many flowing canals, because many of the canals are used for water control and are static most of the time.

We have used two methods of applying Aqualin herbicide in our commercial work:

(1) Moving the equipment in a truck along the bank.

(2) Moving the equipment through the water in a boat.

In our initial work, we used a pump unit mounted on a four-wheel drive truck. This unit was connected to a boom that extended over the canal. Water was taken directly from the canal through the pump where Aqualin herbicide was metered into the water and discharged through another line on the boom back into the canal under the surface. For this method, we used a Gorman-Rupp Pump, with a metering system using standard orifice plates where the flow of Aqualin herbicide is regulated by the pressure drop across the plate.

Another system we have used to meter Aqualin herbicide into this pump unit consisted of a flow meter connected to the suction side of the pump, or better through an eductor to the discharge side of the pump.

This same unit has been used in conjunction with a nurse tank mounted in the truck. We tried this system in order to eliminate variations in the flow of water through the pump caused by clogging of the strainer on the intake line, air leaks in the line, and other factors. The rough roadways usually encountered along canal banks made it difficult to maintain a constant flow of water through the pump. This type of equipment is limited to small areas, because of the size of the portable nurse tank.

Many of these same problems were encountered with the unit mounted in a boat. We decided to try some other method of application and experimented with a compressed gas unit as reported by Orsenigo and Hussey[1]. This unit was designed to meter the Aqualin herbicide directly into the water being treated. Aqualin herbicide is forced from the shipping drum by compressed gas through a direct reading flow meter into a discharge line mounted underwater on the stern of the boat. The discharge line was fitted with four evenly spaced nozzles to aid in distribution of the herbicide.

This type of equipment eliminated some of our problems, but created others. The major problem was adequate mixing of the Aqualin herbicide in the water. The difference in density resulted in some of the Aqualin herbicide being lost to the atmosphere before dissolving in the water. This action frequently resulted in a lower concentration of herbicide in the water than was required. Another problem was maintaining a tight system to prevent the release of Aqualin vapors in the boat and working area.

We have used air boats, outboard motor boats and inboard motor boats, and have found certain advantages in all types.

The outboard motor boat is more versatile because of its lightweight, however, weeds fouling the propeller can be a major problem. The inboard boat will give the best mixing, however, it is heavy and cannot be used in shallow water. The airboat, although heavy can be used in shallow water, and fumes are not as serious a problem.

In October, 1960, we applied Aqualin herbicide on a commercial basis to a number of large canals in Ft. Lauderdale. This treatment was made with the cooperation of Mr. Orville White, Supervisor of the Pest Control Department of Fort Lauderdale, and Mr. Paul Huber of Shell Chemical Company.

These canals had a heavy infestation of Elodea. They contained brackish water and were also affected by tidal movement. We wanted to make the treatment at 5 ppm, but actually achieved about 4.5 - 5 ppm. This rate proved satisfactory as evidenced by the fact that they are still free of weeds.

We have treated canals and lakes in different areas of the State with success. Our experience indicates that Aqualin herbicide can be an effective tool in the control of underwater weeds.

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Formation Of An Independent Tax Supported Weed Control District

William Dryden[1]
and
T. W. Miller, Jr.[2]

Located on the lower gulf coast, Lee County, Florida, abounds with the natural resources that have made Florida famous as a world playground. Swimming at the many beaches, boating, fishing, hunting and similar sports and recreation connected with outdoor living are available to all who choose to live in this area. However, any tropical climate, such as that in South Florida, is conducive to production of a number of noxious aquatic weeds. In Lee County one of the most troublesome is Eichornia Crassipes usually known as water hyacinth. This prolific weed clogs farm ditches, canals, streams, and even the major river in the area, the Caloosahatchee together with all of its tributaries. A major infestation of water hyacinths during 1960 resulted in the Saturday Evening Post's including Fort Myers, the county seat of Lee County, in its "Face of America" series with the caption 'Watery Jungle". The story accompanying the two page color photograph stated — "In Florida — where these boats sit all forlorn in the Caloosahatchee River near Fort Myers, clearing hyacinths out of inland waters is a never ending job." To a county which derives some $30,000,000 of its income each year from the tourist industry, this publicity was at best undesirable.

For several years the State of Florida through a state agency, the Game and Fresh Water Fish Commission, has carried out control activities in our area. But, with a very limited budget, and with the entire state of Florida to cover, it seemed that their efforts in Lee County were inadequate to provide even the minimal control needed in the area. Continued complaints by tourists and local residents, who found it impossible to utilize expensive boats and motors, indicated that something, which could provide adequate control when and where it was needed, had to be attempted on the local level. With this in mind, the legislative delegation of Lee County, after consideration of several alternatives, decided to create a local taxing authority, specifically for the control of water hyacinths. In the interest of economy, it was decided to use an existing agency to carry out the program rather than set up an entire new organization. Accordingly, the legislative delegation appeared before the Board of Commissioners of the Lee County Mosquito Control District, outlined the problem, and requested that the Board consider serving in a dual capacity; that is as the Board of Commissioners of the proposed Lee County Hyacinth Control District. Since it appeared that no other local agency was nearly so well equipped as the Mosquito Control District to handle the complex problems of control of aquatic weeds. The Board agreed to accept the increased responsibility, if the legislature would authorize such a program and provide sufficient funds to make it successful. This was accomplished on June 12, 1961, when Governor Farris Bryant signed the bill creating the Lee County Hyacinth Control District, thereby making it law. The act under which the District now operates gives the Board several broad powers; such as, "all the powers of a body corporate, including the power to sue and be sued as a corporation in said name in any court". In addition, the District may hold real estate; contract; borrow money; and, unlike the Mosquito Control District, may carry liability insurance against cort actions.

Duties of the Board, simply stated, are also broad. "The Board shall perform all duties necessary for the control and eradication of hyacinths in said county". One interesting fact is that the law contains a provision authorizing the Board, if necessary for the accomplishment of the purpose of the act, to perform work outside the boundaries of the District. The Board holds regular monthly meetings, and administers the affairs of the District through a manager, or "Director". Each member of the Board receives compensation of $300.00 per annum for his services. Books and other financial records of the District are audited by the State auditing department in a manner similar to those of other county offices.

To finance the cost of the program, the Board is empowered

[1]Commissioner, Lee County Hyacinth Control District
[2]Director, Lee County Hyacinth Control District

to levy a tax of up to one-fourth mill on all taxable property in the county. In addition, two agencies, the State Game and Fresh Water Fish Commission and the Central and Southern Florida Flood Control District, have agreed to supplement the District's budget with funds they normally would spend in Lee County. Each of these agencies has agreed to make available at least as much money as it has expended in our area in the past. When funds from these two agencies were added to the revenue produced by the one-fourth mill tax, the budget adopted for the fiscal year October 1, 1961, through September 30, 1962, totaled $115,129.19.

While this is our first year of operation, we feel certain that progress will be rapid since we do have the personnel know how and plant facilities of the local mosquito control district to fall back upon. However, it is the intent of the law, and ours, that the Lee County Hyacinth Control District, as an independent agency, will operate a program which can provide adequate control of this obnoxious aquatic weed. We feel sure that our program, carried out by an autonomous taxing body, will be an effective approach to our problem, and that creation of this district marks an important step forward in local government weed control.

Hydrothol For Control Of Aquatic Weeds

By J. L. Frizzell

A number of fatty acid amine derivatives of Endothal acid have been evaluated for herbicidal activity for the last several years. These materials show an increased contact activity over Disodium Endothal. The composition of two of these materials selected for further field evaluation are as follows:

HYDROTHOL — di N. N dimethylcocoamine salt of Endothal.

Herbicide 191 — MONO N, N dimethylcocoamine salt of Endothal.

HYDROTHOL and Herbicide 191 are available as a liquid concentrate (soluble in water) and as a granular product. They are highly effective aquatic herbicides and algicides for use in irrigation and drainage canals, lakes, ponds and other problem areas to control the following weeds and algae:

Najas, Elodea, Coontail, Milfoil, Pondweeds, Water Stargrass, Cobamba, Cattail, Bur Reed, Algae and Chara.

In 1960 and 1961 extensive laboratory evaluations of HYDROTHOL were made. Still water tests indicated that this material was extremely active on Southern Naiad, Elodea and Coontail. Laboratory evaluations in 1961 indicated that the material required relatively short exposure time, which made it suitable for use in slow moving water.

A large experiment was initiated in the Spring of 1961, using HYDROTHOL at the rate of 3 ppm and 5 ppm in small farm canals. HYDROTHOL gave 100% control of Southern Naiad at both rates and little regrowth occurred at the end of nine months.

In June of 1961, HYDROTHOL was applied at 3 ppm and 5 ppm in a canal for the control of Southern Naiad and Coontail. HYDROTHOL was mixed with water and was applied from a boat with a gasoline-driven pump at a pressure of 60 psi. The solution was injected below the water surface. Again, good control was obtained.

In September of 1961, a drainage district field crew applied HYDROTHOL to farm canals one-mile long at the rate of 3 ppm. Complete control of Southern Naiad and Coontail was obtained within seventy-two hours after application of HYDROTHOL. In this same experiment, Herbicide 191 was applied to one-half mile of canal. Observations showed no difference in control obtained with the two chemicals. Numerous other field experiments have confirmed that there is no difference in performance of HYDROTHOL and Herbicide 191.

Extensive field tests for weed control and residue studies have been completed by the Missouri Conservation Commission. These tests were made to determine the herbicidal effectiveness and ecological aspects of the chemical treatment using HYDROTHOL. The field experiments for tracing the degradation of HYDROTHOL were performed in a farm pond located on the University of Missouri Ashland Wildlife Area. Seven enclosures, made by installing plastic curtains in this pond, were subjected to various dosage rates of the commercial formulation of HYDROTHOL. Applications of 0.1, 0.3, 0.6, 1.0, 3.0, 6.0, and 10.0 ppm by weight were made in the enclosures. Water and bottom fauna samples were collected prior to the introduction of the chemical. Water samples were taken daily from each of the enclosures and the control area for a period of twenty-seven days. Bottom fauna samples were collected three weeks following application. All samples were transported to the laboratory for analysis on the day they were collected. Analysis of these samples treated with HYDROTHOL showed that residues were found to be of short duration. Degradation studies of water residues indicated the rate of disappearance to be a function of time and concentration. The lower application rates of 0.1 to 3.0 ppm broke down rapidly within the first week, while higher concentrations of 6.0 to 10.0 ppm took up to twenty-five days. The analysis of fish flesh revealed negative absorption of HYDROTHOL at sub-lethal concentrations. Under field conditions, bottom dwelling fish food organisms increased in abundance and changed in species composition following treatment of vegetation. Bottom fauna showed some up-take of herbicide residues, but little or none was absorbed by fish.

Studies of the degradation of herbicide residues in water indicated that persistence is of short duration, with the rate of disappearance being a function of time and concentration.

In December of 1961, applications of water treated with HYDROTHOL at a rate of five and 10 ppm were made to growing tomato plants, onions, radishes, lettuce and peas. These tests were replicated twice with the soil being saturated to one-hundred percent with both 5 and 10 ppm. Analysis of the crops treated with 10 ppm showed a residue of 0.75 ppm and the 5 ppm showed a residue of 0.18 ppm. With the difference of .18 ppm and 0.75 ppm for 5 and 10 ppm, we certainly do not expect any residue when treated at 3 ppm.

There was no plant phytotoxcity at these high rates. Preliminary results indicate that treated water can be used safely for irrigation purposes without crop injury or residue of HYDROTHOL.

Animal toxicity studies are nearing completion at this time. So far, no ill effects have been detected.

Other uses of HYDROTHOL includes Algae control for ponds and lakes. Tests in 1960 and 1961 indicated that Cladophora and Pithophora can be controlled with dosages of 0.25 to 0.5 ppm acid equivalent applied both as a liquid or a granular.

Tests have shown that Algae in cooling towers, and other circulating systems, that an initial treatment of 3 ppm is sufficient under most conditions for control. Repeat treatments of 0.5 to 1.0 ppm at weekly intervals is suggested.

History Of Water Hyacinth Control In Louisiana

U. S. ARMY ENGINEER DISTRICT, NEW ORLEANS

It happened in New Orleans, Louisiana, in 1884. The water hyacinth (Eichornia Crassipes) was introduced for the first time in this country as a horticultural exhibit from the tropics. Its beauty and free-floating characteristics made it a great favorite with the public.

Since its growth was prolific, there was no hesitancy in giving sample plants to those who wished to beautify their ponds and to others who thought that the new plant might be an answer to some of their livestock feeding problems. And thus was born the problem which was to cause hardships to thousands and cost millions to control.

Within ten years after its introduction, the water hyacinth was a serious problem in some areas in Louisiana and was spreading elsewhere throughout the Gulf States. The first trouble spots in Louisiana were reported in the streams of St. Tammany Parish entering Lake Pontchartrain, in Bayou Plaquemine not far downstream from the old lock and in the Mermentau River in western Louisiana.

The water hyacinth problem had reached such proportions by 1898 that Congress was asked to assist and shortly thereafter the Corps of Engineers was given the mission of removing the water hyacinth from the navigable waterways of Louisiana whenever it became a hindrance to navigation.

An early survey disclosed the seriousness of the problem and