infected and cured fish showed symptoms of an infection. The portion of the population remaining at 54°F. was also challenged with 20 trophozoites per fish. Twenty-five days after challenging, samples of the previously infected fish and the controls were examined under a dissection microscope. Both had a mild, but definite case of ichthyophthiriasis (Table 2).

Table 2. Immune Response of White Catfish to I. multifiliis at Two Temperatures



SUMMARY

Fingerlings of white catfish, *Ictalurus catus*, were infected with 1, 10, 50, 100, 500, and 1,000 trophozoites of *I. multifiliis* per fish. There were no mortalities at rates of 1 and 10 trophozoites per fish. Infection rates of 50 and 100 trophozoites per fish resulted in a 33.3 per cent mortality in each case. Infection rates of 500 and 100 trohphozoites per fish resulted in a 100 per cent mortality.

Immunized fish were challenged at rates of 10, 30, 50, and 100 trophozoites per fish. At challenge rates of 10 and 50 trophozoites per fish, no mortalities occurred. Rates of 30 and 100 trophozoites per fish resulted in a 10.0 per cent and 17 per cent mortality, respectively.

Fish surviving an infection at 54°F. showed no immune response when challenged at 54°F. but did show an immunity when challenged at 78°F.

SIMAZINE AS A PREFLOODING TREATMENT FOR WEED CONTROL IN HATCHERY PONDS[1]

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ABSTRACT

The result of applying pre-flooding applications of simazine to warm-water hatchery ponds employed in the culture of largemouth bass, bluegill and channel catfish fingerlings is described.

Rates of 10 and 15 pounds active simazine per acre appeared to reduce the incidence of algal growths such as *Pithophora* and *Hydrodictyon* and inhibited development of submerged rooted weeds. Effects generally persisted for one production period but were not noticeable in succeeding production cycles.

Some indication was obtained that phytoplankton development was retarded but fish production was not appreciably lower in treated ponds that that in untreated ones.

The development of zooplankton did not appear to be retarded by simazine applications to bass rearing ponds.

Some advantages of pre-flooding treatment of warm-water hatchery ponds are discussed.

INTRODUCTION

An important aspect of the culture of warm-water fishes in ponds is the control of aquatic vegetation. Undesirable or excessive amounts of aquatic plants reduce the production of desirable fish food organisms and interfere with observation and harvest of the fish crop. Also, they may prevent complete utilization of supplemental feeds and increase the possibility of anaerobic conditions developing in the pond during the rearing or harvesting period.

Under hatchery conditions, control of unwanted plants by developing a bottom-shading growth of phytoplankton is not always possible. At

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