

The Results Of Selected Aquatic Herbicides On Elodea In South Florida

F. J. WARE AND J. D. GORMAN

*Fishery Biologist, Florida Game and Fresh Water Fish Commission, Lakeland, Florida, and
Director, Hillsborough County Mosquito Control Unit, Tampa, Florida*

INTRODUCTION

In recent years elodea (*Elodea spp.*) has become one of the most important noxious aquatic plants in the waters of South Florida. Lake Thonotosassa, located in Hillsborough County, is one such example and was selected as our study area. Ware (2) describes the natural lake as having a surface area of 1,541 acres, a maximum depth of sixteen feet, and an average depth of ten feet. Water color is dark from lignin and tannin and occasionally supports a light plankton bloom. The lake's structure is saucer shaped with a shallow sloping shoreline, and is lined with cypress trees. Adjacent uplands are developed with homes, improved pasture, and citrus groves. Submersed vegetation is primarily elodea, present in a solid, almost impenetrable mat along the shoreline. Elodea extends 100 to 200 yards

from the shoreline to the seven foot water depth contour, and occurs infrequently in deeper water. Floating aquatic plants include water hyacinth (*Eichhornia crassipes*), duckweed (*Lemna minor*), water fern (*Salvinia rotundifolia*), and azolla (*Azolla caroliniana*).

This investigation was conducted as a supplement to an earlier study reporting favorable results with copper sulfate (2).

MATERIALS AND METHOD OF APPLICATION

Eight one acre plots of elodea were measured and staked identical as possible. The surface area of each plot was completely covered with elodea prior to treatment. Water depth in the treated areas ranged from 3 to 6 feet.

Hydrothol 191 (Mono [N, N dimethylalkylamine] salt of endothall) granular was applied to plots one and two at rates of 1.25 and 2.5 ppmw, respectively. In plot one the material was applied with a Cyclone Mechanical Spreader. In the second plot the material was applied in strips approximately 10 feet apart, horizontal to the shoreline, pouring the granules straight from the bag. Plots three and four were treated with Casoron AQ (2,6-dichlorobenzonitaille) granular at the rate of 250 and 125 pounds per surface acre, respectively. The strip method of application described above was used on both plots. The fifth plot was treated with two gallons of 2,4-D Amine (4 pounds acid equivalent), one gallon silvex (2-[2,4, 5-trichlorophenoxy] propionic acid) and one gallon of commercial molasses (Florida Grade) as described by Wunderlich (3). Plot six was treated with 100 pounds of fine crystal copper sulfate (2). Plot seven was treated with 1 ppmw of liquid Hydrothol 191 injected into the water under 40 PSI. The eighth plot was treated with 100 pounds of coarse crystal copper sulfate applied in strips.

Following the application of the chemical to the plots, inspections were made 10, 20, 30, 60 and 90 days after treatment to determine the results.

RESULTS AND DISCUSSION

The degree of control obtained by the various herbicides and concentrations is shown in Table 1. Results are expressed in percent and indicate the portion of each plot in which the elodea was eliminated following treatment.

Plot number one, treated with Hydrothol 191 granules at the concentration of 1.25 ppmw, demonstrated a very slow rate of control. Sixty days after treatment approxi-

mately 50% of the plot was cleared of elodea with the majority of the remaining plants detached and void of chlorophyll. On the 90 day inspection it was concluded that 70% control was obtained (Table 1).

In the second granular Hydrothol 191 plot, treated at a concentration of 2.5 ppmw, the 10 day inspection indicated approximately 25% control with the balance of the plants decomposing. The greatest degree of control was 90%, observed during the 60 day inspection. The 90 day inspection showed 80% control with some regrowth visible (Table 1).

Test plots three and four treated with Casoron AQ granules and plot five treated with the mixture of silvex, 2,4-D, and molasses did not exhibit any degree of control of elodea throughout the study (Table 1).

In test plot number six treated with 100 pounds of fine crystal copper sulfate, all of the elodea appeared to be decomposing 10 days after treatment and approximately 20% of the plot was clear. Twenty days after treatment 50% of the plot was void of elodea. The 90 day inspection revealed that 80% control was obtained with some regrowth visible (Table 1).

Plot seven, treated with liquid Hydrothol 191 at a concentration of 1 ppmw, revealed a rapid rate of initial control. Within 10 days 50% of the surface plants were eliminated to a depth of six inches. By 30 days 60% of the surface was void of elodea and 10% of the lake bottom was clear. Subsequent inspections indicated a maximum of 25% control in the plot and heavy regrowth occurring (Table 1).

In plot number eight, treated with 100 pounds of coarse crystal copper sulfate approximately 95% of control was obtained within 30 days (Table 1). Ninety

TABLE 1. RESULTS OF HERBICIDES ON ELODEA—LAKE THONOTOSASSA, AUGUST-DECEMBER 1966.

Plot	Chemical	Rate	Percent Control				
			10 day	20 day	30 day	60 day	90 day
1	Hydrothol 191 granular	1.25 ppmw	10%	10%	10%	50%	70% regrowth 10%
2	Hydrothol 191 granular	2.5 ppmw	25% remaining plants decomposing	25%	40%	90%	80% regrowth 10%
3	Casoron AQ granular	250 lb./ acre	no effect	no effect	no effect	no effect	no effect
4	Casoron AQ granular	125 lb./ acre	no effect	no effect	no effect	no effect	no effect
5	Molasses 2,4-D Silvex	Molasses 2,4-D Silvex/ acre	no effect	no effect	no effect	no effect	no effect
6	Copper Sulfate (fine crystal)	100 lb./ acre	20% remaining plants decomposing	50% remaining plants decomposing	50%	70%	80% regrowth 10%
7	Hydrothol 191 liquid	1 ppmw	50% surface 10% submersed	50% surface 10% submersed	60% surface 10% submersed	25%	25%
8	Copper Sulfate (coarse crystal)	100 lb./ acre	no inspection	50%	90-95% bottom clear	no inspection	90-95% bottom clear

days after treatment the degree of control remained at 95%, with only a small area of deteriorated plants in the plot. No evidence of regrowth was observed.

Based on the results obtained with copper sulfate and comments by Hearne (1), samples of pure copper chips were obtained from the American Smelting and Refining Company. This material was applied to four additional plots at the rate of 25 and 50 pounds per surface acre. Unfortunately, later inspections revealed a dense mat of water hyacinth covering the plots, preventing an accurate evaluation of the results. Following applications of 2,4-D to the water hyacinth, a 60-day inspection of the plots indicated a significant reduction in the density of the elodea. Whether the reduction was due to the pure copper or shading effect by the water hyacinth could not be determined. Later inspections will be conducted to evaluate the final results of these tests.

During the study no fish kills occurred except during the application of the liquid Hydrothol 191 which caused a minor kill in the treated area. However, these tests were conducted as spot or partial treatments. In the event of treatment of an entire body of water, precautions would be necessary to prevent a fish kill, because of the toxicity of certain herbicides or copper.

CONCLUSIONS

Herbicidal activity of the treatments varied from 0 to 95%. Copper sulfate applied at the rate of 100 pounds per surface acre was the most effective and economical. By comparison, the larger crystals gave a greater degree of

control and are recommended. The Hydrothol 191 tests were somewhat lower in effectiveness, and little differences was observed in the granular concentrations. Liquid Hydrothol 191 produced the fastest rate of initial control, but was less effective after 30 days. This herbicide would be recommended where conditions do not permit the use of copper sulfate. No control was obtained in plots treated with Casoron AQ granules and the mixture of molasses, 2,4-D and silvex.

ACKNOWLEDGMENTS

The authors wish to acknowledge the personnel of the Fisheries Division and Hyacinth Control Division, Florida Game and Fresh Water Fish Commission, Thompson-Hayward Chemical Company, Pennsalt Chemical Corporation, and Mr. Andy Price, Pennsalt Chemical Corporation for their assistance in the study. A special thank you is also due to Mr. D. E. Holcomb, Florida Game and Fresh Water Fish Commission, for his critical review of the manuscript.

LITERATURE CITED

1. Hearne, J. S. 1966. The Panama Canal's Aquatic Weed Problem. Proc. Southern Weed Conference 19:443-449.
2. Ware, F. J. 1966. The Use of Copper Sulfate as a Method of Partial Control of Elodea in Lake Thonotosassa, Florida. Proc. Southern Weed Conference 19:491-494.
3. Wunderlich, W. E. 1966. Control of Submerged Vegetation in Louisiana. Proc. Southern Weed Conference 19:450-452.