Aquatic Weed Control Program

of the

Central and Southern Florida Flood Control District

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INTRODUCTION

One of the most perplexing and continuous problems which confronts the Flood Control District in the operation and maintenance of the completed facilities of the Project is aquatic weed control. In this paper I will discuss what problems equatics cause, the methods and means we use to control aquatics, the cost of this program, the results which we are experiencing, and finally, our hopes and expectations for the future.

DESCRIPTION OF PROJECT

A comprehensive flood control and water conservation project had been needed in south Florida for many years if adequate protection from flood and drought was to ever be a reality.

It was only after heavy rains, resulting from two hurricanes, flooded large portions of southern Florida in 1947 that something was done.

The Congress of the United States, in 1948, approved Federal participation with the State of Florida in such a program to be administered through the U. S. Corps of Engineers. The Legislature of the State of Florida, in 1949, elected to participate with the Federal Government and created the Central and Southern Florida Flood Control District to cooperate with the U. S. Corps of Engineers in the construction and operation and maintenance of the works of the Project and represent the people of the area in these matters.

The Flood Control District comprises all or part of 18 counties in Central and Southern Florida. It is more than 15,000 square miles in area; this is larger in area than the States of Massachusetts, Connecticut and Rhode Island combined. (See Map on Plate No. I)

The plan of improvement for the Project includes water control and conservation for the Kissimmee River Basin, the upper end of the St. Johns River from northern St. Lucie County to Lake Harney in Seminole County, Lake Okeechobee and its outlets, the Everglades Agricultural Area, the Conservation Areas east and south of the Everglades Agricultural Area, and the east coastal areas of south Florida.

The Project plan requires the construction or improvement of 1158 miles of canals, 1127 miles of levees and 2570 square miles of water storage areas and lakes, and the construction of approximately 121 control structures and pumping stations. The estimated cost of the construction for the Project is $334,000,000.

The money necessary for this Project comes from three sources:—

1) The Federal Government contributes 80 to 85 percent of the construction money.

2) The State of Florida contributes the other 20 to 15 percent of the construction costs, the costs of State Highway bridges and the costs of lands for water storage from the general revenue funds.

3) The Flood Control District is authorized to levy up to a one mill advalorem tax on the lands within the District to pay for the cost of rights of way for construction, private relocations and operation and maintenance of the facilities.

To date, $102,700,000 has been spent on construction. This means that the Project is approximately 30 percent complete. This includes approximately 558 miles of canals, 527 miles of levees, and 2155 square miles of water storage areas and lakes.

AQUATICS, THEIR PROBLEMS AND CONTROL

Generally speaking, aquatic growth in and along the banks of our canals which tend to impede the proper flow of water are a problem. There are other interests which are also affected by aquatics, such as recreation and navigation, wildlife and insect control. Although these are not our primary responsibility, there are benefits which can be derived by them from the control of aquatics in our canals and water storage areas. We have experienced problems with aquatics in all of the four general classifications:— floating, submersed, emersed, and aquatic and ditchbank grasses.

Of the floating aquatics there are three which have created problems for the District in the operation and maintenance of its facilities:— duck weed and Schleid, water hyacinths, and water lettuce.

The duck weed and Schleid caused a problem at our first pumping stations with the cooling water for the diesel engines which operate the pumps. The weed would clog up the strainers on the cooling water intake to the point where the engines would overheat and require us to shut down our pumping operations. To alleviate this problem, it was necessary to install large revolving self-cleansing screens on these intakes. (See Plate No. II). This was expensive, but it did eliminate the problem.

The second "floater" to be discussed is water hyacinth. The control of this aquatic is without a doubt the most expensive for the District, primarily because of the following:

1) They are found in almost all of the canals, lakes and water storage areas in the District.

2) Their astounding reproductive and growth rate which requires constant retreatment to control.

3) The continued reinfestation of our canals from the discharges of hyacinths from adjacent untreated areas.

The hyacinth, if left uncontrolled, will cut the flow in our large canals by over one-half, and even more in the smaller ones. They can and will jam on bridges and control structures so that flow is almost stopped. (See Plate No. III for an example of this.) Fortunately, we have a relatively inexpensive chemical, 2,4-D, which will control this aquatic. Without control of hyacinths it would be impossible for us to have an effective flood control project in south Florida.

The Flood Control District uses 2,4-D amine almost exclusively in its hyacinth control program. This is applied at a rate of 2 to 4 pounds of acid per acre. It is necessary to retreat the canals every month during the Summer months because the plant grows so fast during this period and the canals are continually being reinfested from adjacent untreated areas. The 2,4-D is generally applied from a boat by a portable pump powered by an air-cooled engine with a 30 - 55 gallon drum used as a supply tank. A single hose connects the outlet side of the pump to a nozzle hand-gun which has a regulator so that pressure may be increased or decreased as needed. The pressure ranges from 25 to 400 pounds per square inch. (See Plates Nos. IV and V). Spraying from the bank by truck and aerial spraying are sometimes employed for special conditions. (See Plate No. VI). Extreme caution must be used in the application of this chemical in areas where drift of the spray could damage crops and plants adjacent to the canal. No spraying is done on windy days. The District has been spraying in such areas for a good many years without damage or repercussions.

It is necessary at times to use mechanical means, such as dragline, to remove these aquatics during floods and pumping operations. Even with continued control spraying by the District we have found it advantageous to erect floating barriers in the canals at our pumping stations to prevent hyacinths from reaching the station trash racks. The aquatics are then removed by dragline from the canal. (An example of this barrier is shown on Plate No. VII).

The remaining floating aquatic which requires control by the Flood Control District is water lettuce. Water lettuce does not normally create too great a problem in water movement. It is slow growing in comparison to hyacinths and does not tend to jam against bridges and structures because of its smaller size. However, in extended periods of low or no flow in canals, it will eventually cover the canal to the point it does interfere with the flow of water. At the same time it is also a hazard to navigation, wildlife and insect control interest. We, therefore, find it necessary to spray it during these periods. This aquatic, until recently, was difficult to kill. 2,4-D had little effect on the plant. Through experiments carried on at the Plantation Experimental Station in Fort Lauderdale by the Crop Research Division of the U. S. Department of Agriculture, it was found that a new chemical, Diquat, had very satisfactory results in controlling water lettuce. The material is mixed with water and sticking agent and applied in the same manner as 2,4-D at a rate of 2 - 4 pounds of chemical per acre of lettuce.

There are three types of submersed aquatics which now present a serious control problem for the Flood Control District. They are Coontail, Elodea and Southern Naiad. These plants are most prevalent in the shallower canals constructed in rock

in Dade and Broward Counties. The plants have small stems which grow several feet in length and have small leaves which extend from the stem. They grow from the bottom of the canal and will, if uncontrolled, effectively block flow. Even in the larger canals where flow is not completely blocked, the weed will tear loose or break away and jam on bridges and structures in large mats which will block flow at these points. This type of aquatic still represents one of the most serious control problems for the Flood Control District. We have not as yet found any inexpensive or practical means of controlling these aquatics in canals as large as ours by the use of chemicals.

The Flood Control District is now using mechanical methods in an effort to prevent the interference with water flow. We have from time to time used dragline equipment with special cleanout buckets for this work. This method of removal is very expensive and slow, and the results are not satifactory; too much material is left in the canal, allowing it to reestablish in a very short period of time. We are now using another method of mechanical removal which we hope will give somewhat better results and is definitely much cheaper and faster.

The District has purchased an amphibious two and one-half ton truck which is being used to pull a heavy steel plow behind it and tear the aquatic loose from the canal bottom. The material then floats to a barrier placed in the canal where it is removed by a dragline. It is necessary to repeat this operation approximately every four months to keep the aquatics from affecting water flow. (See Plates No. VIII and IX).

Emersed aquatics, with the exception of alligator weed, do not present a serious problem to water flow in our canals. The canals appear to be sufficiently deep to inhibit the growth of this type of aquatic; thus prevent it from causing a noticeable decrease in flow.

Alligator Weed produces long stems about the diameter of your little finger which are vine-like and separated into short segments called nodes. Each node is about 1½ inches long. These appear much like a bamboo stalk. In the water these semi-floating stems extend 15 to 25 feet away from the bank. They branch and rebranch and send out upright shoots from the nodes and in time form a dense mat. Uncontrolled, they will eventually block canal flow. The mats also will at times break loose and float downstream to lodge on bridge, control structure or pump intake.

Fortunately, infestations of alligator weed in our canals were discovered early while they were small and isolated and before they had the opportunity to create a serious problem for us. We have been able to satisfactorily control this aquatic by spraying under water around the plant or mat a mixture of one-half a gallon of 2,4-D amine and one-half a gallon of aqua-herb in 50 gallons of water. This requires between 100 and 200 gallons of mixture per acre treated. It is also necessary for this mixture to remain in contact with the plant for at least 15 minutes to be effective. The retreatment of the alligator weed with the 2,4-D and aqua-herb mixture is necessary every 60 days to give proper control of the growth. We have found that surface spraying of the weed with the same mixture of 2,4-D as used on water hyacinths will aid in retarding the growth and spreading of the mats.

In some areas aquatic and ditchbank grasses have created some problems for us. Although they do not generally reduce the canal flow sufficiently to warrant treatment, they do provide a protected area for other aquatic weeds such as hyacinths, lettuce, to grow and make it difficult to spray them. In certain residential areas they are objectionable because of the unsightliness and the fact that they harbor snakes and rats. Two of the most common types found are Maidencane and Paragrass. These grasses have a sugar cane like appearance and grow several feet in height. They also will survive and grow in several feet of water if a portion of the plant can stay above the surface. Effective control of these plants is obtained by the use of dalapon at a rate of 8 - 10 pounds per acre. The best results can be obtained from two applications about 2 - 3 weeks apart. This treatment should be repeated every 3 - 4 months to control the growth. (See Plate No. X).

THE COST OF OUR AQUATIC WEED CONTROL PROGRAM

The cost of our aquatic weed control program is high. Approximately One Million Dollars ($1,000,000) has been spent since 1949 when the Project was started. It is not, however, excessive when you compare this cost with the investment made in improvements under this Project, more than One Hundred Twenty-nine Million Dollars ($129,000,000); and the benefits which are now and can continue to be derived from their full use. It is estimated that we can expect $4.00 returned in flood control and water conservation benefits for each dollar which will be spent over the life of the Project for construction and operation and maintenance; benefits which cannot be obtained without proper aquatic weed control.

Our annual cost of aquatic weed control has increased with each year of operation. This is due mainly to the annual expansion of the Project facilities. In the beginning it was only a few thousand dollars per year. Now we are spending One Hundred Thirty Thousand Dollars ($130,000) annually. Chemical costs alone now amount to $30,000 annually. This is on a Project which is about 30% complete. Allowing for an increase of 15% in costs as the canals grow older and the costs of living rise, we can reasonably expect an annual expenditure of One Half Million Dollars ($500,000) for aquatic weed control after the Project is completed.

THE FUTURE

We, of the Flood Control District, have an immediate need for an effective, inexpensive chemical means of controlling submersed aquatics in our canal systems. Our present mechanical methods of control are simply not adequate to our needs. At the present time, a research program is underway by the Crop Research Division of the U. S. Department of Agriculture in Fort Lauderdale in cooperation with the Flood Control District to test and develop new chemicals for this purpose and to also develop a feasible means of application. It is certainly our hope that a feasible, economical chemical treatment for these aquatics can be found in the next few years. We need a chemical which is:

1) capable of killing the plant on contact or at least requires a very short period of contact to do so. This would make it possible to saturate a very limited segment of the canal and allow this volume or slug of water to move down the canal and destroy the plant as it goes.

2) not harmful to the fish population in the canal.

3) able to retard the reestablishment of the aquatics in the treated area.

4) last, but not least, less expensive to use than our present means of control.

It is certainly our hope that new and better chemicals, equipment and methods will be found to aid us in our control program for all types of aquatics which cause problems.

I feel we can reasonably expect this result from the research and development programs now being carried out by both private chemical companies and public agencies such as the U. S. Department of Agriculture.

With the means now at our disposal for aquatic weed control, eradication is not practical or even possible. It is our hope that the future will bring some breakthrough which will make this dream of eradication a reality.

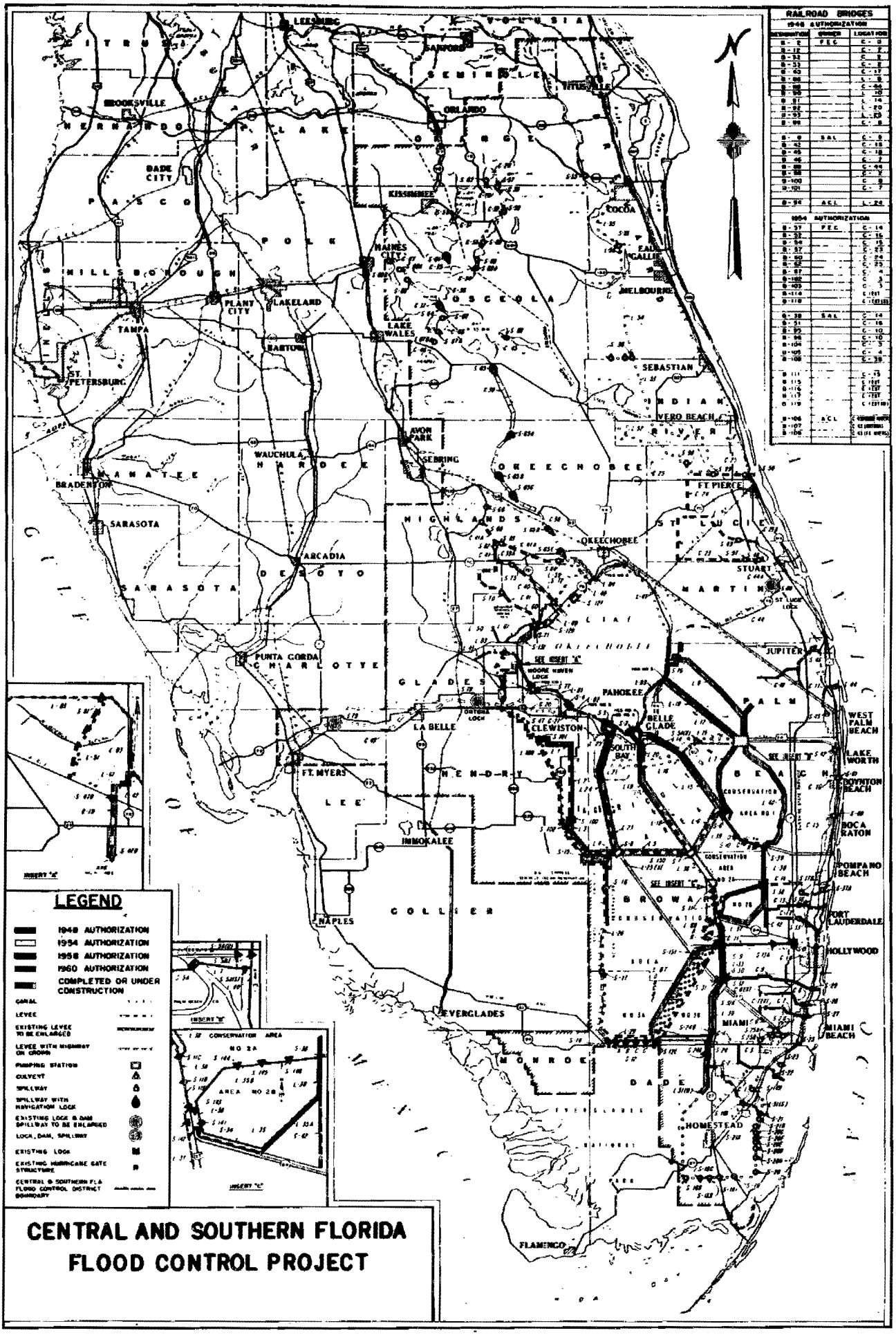


Plate No. I—Map of F. C. D., showing Project works

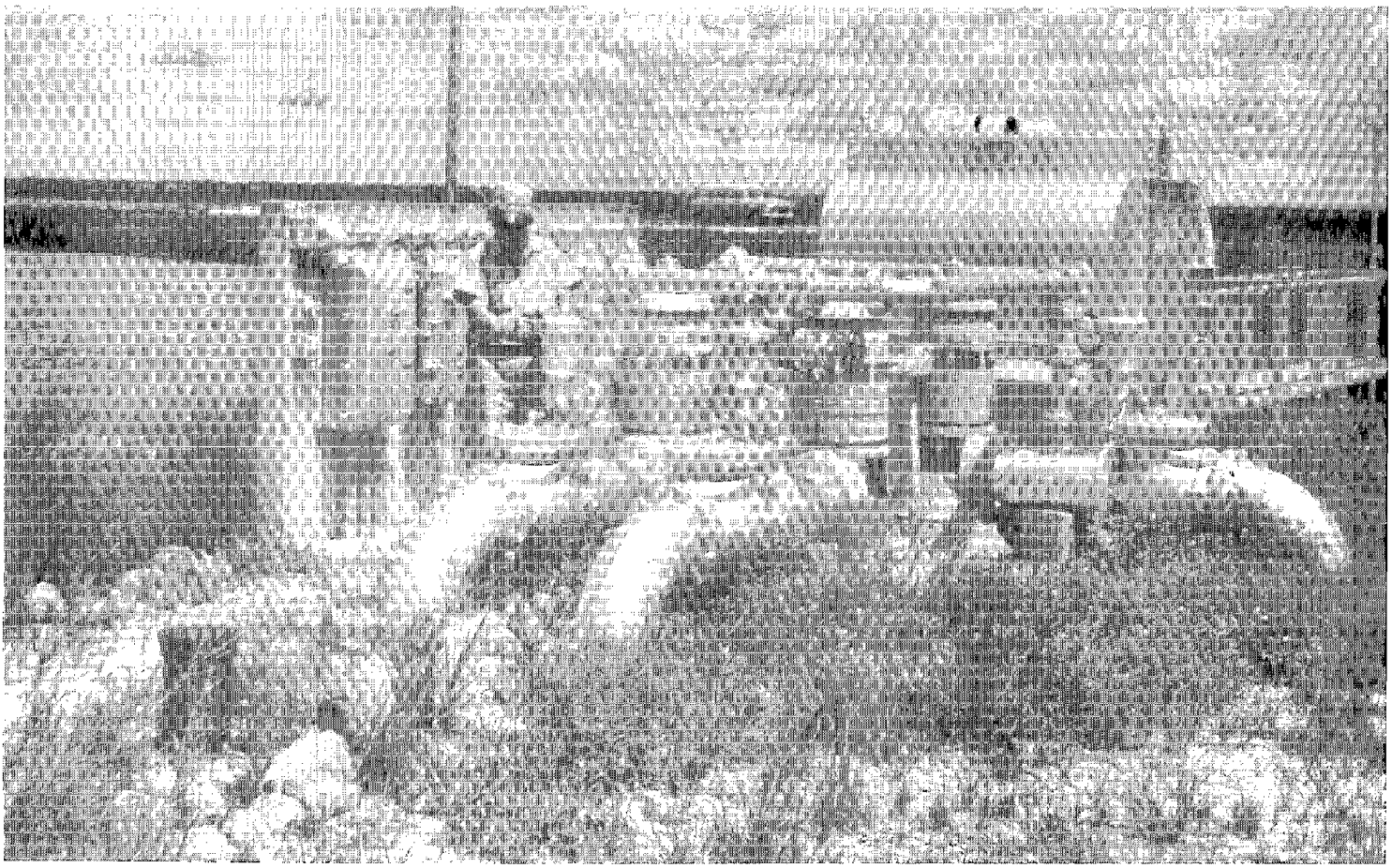


Plate No. II—Self-cleansing Intake Screen

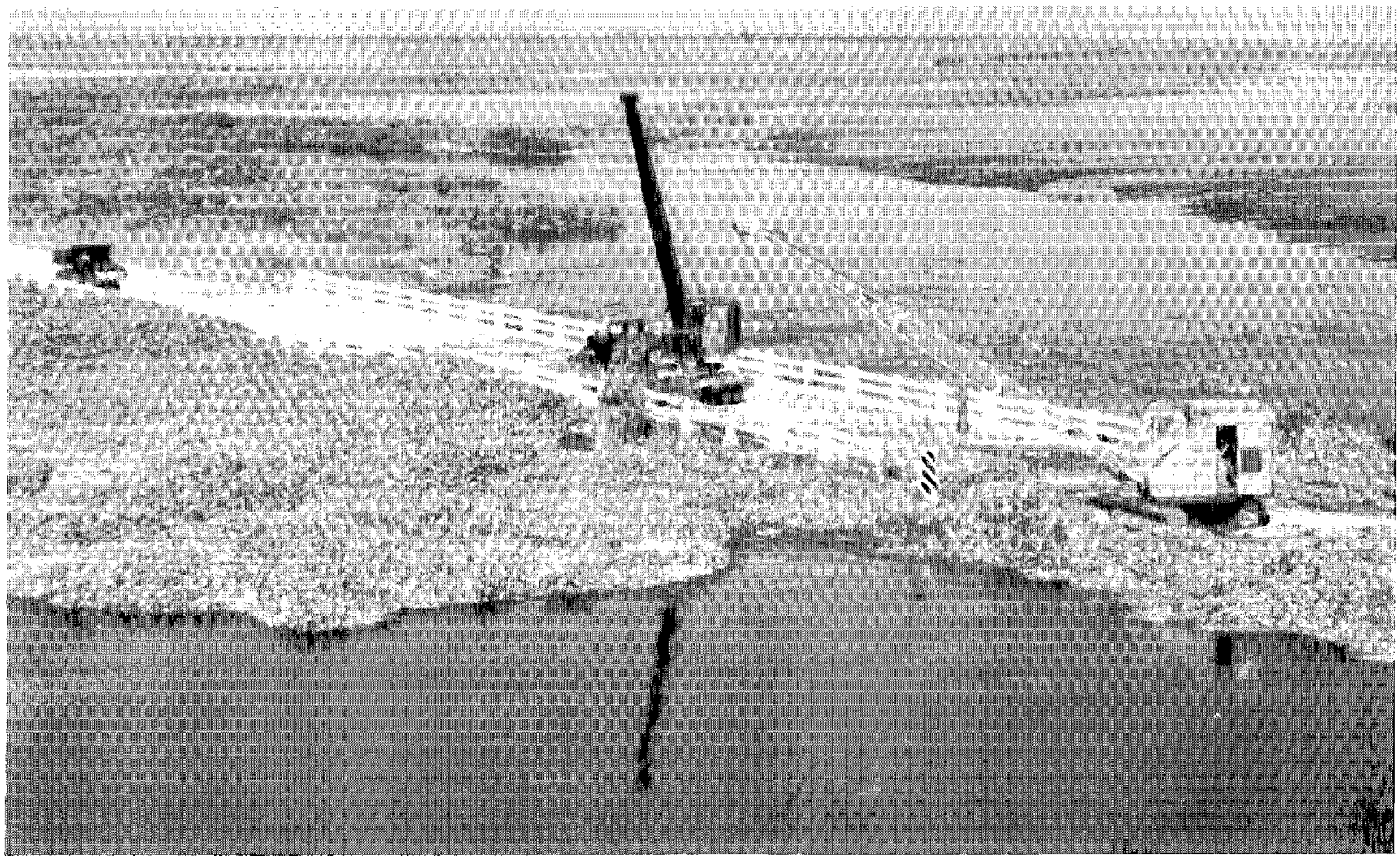


Plate No. III—Hyacinth Jam at Bridge

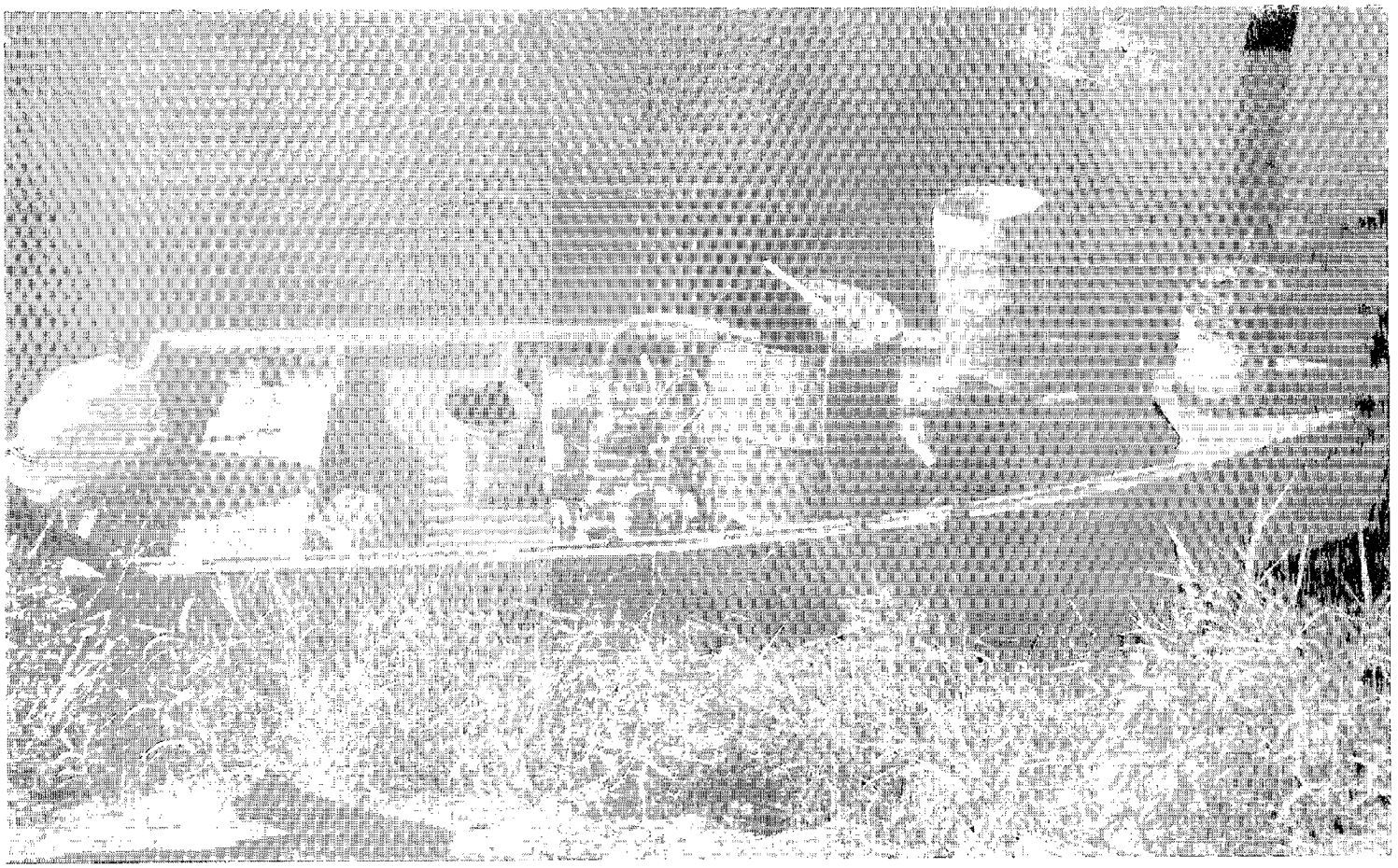


Plate No. IV—Equipment **Necessary for Hyacinth Control**

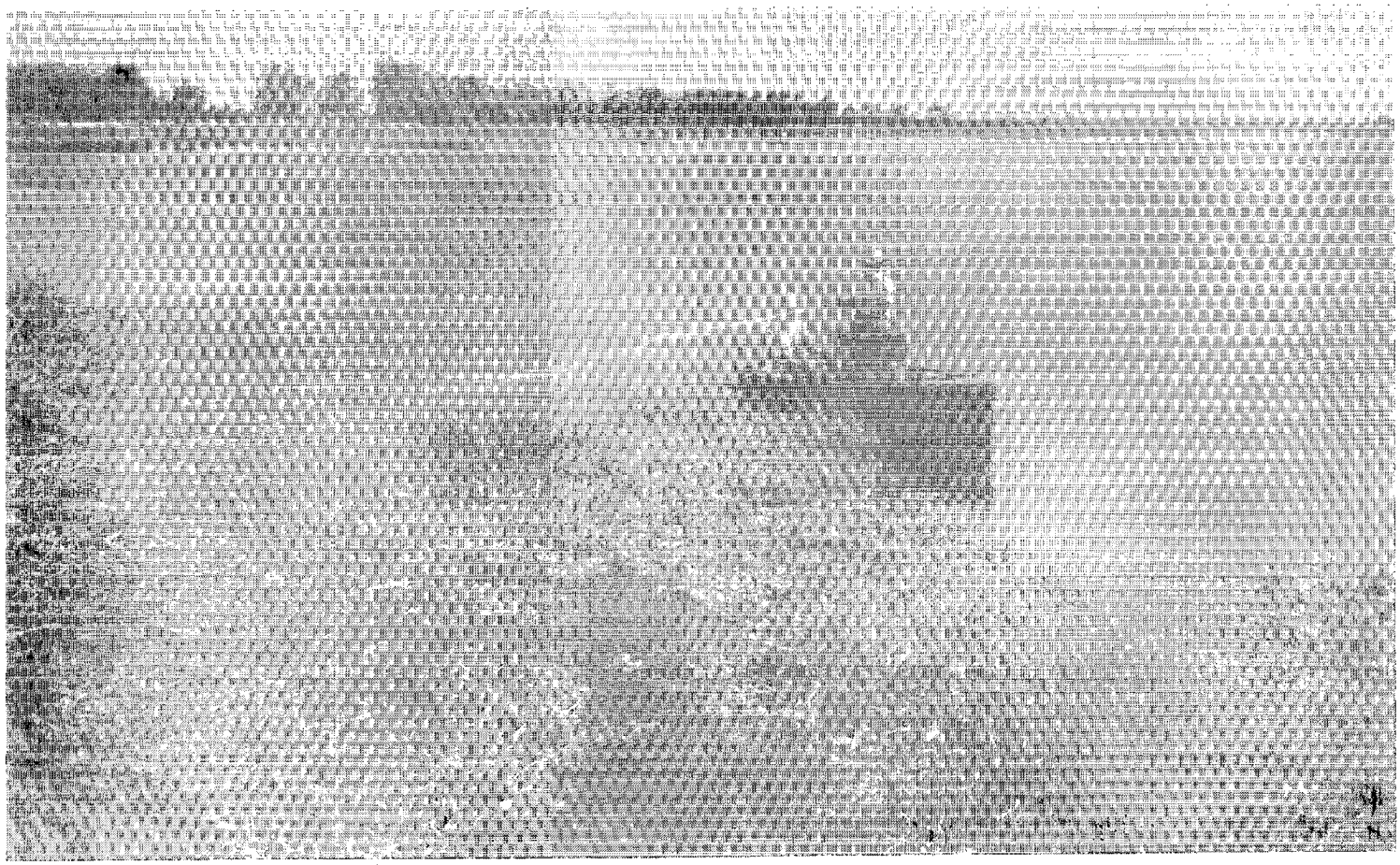


Plate No. V—Hyacinth Spray Crew in Operation

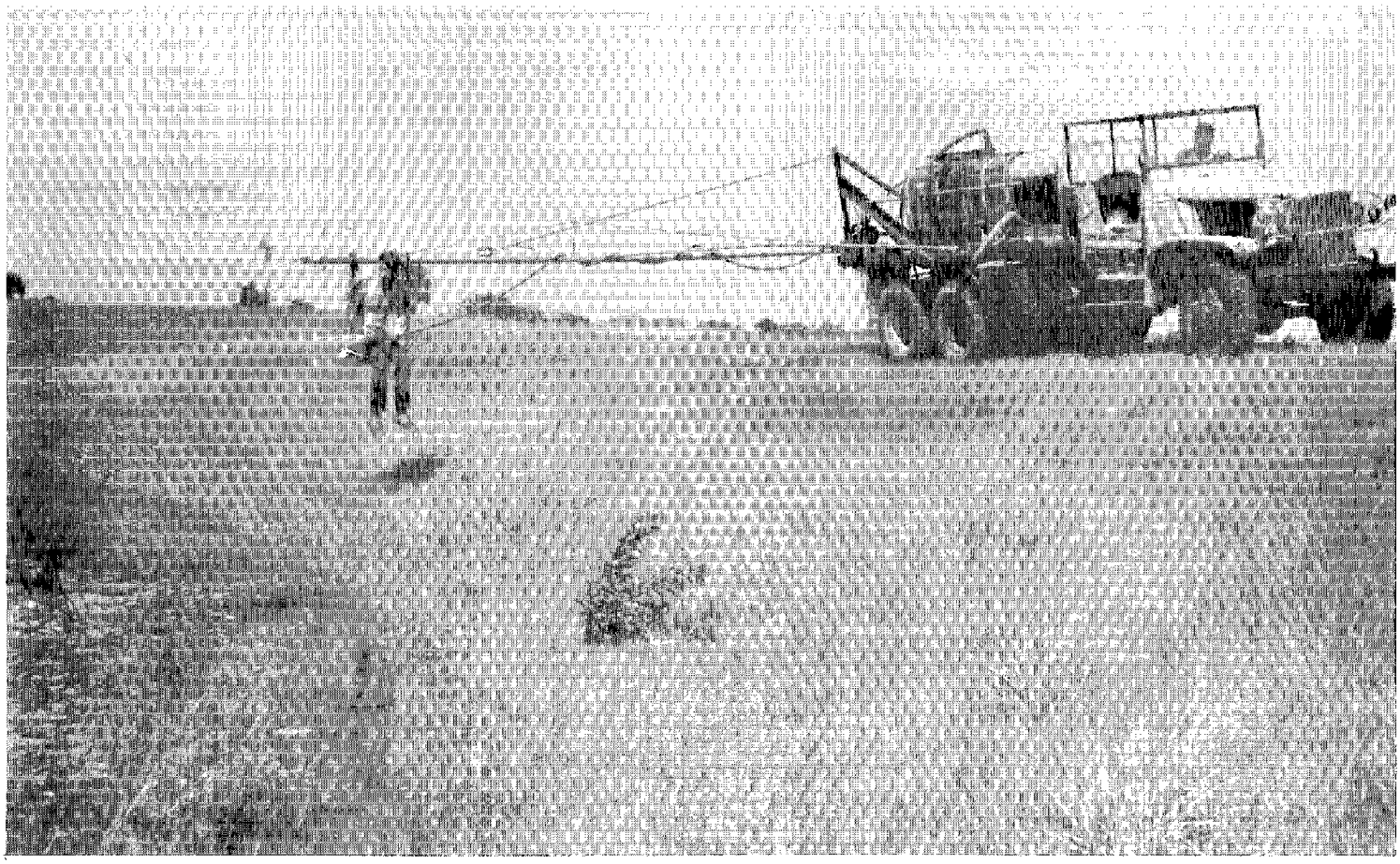


Plate No. VI—Aquatic Weed Control by Truck

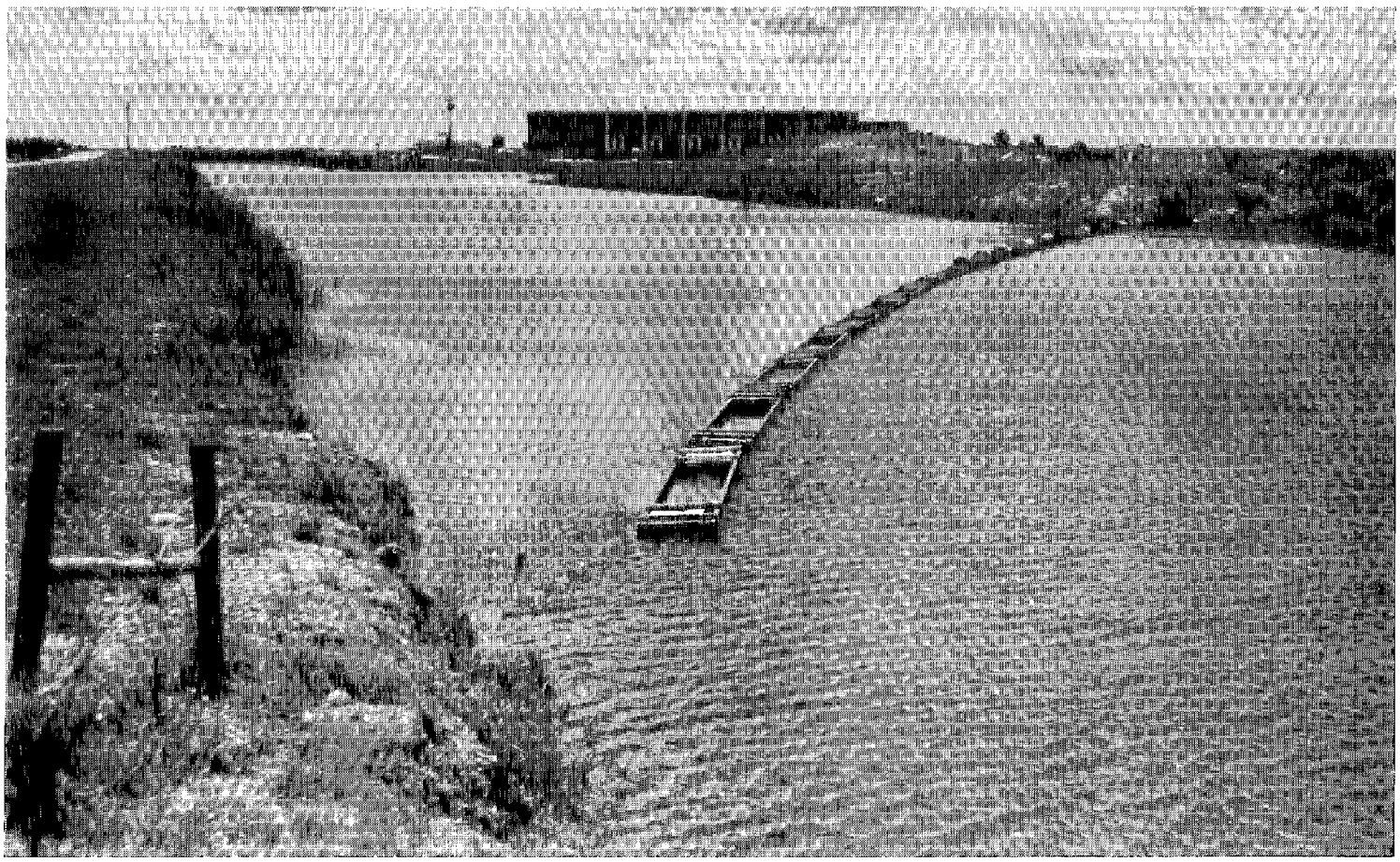


Plate No. VII—Floating Aquatic Weed Barrier

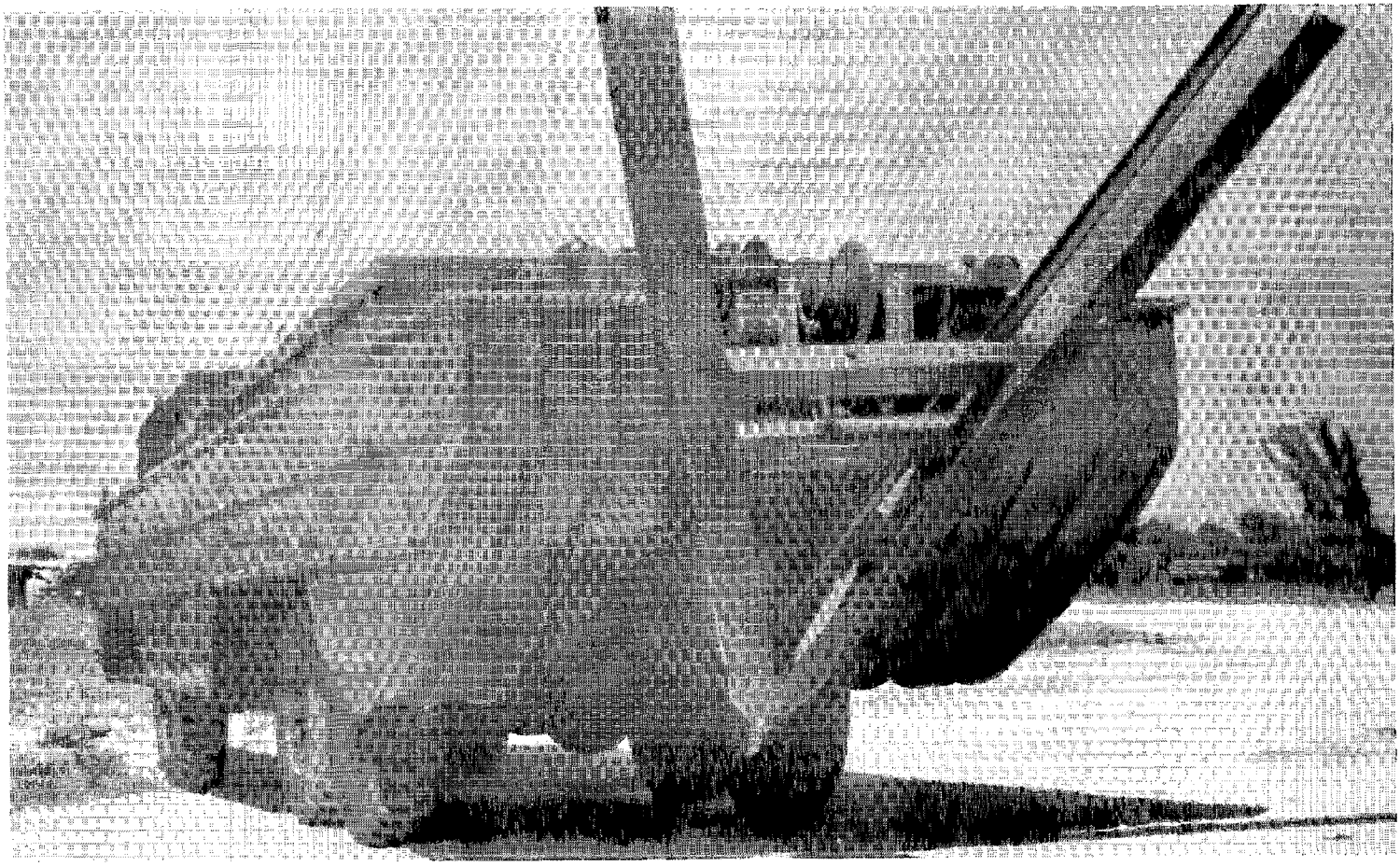


Plate No. VIII—Steel Plow Attached to Amphibious Truck

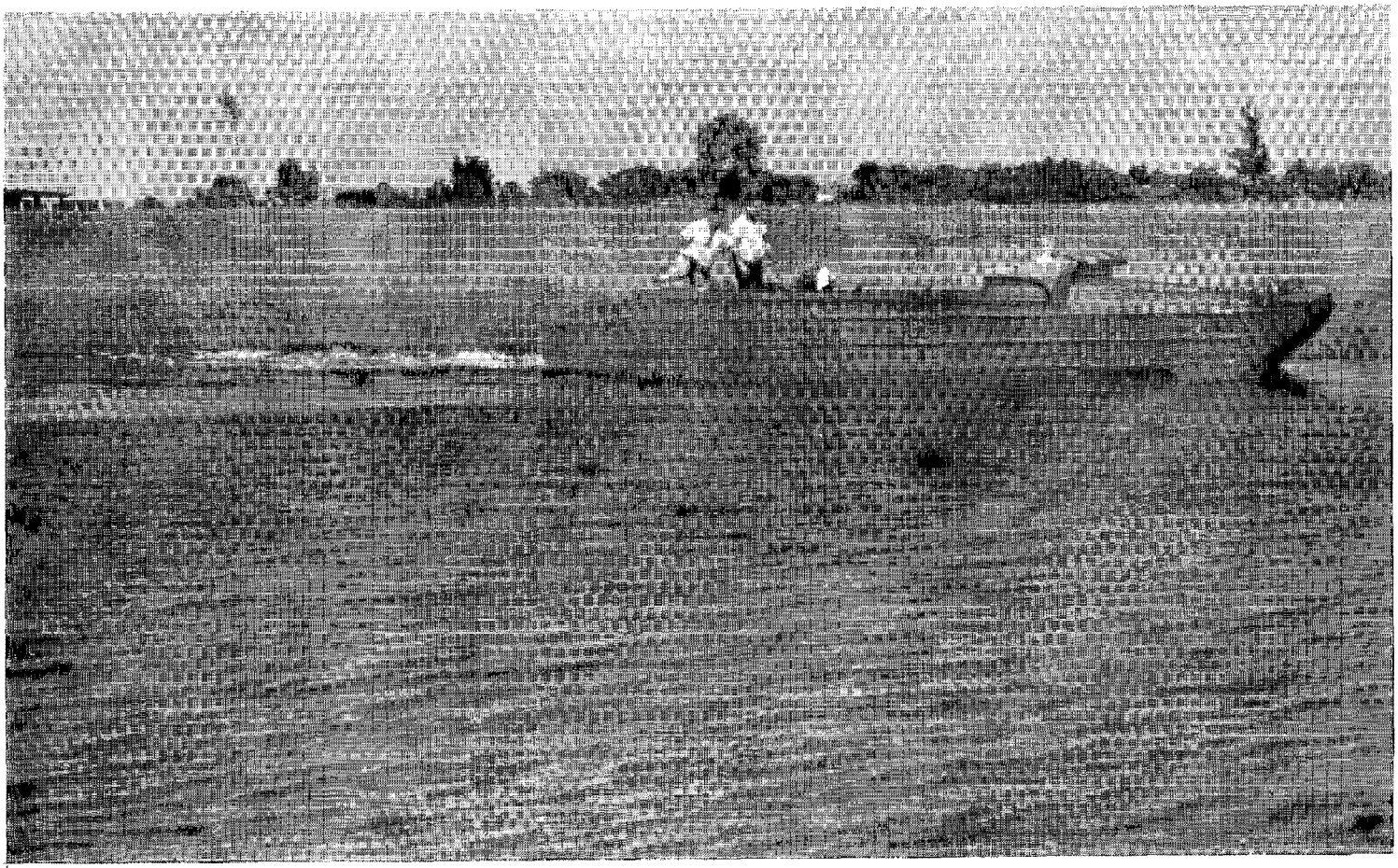


Plate No. IX—Amphibious Truck

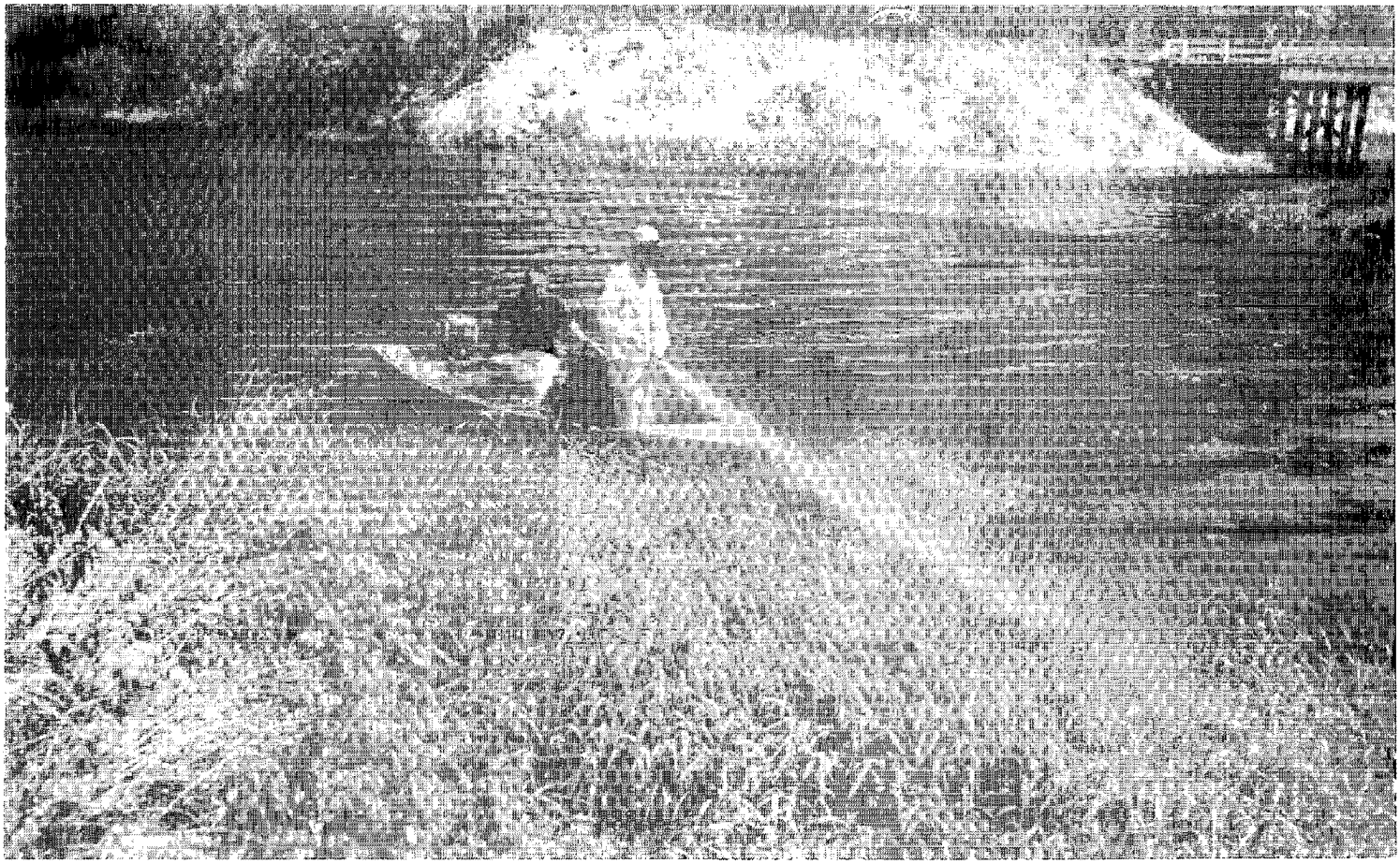


Plate No. X—Control of Bank Grasses by Spraying

Eichhornia crassipes Solms

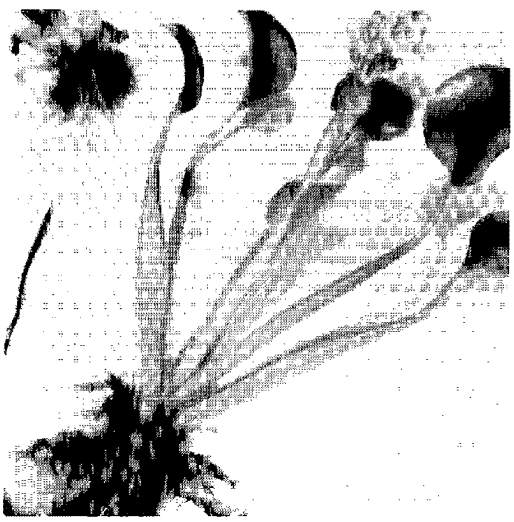
PONTEDERIACEAE

South American; naturalized in and often choking fresh waterways.

Aquatic herb; multiplying rapidly (three plants producing 3,000 in 50 days), forming a floating mass and sending long roots down to the bottom. Leaves roundish, 2 to 5 in. wide; leafstalk cylindrical with a basal, balloon-like swelling filled with light, crisp, spongy tissue. When rooted on muddy shore, stalks are straight and to 3 ft. high. Flower stem 5 to 16 in. tall, topped by showy spike. Flowers 1 in. wide, bluish-purple, 6-lobed, with upper lobe yellow in center.

Use: Young leaves, leafstalks and flower clusters may be thoroughly cooked and eaten. If eaten raw may cause itching, though a Miami doctor has reported that a lady patient liquefied water hyacinth leaves in her electric blender and partook of this regularly with no apparent harm.

Dr. Howard says the boiled flowers are gelatinous; the young inflated leaf bases, fried in deep fat, are "crisp like pork rind or popcorn."



EICHHORNIA CRASSIPES