COMPARATIVE TOLERANCE OF FINGERLING BLACK CRAPPIE, WHITE CRAPPIE, AND LARGEMOUTH BASS TO FINTROL-5 AT TWO pH LEVELS[1]

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ABSTRACT

A comparison of tolerance of fingerling black crappie, white crappie and largemouth bass to Fintrol-5 was conducted in aquaria. White crappie were found to be more susceptible to Fintrol-5 than were black crappie and largemouth bass. Largemouth bass and black crappie showed similar tolerance to the toxicant. The mortality of largemouth bass and black crappie was significantly reduced at a pH of 8.0-8.5. All three species suffered significant mortalities beginning with .04 ppm Fintrol-5 at a pH of 7.0. One ppm KMn04 significantly reduced mortality by detoxifying Fintrol-5.

INTRODUCTION

The management of black crappie, *Pomoxis nigromaculatus* (Lesueur), and white crappie, *Pomoxis annularis* Rafinesque, in small impoundments consists mainly of keeping the population size in balance with the available food supply. In many cases the crappie population tends to outgrow the food supply. If the recruitment of crappie could be controlled, this problem of overppopulation could be reduced.

The selective toxicant antimycin, the active ingredient of Fintrol-5, has shown potential in controlling crappie populations. It was used to remove young-of-the-year white crappie from a pond in one study and killed almost no largemouth bass, *Micropterus salmoides* (Lacepede), (Burress, 1970). In a laboratory study, 1 ppb antimycin eliminated fingerling black crappie in less than four hours (Berger, Lennon, and Hogan, 1969). Antimycin has several advantages over other piscicides. It appears to have an irreversible effect and does not repell fish. It degrades rapidly and can be detoxified quite easily with potassium permanganate (KMn04). (Gilderhus, Berger, and Lennon, 1969). Antimycin has also proved to be more toxic to smaller fish than to larger ones (Burres and Luhning, 1969). One limiting factor in the use of antimycin is pH. At pH values above 8.5, there is a very rapid detoxification of antimycin (Berger, 1965). Water temperature and hardness have less effect on the activity of antimycin than pH (Berger, *et al.*, 1969).

The study was conducted to test the selectivity of Fintrol-5, a commercial formulation of antimycin, on fingerlings of both species of crappie and fingerling largemouth bass. Since the bass is the primary predator in a bass-bluegill fish population and controls the forage in the maintenance of balance, it was studied in conjunction with the crappie. If a significant difference in selectivity existed, treatment with Fintrol-5 in the spring after a crappie spawn may reduce the

[1]Part of the study done at Auburn University as partial requirement for the Master of Science degree and in cooperation with the Alabama Department of Conservation and Natural Resources.

recruitment rate without affecting bass population recruitment. In the event fingerling bass were eliminated, they could be correctively restocked in the early summer months.

METHODS

Aquaria

Twenty-four, 15-gallon glass aquaria were used for the tolerance study. Water was from the Auburn City water supply. It was filtered through activated charcoal, gravel, and sand, and aerated. Forty liters of water were used in each aquaria. Throughout the study the water varied in calcium hardness from 30.5 to 41.5 ppm $CaCO_3$ and in temperature from 68° F. to 75° F.

Fish

Fingerling black crappie, white crappie, and largemouth bass used in the study were produced in ponds at Auburn University. Fingerling black crappie varied from 31 mm to 108 mm; white crappie varied from 35 mm to 91mm; and largemouth bass were approximately 30 mm to 60 mm in total length.

Chemicals

Fintrol-5, a commercial formulation of antimycin, was used throughout the study. Fintrol-5 consists of fine sand coated with a formulation of 1% antimycin incorporated in carbowax in such a way that the toxicant is released within the first 5 feet of descent in the water. It was added at six concentrations (0, .02, .04, .06, .08, and .10 ppm or equivalent to 0, .2, .4, .6, .8, and 1.0 ppb antimycin).

The two pH levels desired were 7.0 and 9.0. These were thought to be in the range most likely encountered in productive farm ponds (Swingle, 1961). These pH values were obtained by the addition of 25 ml of 1.0 N sodium hydroxide and 80 ml of 1.0 M potassium phosphate (monobasic) for the pH value of 7.0. For the attempted value of 9.0, 20 ml of 1.0 N sodium hydroxide and 80 ml of 1.0 m Boric acid were added to each aquaria. Due to the amount of liming by the city in the water supply, a pH of 8.0-8.5 was obtained instead of pH 9.0. This was still an acceptable value and addition of more buffers to raise the pH was avoided.

Potassium permanganate was dissolved at the rate of 9 grams to 900 ml of distilled water and stored in a brown glass bottle. The potassium permanganate was added one hour after the addition of Fintrol-5. It was added at 1 ppm since this amount is sufficient to detoxify Fintrol-5 (Gilderhus, *et al.,* 1969). One ppm and 0 ppm were the two treatment levels of potassium permanganate.

Design

The study utilized levels of pH at 7.0 and 8.0-8.5, potassium permanganate at 0 and 1 ppm; Fintrol-5 at 0, .02, .04, .06, .08, and .10 ppm; and three species of fish. Since largemouth bass fingerlings were available for only a short while in early summer, the bass study was conducted first utilizing four replications. Although the crappie fingerlings were available for a longer period of time, they were not as numerous as the bass; therefore, only three replications were used in the case of each species of crappie. Ten was the average number of fish in each aquarum. After the addition of the different concentrations of Fintrol-5 and potassium permanganate, mortality of fish was observed up to 72 hours.

RESULTS

Largemouth bass fingerlings suffered 38%-98% mortalities with Fintrol-5 concentrations from .04 ppm to .10 ppm at a pH of 7.0 (Figure 1). At the higher pH (8.0-8.5) 27% mortality was observed at .08 ppm Fintrol-5; however, only 5%

mortality was observed at .10 ppm Fintrol-5 (Figure 2). The addition of 1 ppm KMn04 significantlv reduced mortalities at all concentrations and both pH levels (Figures 3 and 4).

Black crappie suffered 50%-95% mortalities with Fintrol-5 concentrations from .04 ppm to .10 ppm at a pH of 7.0 (Figure 1). At a pH of 8.0-8.5 only 37% mortality was observed at .10 ppm Fintrol-5 (Figure 2). The addition of 1 ppm KMn04 reduced mortalities significantly at all concentrations of Fintrol-5 and both pH levels (Figures 3 and 4).

White crappie fingerlings suffered high mortalities at both pH levels (Figures 1 and 2). However, the more severe mortality was at a pH of 7.0. Beginning with .04 ppm to .10 ppm Fintrol-5 at this pH, 90%-100% mortalities were observed; and beginning with .06 ppm to .10 ppm Fintrol-5 at a pH of 8.0-8.5, 52%-100% mortalities were observed. The addition of 1 ppm KMn04 reduced mortalities significantly at all concentrations of Fintrol-5 and both pH levels (Figures 3 and 4).

DISCUSSION

The white crappie were more susceptable to Fintrol-5 than black crappie or largemouth bass. The white crappie were affected severely at both pH levels. At a pH of 7.0, .04 ppm Fintrol-5 produced 100% mortality among the white crappie as compared to 38% for largemouth bass and 50% for black crappie. At a pH of 8.0-8.5, .06 ppm Fintrol-5 produced 52% mortality among the white crappie as compared to 2% for largemouth bass and 14% for black crappie. It appears that fingerling white crappie may be controlled with small concentrations of Fintrol-5. Fingerling black crappie may not be as easily controlled since their tolerance is similar to the largemouth bass fingerlings.

The use of Fintrol-5 in crappie management should begin upon discovery of the crappie fingerlings in the early spring. Depending on the pH, the use of low concentrations of less than .06 ppm Fintrol-5 might be sufficient to reduce or completely eliminate fingerling white crappie without affecting the other fish in the population. In the event black crappie were the target fish, a higher concentration would be necessary. If the treatment with Fintrol-5 did affect fingerling bass, they could be correctively restocked in the late spring.

This method of treating fingerling crappie will need extensive field testing to determine its effectiveness as a management tool; however, from all indications Fintrol-5 appears promising as a solution to the problem of periodic crowding by crappie in small impoundments.

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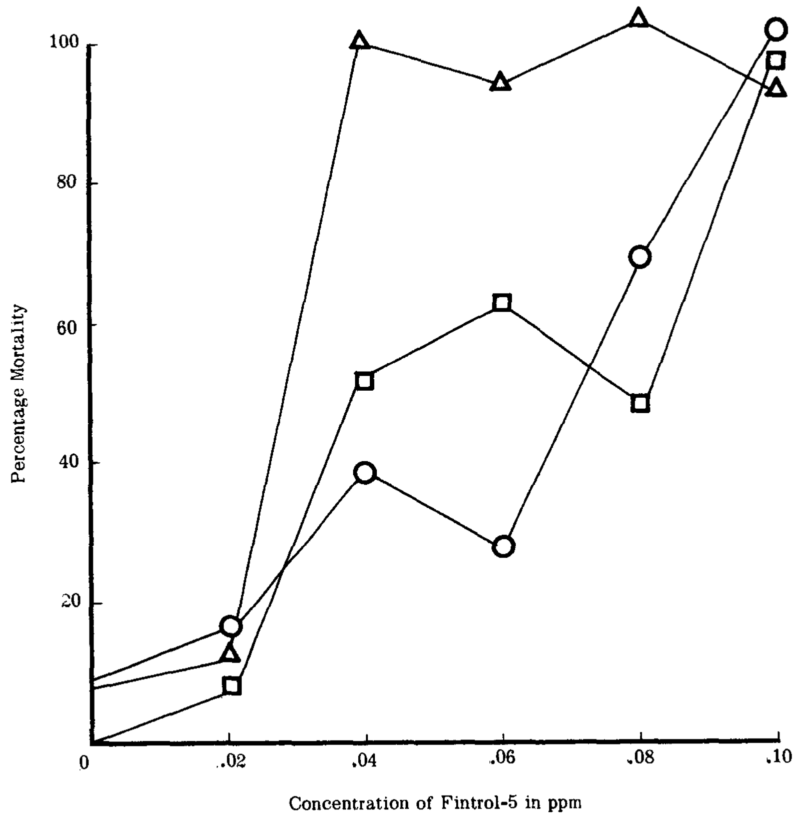

Figure 1. Total percentage mortality of largemouth bass, white crappie and black crappie at pH 7.0 and 0 ppm KMn04

○Largemouth Bass ▲ White Crappie □Black Crappie

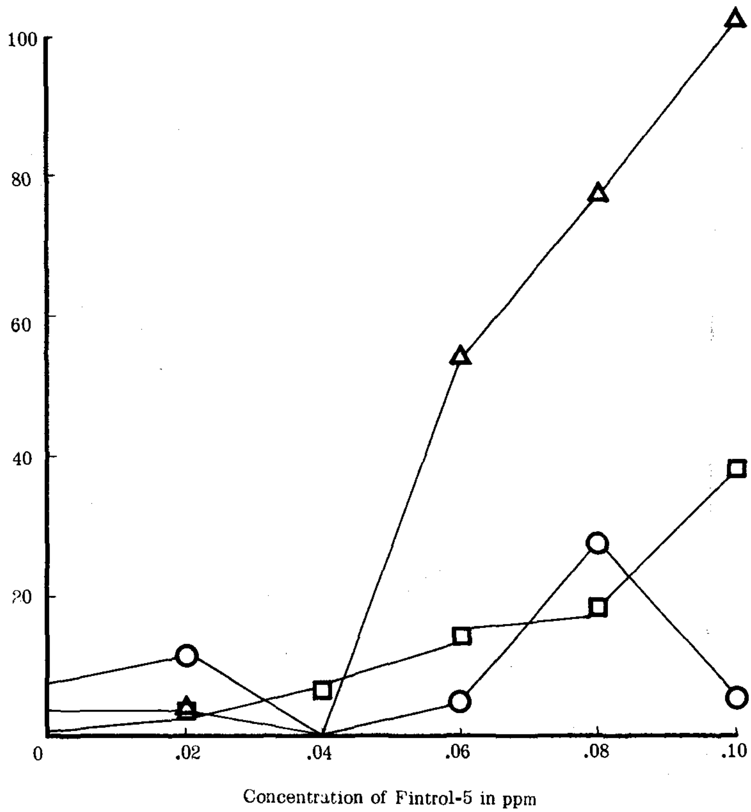

Figure 2. Total percentage mortality of largemouth bass, white crappie and black crappie at pH 8.0-8.5 and 0 ppm KMn04

○ Largemouth Bass ▲ White Crappie □ Black Crappie

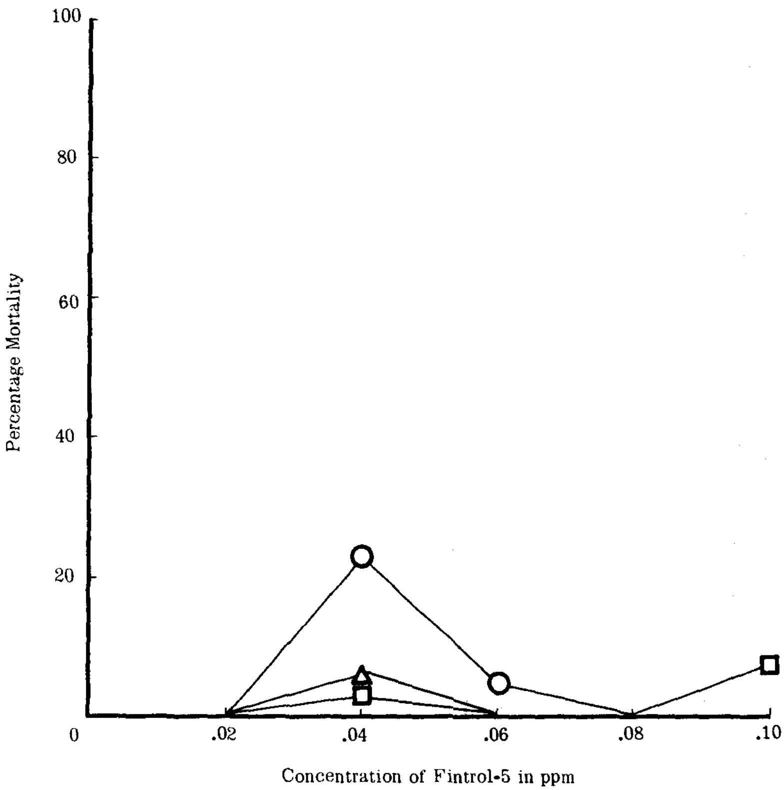

Figure 3. Total percentage mortality of largemouth bass, white crappie and black crappie at pH 7.0 and 1 ppm KMn04

O Largemouth Bass ▲ White Crappie □ Black Crappie

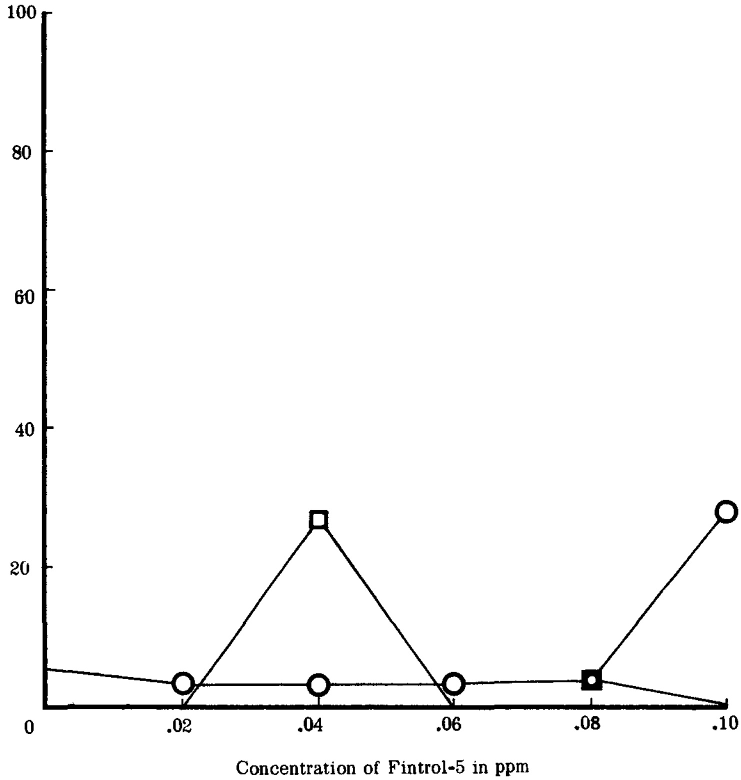

Figure 4. Total percentage mortality of largemouth bass, white crappie* and black crappie at pH 8.0-8.5 and 1 ppm KMn04

○ Largemouth Bass

□ Black Crappie

*Zero mortality at all concentrations