MIDGE LARVAE CONTROL IN COMMERCIAL CAT-FISH PONDS: TOXICITY OF ABATE(R) TO CHANNEL CATFISH (*ICTALURUS PUNCTATUS*)

Howard Chambers and David L. Fabacher
Department of Entomology
Mississippi State University
Mississippi State, Mississippi 39762

ABSTRACT

Populations of midges are a general nuisance around commercial catfish ponds in the Mississippi Delta. Abate(R) [(0,0,0′,0′-tetramethyl 0,0′-thiodi-p-phenylene phosphorothioate) American Cyanamid Company] is recommended for midge larvae control in aquatic areas at a concentration of about 2 ppb. Data in this study show that the LC50 of Abate to channel catfish is between 5 and 7 ppm. This represents a wide safety margin that should insure Abate to be non-toxic to channel catfish when used at the recommended rate for midge larvae control.

INTRODUCTION

Midge populations are reported to be a general nuisance in aquatic areas, particularly around commercial catfish ponds in the Mississippi Delta (1). Abate [0,0,0′,0′-tetramethyl 0,0-thiodi-p-phenylene phosphorothioate) American Cyanamid Company] is recommended for the control of midge larvae in aquatic areas.

The purpose of this study was to determine the toxicity of Abate to channel catfish, *Ictalurus punctatus*, and to compare this toxicity to the recommended rate of Abate for midge larvae control.

MATERIALS AND METHODS

Channel catfish [average wet weight 6.8 g; average total length 10.2 cm (range 8.3-13.9 cm)] were obtained from commercial fingerling ponds in Oktibbeha County, Mississippi. The fish were taken to the laboratory and held in flo-thru tanks which contained dechlorinated tap water. Appropriate amounts of Abate (4 lb/gal EC) were diluted in acetone and added at 1 ml of acetone/liter of water. Controls were treated with acetone alone at 1 ml/liter. A saturated solution of sodium thiosulfate (0.6 ml/20 liters) was used to reduce chlorine content of tap water. Each test aquarium contained ten fish in 20 liters of water. Fish were fed twice daily. Mean water temperature was 70° F. The water was well aerated with the use of air stones. Test concentrations ranged from 0.02 to 20 ppm.

Additional bioassays to determine the effects of varied laboratory conditions on the persistence of Abate in water were made. These conditions included uptake of Abate by catfish, aeration of water, and chemical hydrolysis of Abate in water.

RESULTS AND DISCUSSION

Unlike the symptoms of poisoning by most organophosphorus insecticides, there was no hyperexcitation or rapid movements in the fish. The symptoms of the catfish poisoned by Abate included sluggishness, loss of equilibrium, and swimming near the surface of the water. The lowest test concentration at which fish showed symptoms was 2 ppm. This concentration produced symptoms within 30 minutes. However, all but three fish recovered within 24 hours, suggesting that Abate undergoes detoxication in the fish.

Guppies exposed to 100 ppm for seven days in the laboratory showed no effects, while the 24-hr LC50 value of Abate to young rainbow trout was found to be 1.9 ppm (2). Results of assays with Abate show that it possesses a relatively low toxicity to channel catfish (Table 1); the 24-hr LC_{50} value is between 5 and 7 ppm.

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Additional toxicity studies were conducted with Abate to provide information on the persistence of Abate in the water under laboratory conditions. Fish initially treated with 20 ppm Abate were killed within one hour. These fish were removed from the aquarium and the water mixture of Abate was allowed to stand for three days with continued aeration. On the third day untreated fish were placed into this aquarium. There was no mortality in these fish after four days exposure. This inplied that: [1] the original test fish had removed sufficient Abate from the water to reduce the concentration to a non-toxic level, [2] that aeration enhanced the oxidative degradation of Abate to a non-toxic level; and/or [3] chemical hydrolysis reduced the concentration of active toxicant to a sublethal level.

To determine the persistence of Abate in water alone, an aquarium was set up with 20 ppm Abate and allowed to stand for three days. On the third day, 10 channel catfish, aeration, and 0.6 ml of saturated sodium thiosulfate were added. Eight fish were killed within 24 hours, the remaining two had symptoms. By the fourth day of exposure all fish were dead. Comparison of these data with results in Table 1 show that more than half of the insecticide had been degraded in three days.

To determine the effect of aeration on Abate persistence in water, an aquarium was set up with 20 ppm Abate, aeration, and sodium thiosulfate and allowed to stand for three days. On the third day ten chennel catfish were placed in the aquarium. On the fourth day of exposure one fish was dead and the remaining nine had symptoms. These data show that aeration also contributes to Abate degradation in water.

This series of tests shows that uptake of Abate by fish, chemical hydrolysis of Abate in water, and aeration of water reduce the persistence of Abate in laboratory aquaria. These results are limiting since they were obtained under laboratory conditions and not field conditions. Nevertheless, uptake of Abate by fish and chemical hydrolysis in water would probably shorten the persistence of Abate in the aquatic environment, as would other factors not considered here. However, the degree of aeration used in the laboratory would not be present under field conditions.

The recommended rate of Abate for midge larvae control is about 2 ppb (2) and the LC50 of Abate to channel catfish is between 5 and 7 ppm. This represents a wide safety margin that should insure Abate to be non-toxic to channel catfish when used at the recommended rate for midge larvae control.

REFERENCES

Young, D. F. Jr. 1972. Extension Entomology Department, Mississippi State University. Personal communication.

Abate Technical Bulletin, American Cyanamid Corporation.

Table 1. Toxicity of Abate(R) to channel catfish.

	No. dead/no. treated			
Dosage	1 day	3 days	7 days	Comments
Control	0/20	0/20	0/20	
0.2 ppm	0/20	0/20	0/20	No symptoms
2 ppm	0/20	0/20	3/20	Symptoms
5 ppm	1/20	1/10	1/10	
7 ppm	7/10	10/10	--	
10 ppm	10/10	–	--	Dead within 1 hour
20 ppm	20/20	–	--	Dead within 1 hour

*1 day = 24 hours

STAKE BEDS AS CRAPPIE CONCENTRATORS

Gedeon D. Petit, III
Tennessee Game and Fish Commission
P.O. Box 40747
Nashville, Tennessee 37220

ABSTRACT

In 1968 fisheries personnel of the Tennessee Game and Fish Commission began constructing and evaluating stake beds made of sawmill strips as tools to help fishermen harvest more crappie from Kentucky Reservoir. They are: hammer driven type; driver driven type; portable pre-fab type. Crappie concentrate readily on all three types with variations occurring due to location and seasonal fish movement. Over 128 hours of documented fishing on stake beds by the author produced 6.6 crappie per hour as opposed to 1.8 crappie per hour on control cover areas. A five year mean for crappie fishermen on the same reservoir is 0.998 crappie per hour.

INTRODUCTION

It is generally considered relatively difficult for average anglers to consistently harvest fish from large reservoirs. This is particularly true when initial boom years are passed, and in some reservoirs, such as 158,000 acre Kentucky Reservoir, the situation is further complicated when originally productive cover areas are silted in, rotted away, or otherwise destroyed.

Tennessee began a broad-scope study of the sport fishery in the Tennessee portion of Kentucky Reservoir (about 98,000 acres) on July 1, 1965. This multifaceted approach included a year-round creel survey. By 1968, it became clear that the white crappie (*Pomoxis annularis*) was the bread and butter fish in this reservoir, and that most crappie anglers were having trouble harvesting this species unless ideal shallow water spring fishing conditions occurred. Data indicated adequate crappie populations existed.

As a result of documented declines in angler harvest of the white crappie, a decision was made to investigate methods of getting this particular species and the fishermen together on a more regular basis. Several approaches, including local area fishing reports, marking existing cover, word of mouth direction by creel clerks, and building different types of crappie concentrators, were tried.