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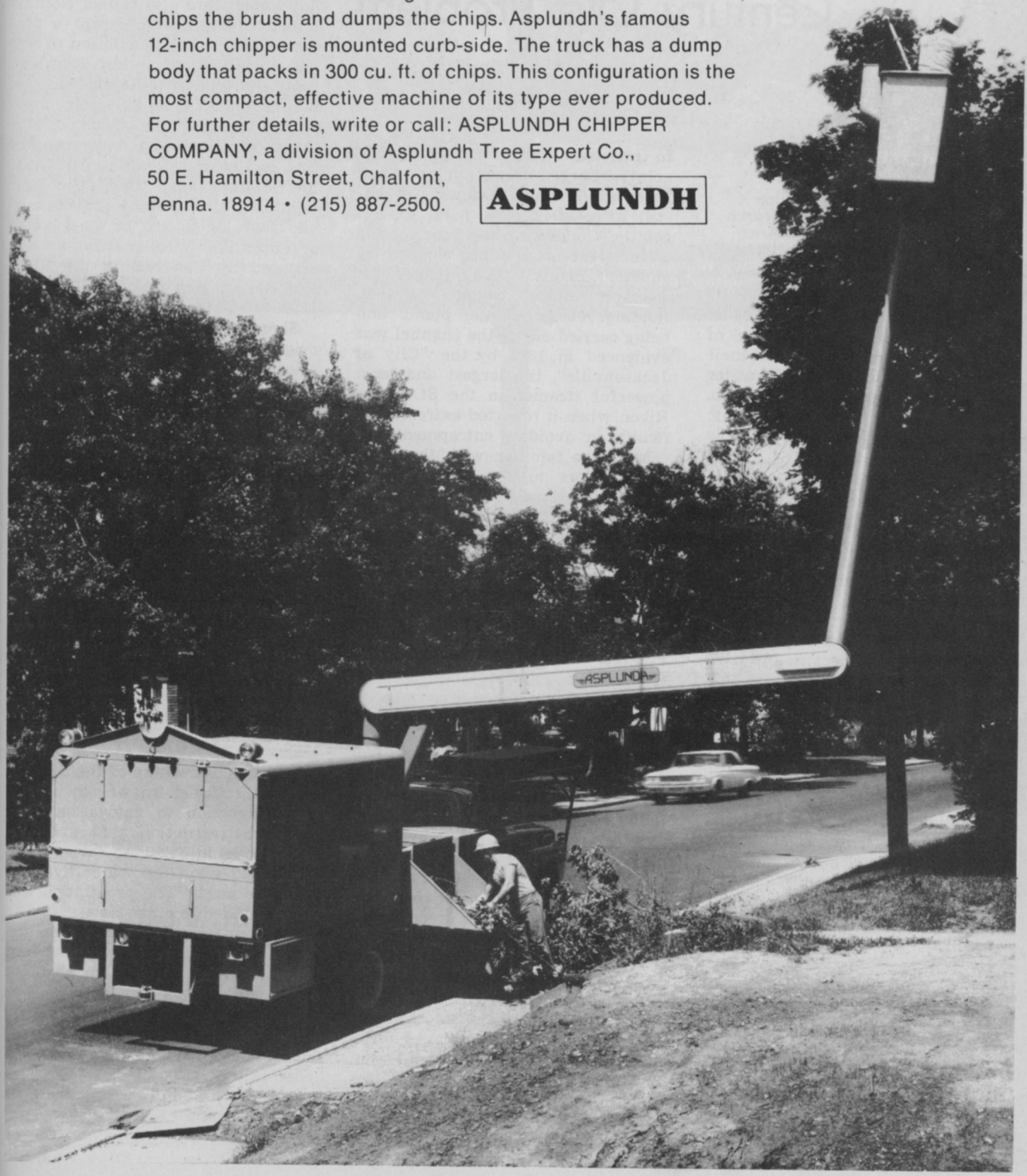


For More Details Circle (118) on Reply Card

Aquatic Weed History

Century Old Problem

By JULIAN J. RAYNES
Assistant Chief
Civil Land Planning Section
Environmental Engineering Branch
Engineering Division, U.S. Army
Engineer Division, South Atlantic

THE words "obnoxious aquatic plants" conjures up visions of waterways, rivers, streams, and their tributaries, all choked with water hyacinth, alligatorweed, Hydrilla, Eurasian watermilfoil and many, many other species of undesirable aquatic plants.

The vision would not be complete if we did not include the many boats and barges stuck in the vegetation and moving with vegetation as directed by the wind; or the flood waters which are being retained on land areas because floodways are choked with aquatic vegetation; or the agricultural crops suffering extensive damages because of the lengthy periods of flooding resulting from clogged drains choked with aquatics; or the untold losses to wildlife and fisheries as a result of coverage of open waters and blanketing of marshlands by obnoxious plants; or the reduced flows of life giving water in choked irrigation ditches. We must not forget these visions because they can become reality again in short order if neglected.

We are a nation subject to cause and effect. The history of aquatic plants or weeds in the Southeast is the result of cause and effect. In 1896, the large masses of water hyacinths in the St. Johns River in Florida and some of the main rivers in Louisiana created serious navigation problems and the Congress was made aware of the problem. It was reported that small boats with screw propellers found it impossible to penetrate large masses of hyacinths. Large steamers going at full speed would come to almost a standstill after striking a bank of hyacinths. Condensers used for cooling water were often times clogged by aquatic plants. The danger of steamers being caught between floating masses of the plants and being carried out of the channel was evidenced in 1896 by the "City of Jacksonville", the largest and most powerful steamer in the St. Johns River, when it reported extreme difficulty in avoiding entrapment.

Most are familiar with the story that visitors to the New Orleans Centennial Exposition in 1884 carried the beautiful hyacinth to their homes where it flourished. One document relating to Florida states that as nearly as can be learned, water hyacinths were first introduced into the St. Johns River about 1890 at Edgewater about four miles above Palatka. Within six years, the problem became so acute that the War Department was asked to investigate the situation.

In accordance with Congressional authority, a Board of Officers was appointed in 1897 for the purpose of investigating the extent of obstructions to navigable waters of Florida, Louisiana, and other states by water hyacinths and performing such experimental work as necessary to determine a feasible plan for removing such obstructions. The records of that Board state that one of the members, when in charge of certain river and harbor work in Louisiana some 20 years previously, had observed the plant and its peculiarities and that it was then believed to be flourishing in the Atchafalaya Basin. This would place water hyacinth as flourishing in Louisiana about 1877 which is six years before the New Orleans Centennial Exposition!

Engineers of the U. S. Army Engineer District Office, then located in St. Augustine, Florida, recommended the construction of a mechanical crusher boat. The Board of Officers adopted this recommendation and further advised the use of log booms as an adjunct and suggested utilizing nature by drifting the plants out to sea.

The Board also conducted the earliest known chemical tests for control using muriatic, sulfuric and even carbolic acids. Kersosene and hot water were also tested. Nothing effective was found except a prohibitively expensive solution of salt and quicklime which destroyed both roots and tops in 48 hours. This cost was estimated to be $100 per acre.

Subsequently, the Chief of the Corps of Engineers recommended that two crusher boats be built, one for Florida and the other for Louisiana at a cost of $25,000 each and that log booms be used as an adjunct. The recommendation was adopted by Congress in the River and Harbor Act approved March 3, 1899.

Shortly after the adoption of the original project, a mechanical crusher boat was constructed; however, in 1902 the crusher boat was abandoned because of its inability to cope with the rapid rate of spread of the plant and the demonstrated need for destruction of far greater capacity. In the meantime, the value of sodium arsenite for killing these plants had been demonstrated and since it appeared to offer the extra capacity needed it was adopted for use.

Sodium arsenite was used for hyacinth control even though it was known to be toxic to man and animals. As a result of protests by cattlemen in Florida, the River and Harbor Act approved March 3, 1905, in appropriating funds for "the removal of the water hyacinths from the navigable waters of the State of Florida, so far as it is or may become an obstruction to navigation", imposed the restriction "that no chemical process injurious to cattle which may feed upon the water hyacinth shall be used." The prohibition was not extended to other states.

The un-retouched photos on the next page give a good idea of how aquatic weeds plagued our southern waterways during the early part of this century.

Records indicate that 23 chemicals were tested in 1906 in the search for chemical control. These included:

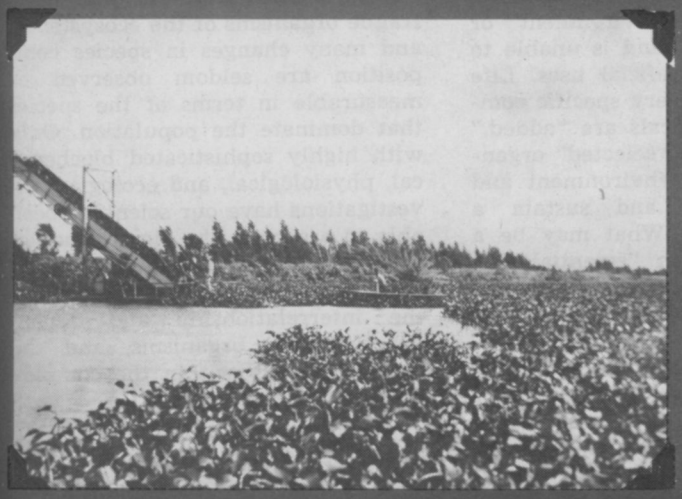
1. London purple
2. Arsenite of lime

(continued on page 22)

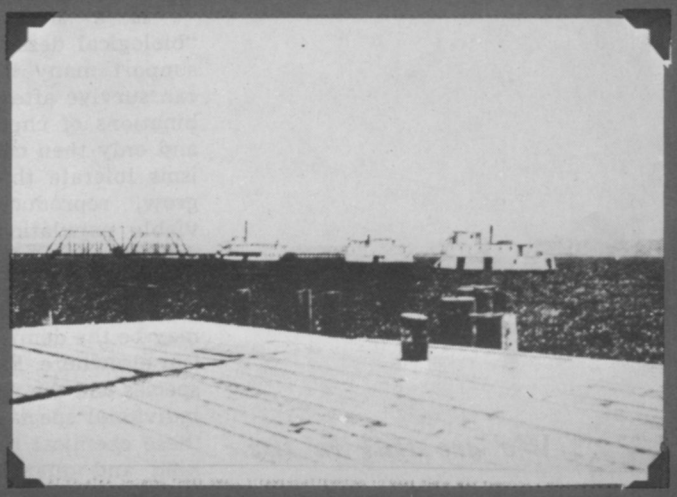
the good ol' days

Hyacinth conveyor No. 3 operates in the St. Johns River near Sanford, Fla. in September 1940.

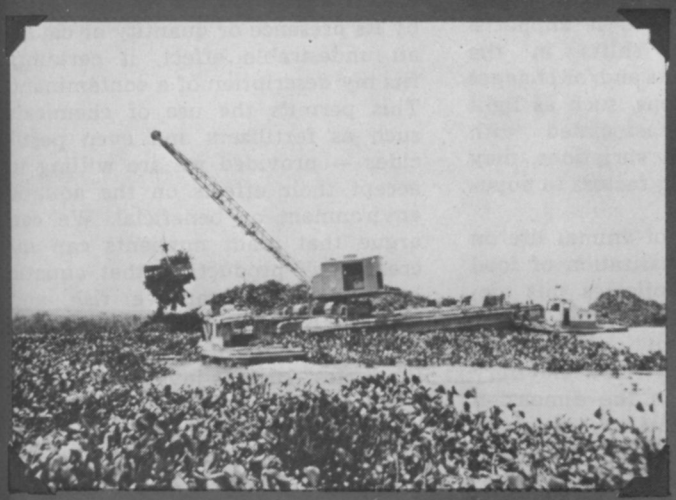
This photo taken on the north fork of the St. Lucie River shows a crane depositing hyacinths on the riverbank.



Removing hyacinths with a conveyor in the Hillsboro Canal in the late 1930's.



Three small steamers try to chart a course through hyacinths. The foreground of this un-retouched photo, taken around 1900, is the bridge at Palatka.



In 1927, equipment like this was used to remove hyacinths from navigation channels.

Hyacinth destroyer at work in Arbuckle Creek

Modern Biocides – A New Dimension To Water's Complex Environment

by DR. CHARLES R. WALKER
Chief, Branch of Pest Control Research
Division of Fishery Research
Washington, D. C.

. . . . We are still in the "cave man era" and our management tools are as crude as the stone axe or use of fire . . . .

WATER alone, without chemicals, is a sterile environment or "biological desert" and is unable to support many beneficial uses. Life can survive after very specific combinations of chemicals are "added," and only then can "selected" organisms tolerate this environment and grow, reproduce, and sustain a viable population. What may be a needed level of an "essential element" or "chemical condition" to one organism in one geographic location may be the demise of another organism elsewhere. Even the diversity of species and the population density of individual species vary according to these chemical constituents, both in kind and quantity, within specific ranges in concentration.

Thus, a critical relationship in the chemical character of water exists at all times with respect to both the plant and animal life it supports. Small, temporary shifts in the chemical constituents and/or changes in physical conditions, such as light and temperature associated with diurnal or seasonal variations, may pose serious limiting factors to populations.

The dependency of animal life on plant life and specialization of food habits further complicates this picture of the aquatic ecosystem.

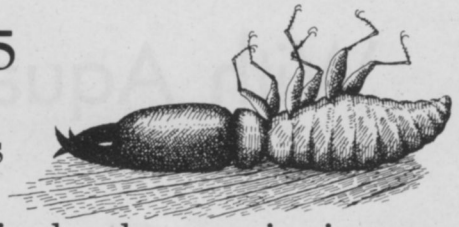
The development of modern biocides has brought a new and very important change in the dimension of chemicals and their potential effects on the aquatic ecosystem—both for beneficial and harmful consequences. If the contaminates are toxic and persistent, they can create havoc, particularly on the more fragile organisms of the ecosystem—and many changes in species composition are seldom observed or measurable in terms of the species that dominate the population. Only with highly sophisticated biochemical, physiological, and ecological investigations have our scientists been able to ascertain the significance of the chemicals and effects on each species, the community microcosms, the interrelationship and dependence among organisms, and the flow of energy within the complex aquatic ecosystem.

What then is a contaminate of the aquatic ecosystem? There are probably as many definitions as contaminates. Webster's definition suggests *to make impure, unclean, pollute, corrupt, complete befoulment or decay.* If a substance is "out of place" by its presence or quantity or causes an undesirable effect, it certainly fits my description of a contaminant. This permits the use of chemicals such as fertilizers and even pesticides — provided we are willing to accept their effects on the aquatic environment as beneficial. We can argue that plant nutrients can increase fish production, that aquatic herbicides can improve fish and wildlife habitat, that certain pesticides can control "biological contaminates" such as invertebrates and vertebrates that are nuisance species, disease vectors, unwelcome competitors, or parasites. We feel justified in their use to provide better fish, hunting, and aesthetic qual-

(continued on page 24)

Shell P.C.O. Products.
The line the bugs fall for.

Aldrite® 4 and Dieldrite® 1.5

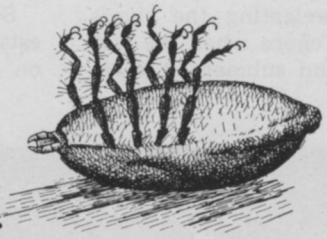


Insecticides were proven superior by university tests of Shell's termiticides. The tests proved conclusively that Shell's Aldrin is clearly superior in performance to all major competitive products for subterranean termite control. Second only to Shell's Dieldrin.

Akton® 2 Insecticide controls chinch bugs in turf for up to eight full weeks, rain or shine.

At 1¼ lbs. per acre, competitively priced Akton keeps turf green for up to ten full weeks.

Gardona® 75 Insecticide is tough on ticks. It controls them for up to nine full weeks with a surprisingly low order of toxicity to fish and mammals. Gardona can be applied with air or ground equipment.



Vaponite® 2 Insecticide rapidly reaches out and kills the toughest roaches. Vaponite's Vapona Insecticide vapors spread out into little nooks and crannies flushing roaches out and killing them rapidly.

Shell does a better job.

SHELL

How We Reduced Drift With Aquatic Herbicides

By VERNON MEYERS
Coordinator
Aquatic Weed Section
Florida Game and Fresh
Water Fish Commission

MY primary interest in fighting water weeds is the fish and wildlife aspect of it. We need *some* weeds for our fish but we can't let the plants get out of hand. Some of these weeds down here take over so fast, they choke up the waterways before you hardly know it.

Then, too, navigating the rivers can be a tough chore when the water hyacinths and submerged vegetation have taken over—not to mention what it can do to skiing, swimming, and helping to build mosquito populations.

That's why all of us aquatic weed specialists stay so busy looking for new and better ways to keep our waters weed-free.

Something that especially interests me is anything that cuts down on herbicide drift, even though we haven't had any big problems with that in the past. Unfortunately, the drift problems that have plagued the phenoxies since their introduction nearly 30 years ago continue to be a real worry, especially to people spraying rights-of-way. Drift from a right-of-way to nearby sensitive crops can do plenty of damage.

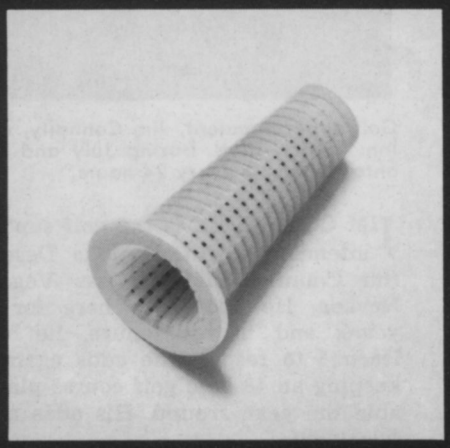
Concern with drift was why we

(Continued on page 48)

A small motor which operates from the 12-volt battery on the air boat, above, drives the Directa Spra unit. Arc of the spray pattern can be adjusted to 90, 180 or 360 degrees.

Directa Spra in action. Notice that the spray pattern is "wheel" shaped. Herbicide passes through the control box to the hub of the unit where it enters eight tubes which make up the delivery section. Nozzles may be attached to the tubes.

Why we spent $25,000 to develop a 10¢ grit screen.



It's a small thing. A plastic screen designed to fit under a spray head. Small. But important. Because all water contains debris. And debris will clog small nozzles and spray heads.

No matter what kind of spray heads you're using, you can use our filter. And it only costs a dime. Money well spent on a product nobody else offers.

But then, nobody else offers what Rain Bird offers. No one else makes the world-famous Rain Bird impulse sprinkler head. We've sold millions, and most of them are still working as well today as the day they were installed.

With that kind of record, it's no wonder we're the world's leading manufacturer of sprinklers for agricultural, commercial, golf course, and residential needs.

Our 10¢ grit screen tells a lot about a company as big as we are. To get big, and stay big, you've got to sweat the small stuff too.

RAIN BIRD®

GLENDORA, CALIFORNIA 91740

Even In Las Vegas . . .

You Can't Gamble With Turf

Golf superintendent, Jim Connally, checks the condition of the turf at the Desert Inn Country Club. During July and August he pumps a million gallons of water onto the course every 24 hours.

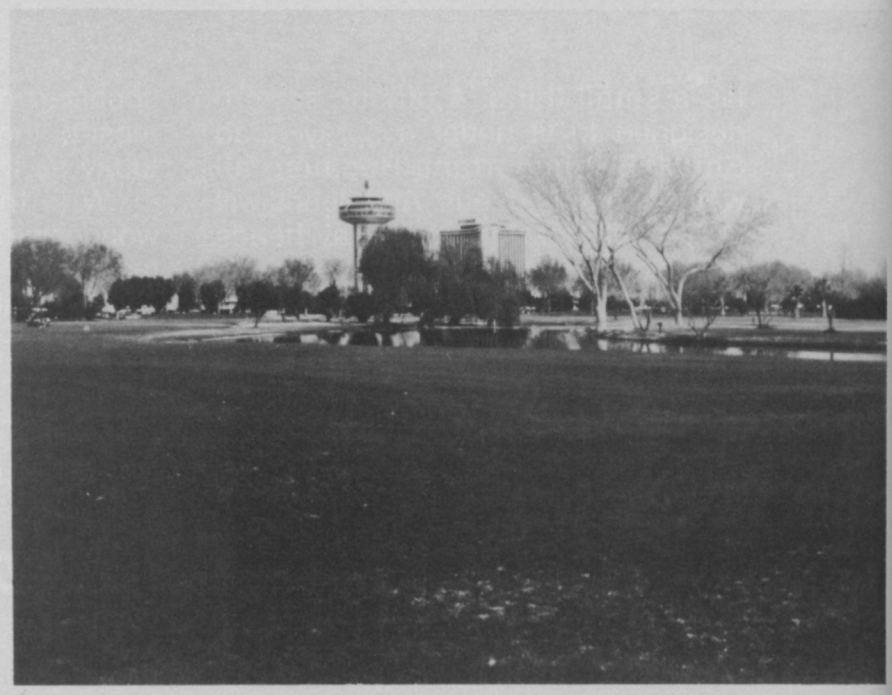
JIM CONNALLY is the golf superintendent at the famous Desert Inn Country Club in Las Vegas, Nevada. He has been there for 3 years, and in his tenure, he has learned to respect the odds against keeping an 18-hole golf course playable the year around. His odds are formidable.

To begin with, the climate is against him. He has measured ground temperatures up to 126 degrees F. in July and August. During these months, he isn't surprised to find the thermometer bouncing around the 100 degree mark at 6 a.m. During the milder winter period at Las Vegas—January and February—he may encounter a temperature of 20 degrees at dawn, and on the same day see it shoot up into the high seventies.

To complicate the picture, there

(continued on page 34)

Weed control is a big problem during the year for Jim Connally. Heavy player traffic on the course and a dry climate is an open invitation to crabgrass and goosegrass. This superintendent uses Dacthal, a broad-spectrum herbicide to control these problems.



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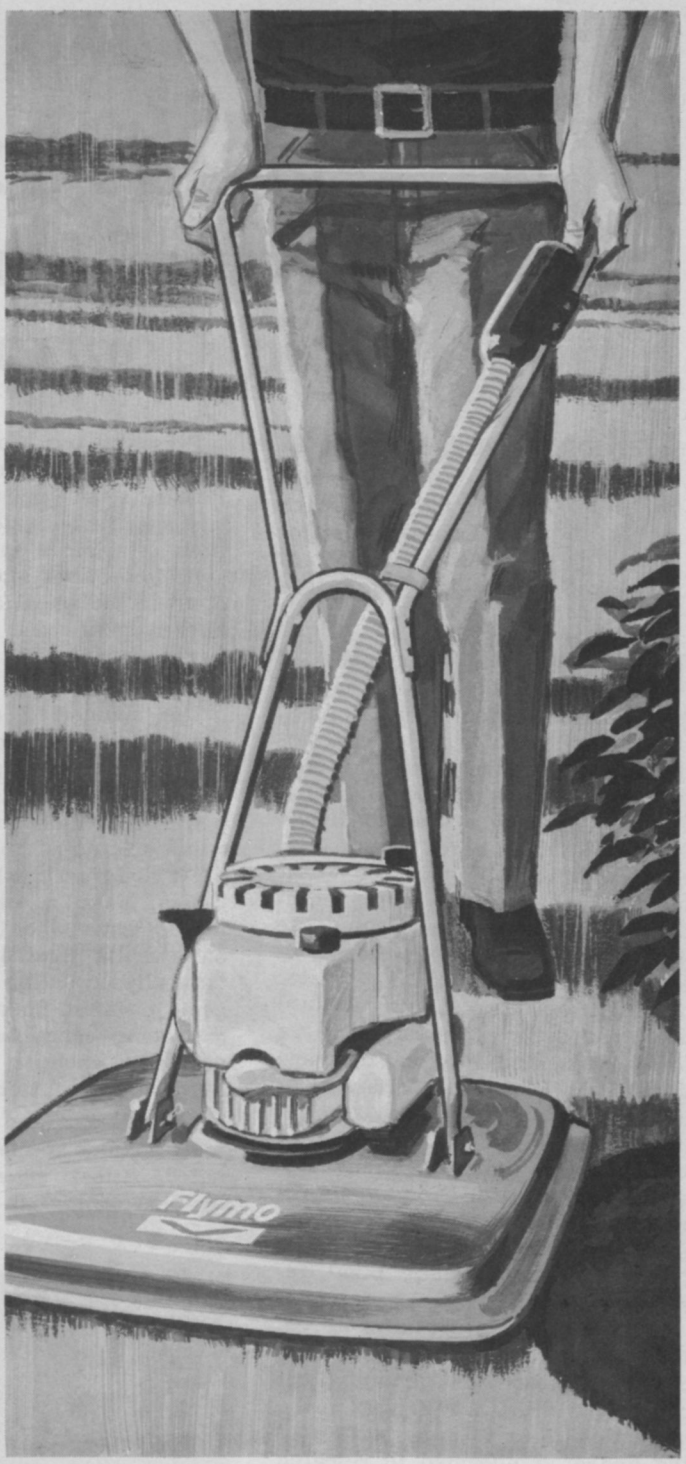
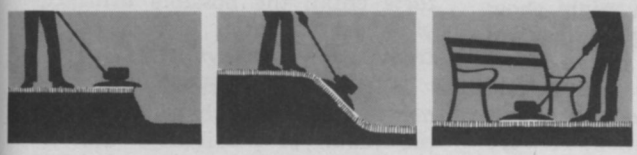
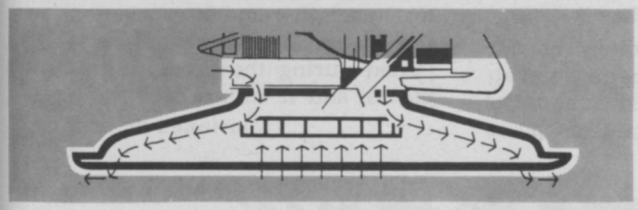


FLYMO FLOATS—TRIMS CLEAN AND CLOSE



Edgings, traps/Steep inclines, bunkers/Under benches, close to trees.



The Flymo impeller sucks in air and presses it to the edge of the hood covering the cutting blade. An air cushion is formed, lifting the machine and making it float. Under the cutting blade the upward return airstream raises the grass so that it is cut to the same height.

Proven in golf-course and institutional grounds maintenance throughout the world, the Flymo rides on a stable, controllable cushion of air, making the irregular maneuvers of trim and clean-up work faster and easier than ever before. And without scalping. No wheels to limit direction of movement or height above ground. Deep and wet grass no problem. Cutting height easily adjustable from less than ½" to 2½" or higher. Flymo 19" and 21" models with 4 and 5 hp motors. A nation-wide network of distributors and dealers stands behind your Flymo machine with prompt, dependable service.

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Florida's $2.8 Million Aquatic Plant Research And Control Program

By DR. ALVA P. BURKHALTER
Coordinator
Aquatic Plant Research
and Control, Dept. of
Natural Resources
State of Florida, Tallahassee

THE FLORIDA Department of Natural Resources, Bureau of Aquatic Plant Research and Control, like many other agencies and individuals, is dedicated to the control of noxious aquatic weeds in Florida waters. Conservatively, 200,000 to 300,000 acres are infested, thus rendering many of our water bodies useless. Recreational activities, such as boating and fishing, are hampered. Efficiency of potable water reservoirs is declining. Water qualities, resulting from natural death and decay of the aquatics, are threatened, sand clogged drainage ditches pose potential flooding problems.

Last year the Florida legislature bolstered the Aquatic Plant Research and Control Program by directing $2.8 million of the boat registration fees and gasoline taxes for spending in aquatic plant research and control.

Currently the program is threefold: research, matching funds and control. Research in aquatic plant control has drastically lagged in the past; therefore, a large portion of the budget is allocated to research needs. At present our control efforts entail biological, mechancial and chemical systems. Current research projects sponsored or co-sponsored by the Department of Natural Resources include:

Utilization of the white amur (a herbivorous fish) as a potential tool is presently underway. Determination of the effectiveness of the amur as a biological control agent at various stocking rates, observation of the aquatic plant preference of the amur on water quality, and influence of the amur on other fish and invertebrate organisms are some of the areas under investigation.

Presently our most effective biological tool has been insect attack. Release sizes for insects and mites host specific on water hyacinth have been established in order to study subcolonization and establishment of these biological agents. Then the effectiveness, and factors which might enhance or reduce their effectiveness will be evaluated.

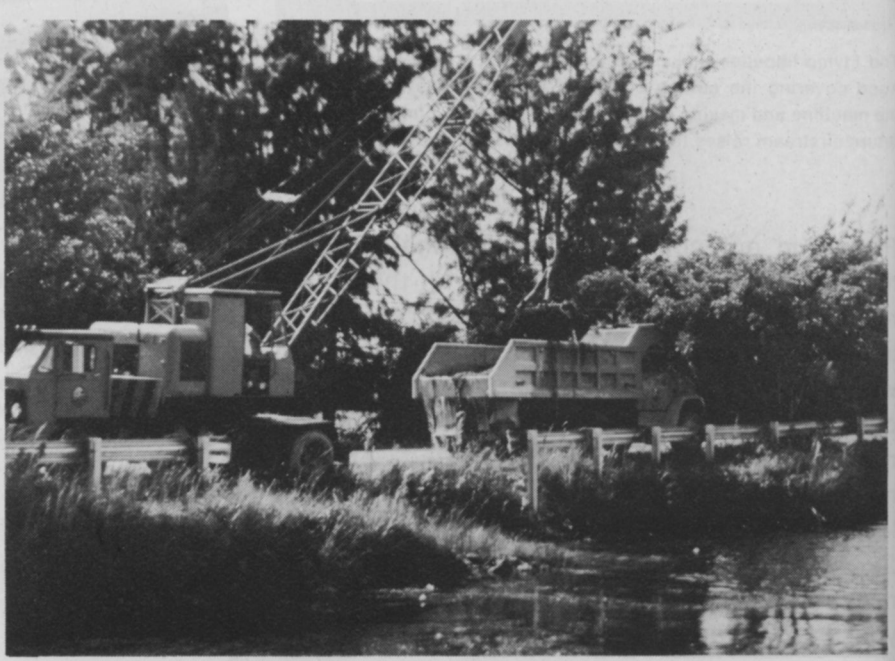
The submersed aquatics, particularly hydrilla, are fast becoming perhaps our worst problem. Studies are underway to establish the native home of hydrilla, its worldwide distribution, and pathogens, insects and other arthropods which might show potential as a biological control agent. Travels to the native home of hydrilla hopefully, will reveal naturally occurring insect or pathogenic enemies. In addition, surveys are being conducted for naturally occurring enemies of hydrilla and *Myriophyllum* in Florida.

The biology and ecology of our most noxious species are to be evaluated. Attack on noxious aquatics by microbiological organisms poses another potential tool. Such possible attack is under investigation. Also, a survey for compounds which occur naturally in plants and may retard susceptibility to attack is underway. By reducing these natural compounds, the plants would thus be more susceptible to attack.

The Department of Natural Resources is designing and building a high capacity mechanical harvester for water hyacinth to be stationed on the St. Johns River. A crimper-type hyacinth harvester is also under investigation. Other research efforts entail the possible utilization of these aquatics once removed from the waterways.

Is the future printing on paper made from water hyacinth beyond the realm of possibility? Can hyacinths be used as a soil amendment and source of plant nutrients? Water hyacinth remove nutrients from the water. Are these nutrients retained during the processing of the plants, and if so, are the plants ac-

(Continued on page 37)



Mechanical control of aquatic plants is presently used in many areas where other means are not feasible.