

Control Of Elodea In A Residential Situation¹

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ABSTRACT

Experiments were conducted in tide-affected canals to determine the effect of diquat, amine salt of endothall (Hydrothal 191)(2) and copper sulfate on elodea (*Elodea canadensis*). Endothall was the most effective herbicide evaluated in the experiment. Applications of 2 and 4 ppmw gave complete control of elodea with very little fish toxicity. Regrowth was occurring in the treated area after 16 weeks. Diquat applied at 2 ppmw and copper sulfate at 5 ppmw did not give satisfactory control of elodea. Operational treatments of an entire canal system in a residential development with endothall is also discussed.

INTRODUCTION

During the last 10 years many real estate developers in southeast Florida have constructed homes on lots that abut canals. These canals are usually considered fresh water but they are affected by the ocean tides because they are connected to a system of canals that connect to the Atlantic ocean. In extremely dry periods the salinity in the canals will vary and gradually increase to a concentration of 2,000 to 8,000 ppm. The canals are normally 4 to 6 ft deep, 50 to 75 ft. wide, and are very fertile due to fertilizer leached from home lawns, and submersed aquatic plants become established in them soon after the canals are constructed. Submersed aquatic weeds in these canals have become a major problem. The canals are designed primarily for recreational purposes but property values decrease in the area when dense growths of aquatic weeds become established. The home owners in the development are usually responsible for the maintenance of the canals. The cost of controlling the aquatic weeds in the canals must be borne by the homeowners in the development.

The present study was conducted in the Plantation Isles development of Plantation, Florida in cooperation with the Old Plantation Water Control District. The canals in this residential development were densely infested with elodea (*Elodea canadensis*) and home owners requested recommendations on methods of control. Previous research in Southeast Florida had shown that diquat (6,7-dihydrodipyrido [1,2-a:2',1'-c] pyrazidiinium salt) and the amine salt of endothall (7-oxabicyclo [2.2.1] heptane-2,3-dicarboxylic acid) were very effective in the control of certain species of submersed weeds (1, 2). This paper concerns the evaluation of several herbicides on elodea and the manner in which the final control program in the home development was carried out.

MATERIALS AND METHODS

Small Plot Experiments

Three finger canals uniformly infested with elodea were selected in February 1965 to evaluate the effects of diquat,

1. Cooperative investigations of the Crops Research Division, Agricultural Research Service, U. S. Department of Agriculture; the Central and Southern Florida Flood Control District; the Florida Agricultural Experiment Station; and the Old Plantation Water Control District.
2. Trade name.

amine salt of endothall (Hydrothal 191) and copper sulfate on elodea. The canals were 60 feet wide and had an average depth of 4 to 5 feet at high tide. A plot 300 feet long was treated in each of the canals. The plot in Canal 1 was treated with 5 ppmw copper sulfate, Canal 2 with 4 ppmw of endothall, and Canal 3 with 2 ppmw diquat. The herbicides were applied at low tide but concentrations were adjusted to give the desired concentration at high tide.

The herbicides, with the exception of copper sulfate, were applied by spraying the material evenly over the weed surface from a boat. The boat was propelled over the weeds by a small air fan mounted on the rear of the boat. Water was pulled from the canal by a pump mounted in the boat and the desired concentration of herbicide was mixed with the water in the pump. A man standing on the bow of the boat applied the spray solution uniformly over the plot surface, Figure 1. The granular copper sulfate was spread over the plot surface by hand.



Figure 1. Application of Hydrothal 191 to a canal infested with elodea in Plantation Isles, Plantation, Florida. A small air fan was necessary to propel the boat over the weed surface.

Canals 1, 2, and 3 were retreated in November 1965. Canal 1 was treated with 2 ppmw diquat; Canal 2 with 2 ppmw of endothall; and Canal 3 with 4 ppmw of endothall. In December 1965, one-half of the plot in Canal 2 was treated with granular dichlobenil (2,6-dichlorobenzo-nitrile) (Casoron)² at 10 lb/A.

Operational Application

In August 1965 the entire canal system was treated in three phases with 4 ppmw of endothall, Figure 2. Residents of the area were warned not to use the water for recreation or irrigation for 72 hours after treatment. The chemical was again applied in the same manner as described previously with the exception that the spray solution was injected below the water surface at 150 psi. Care was taken to get uniform dispersion of the spray solution in the water. In areas where small patches of hyacinth covered the surface, extra chemical was applied with the idea that the tide inflow would move

the herbicide under the hyacinth mats. The elodea growth was so dense in the canals that homeowners were unable to move their boats from the dock and care had to be taken to apply sufficient herbicide in these areas.

than 5 ppmw would be required for the control of elodea in a tidal area.

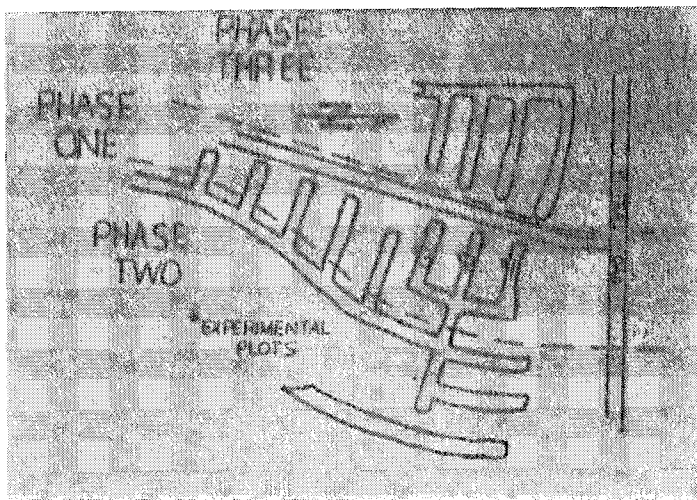


Figure 2. Area map distributed to residents of the development showing phases of canal sprayings.

Periodic observations were made from a boat before and after each treatment. Percent of infestation, weed condition and growth stage were recorded on each observation trip. Retreatments were usually made when the weed populations were 50 percent of original density.

RESULTS AND DISCUSSION

Small Plot Experiments

The most effective herbicide applied in the three canals was endothall, Figure 3. The elodea had sunk to the canal bottom 7 days after treatment and the plot was free of all vegetation at the end of 30 days. The results were similar to those obtained on southern naiad in 1961 (2). Fish kill in the treated area was very small. This did not agree with the fish toxicity studies which showed most fish were killed when exposed to 1 ppmw of endothall (4). Whether the fish moved out of the treated area before death is not known at this time. Regrowth was found in the treated area 16 weeks after treatment. The information obtained with endothall in this experiment was used as a basis for treating the entire canal system with endothall in August 1965.

The area treated with 2 ppmw of diquat showed little herbicidal effect 2 weeks after treatment. Evaluations made 30 days after treatment indicated that the elodea had been "burned" about 1 foot below the water surface but was recovering rapidly. The treatment was considered unsatisfactory. Laboratory experiments at this station have shown that longer contact periods are required for diquat to control elodea at this concentration. Elodea plants in the treated area were heavily encrusted with algae and marl deposits. Whether the algae and marl deposits would affect the activity of diquat on elodea is being investigated at this time.

Elodea was affected little by the treatment of copper sulfate. There was a slight sinking of the elodea from the surface but this was thought to be due to the killing of the algae on the surface. Concentrations of copper sulfate much greater

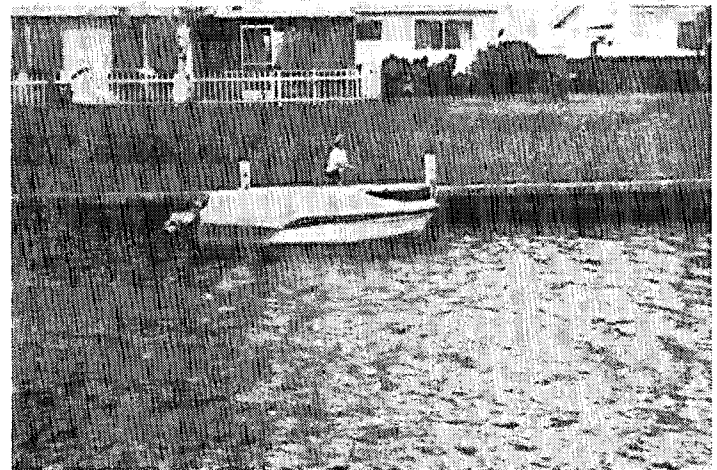
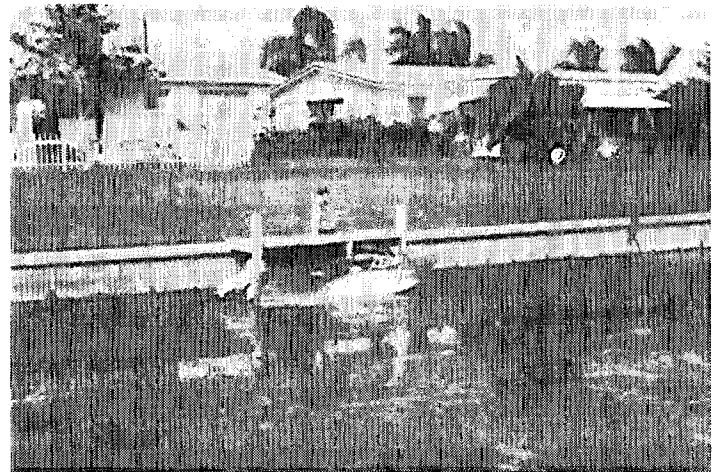


Figure 3. A canal in Plantation Isles at time of treatment (top) and the same canal 7 days after treatment with 4 ppmw of endothall (bottom). The density of elodea around the boat and dock in the top photograph was typical of the entire canal system.

The three canals were retreated with diquat and endothall in December 1965. Canal 1 received the 2 ppmw treatment of diquat since the elodea plants appeared to have less algae and marl deposit on the leaves. Canal 2 was selected to receive the same concentration of endothall while Canal 3 received 2 ppmw of endothall. Results of these treatments were similar to those obtained in the previous treatment. However, the 2 ppmw of endothall was as effective as the 4 ppmw. The diquat treatment in Canal 1 never controlled more than 50 percent of the elodea.

Five days after treating Canal 2 with 2 ppmw of endothall, one-half of the canal was treated with a granular formation of dichlobenil at 10 lb./A. The dichlobenil was applied to determine if it would prevent the regrowth of elodea. Experiments in ponds have shown this herbicide to be effective on many species of aquatic weeds if applied before the plants initiate growth in the spring (3). Observations made in early May indicated that the dichlobenil was having an effect on the regrowth of elodea. Regrowth was 2 to 3 times greater in the area that had received no dichlobenil.

Operational Applications

The residents of the Plantation Isles development held a meeting in May 1965 and voted to have the City of Plantation, Florida tax each property owner for the purpose of aquatic weed control. In August 1965 the City of Plantation entered into an agreement with the Old Plantation Water Control District to apply endothal at 4 ppmw in the canals of Plantation Isles. The entire canal system was treated in three phases to try and reduce the fish kill. Home owners received notices through the mail from the City Manager's office notifying them that their canals would be treated on a certain date and not to use the water for recreation or irrigation for 72 hours.

The operational application was a complete success. Seven days after treatment the residents of the area were able to use their boats without aquatic weeds clogging the propellers for the first time in 6 to 9 months. Fish killed in the treatment were picked up the day after treatment by City maintenance crews. The fish kill was very small as was found in the earlier experiment. The small fish kill could have been related to the rapid dilution of the herbicide by the tidal movement of the water.

Observations made with the Water Control District supervisor in late November showed that the elodea was beginning to regrow in the more shallow areas of the canals. In Febru-

ary 1966 the entire system was treated again with endothal but the concentration was reduced to 2 ppmw. Control with the lower concentration was as good as that obtained with the higher concentration.

The City plans to have the Water Control District continue to retreat the canal system. It is hoped that as the treatments are continued the length of control between retreatments will increase.

The program that was adopted by the residents of Plantation Isles may be the answer to many of the problems of land and home developments in southeast Florida. If such programs are adopted at the initiation of the home construction many of the problems that face old established home developments could be avoided.

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