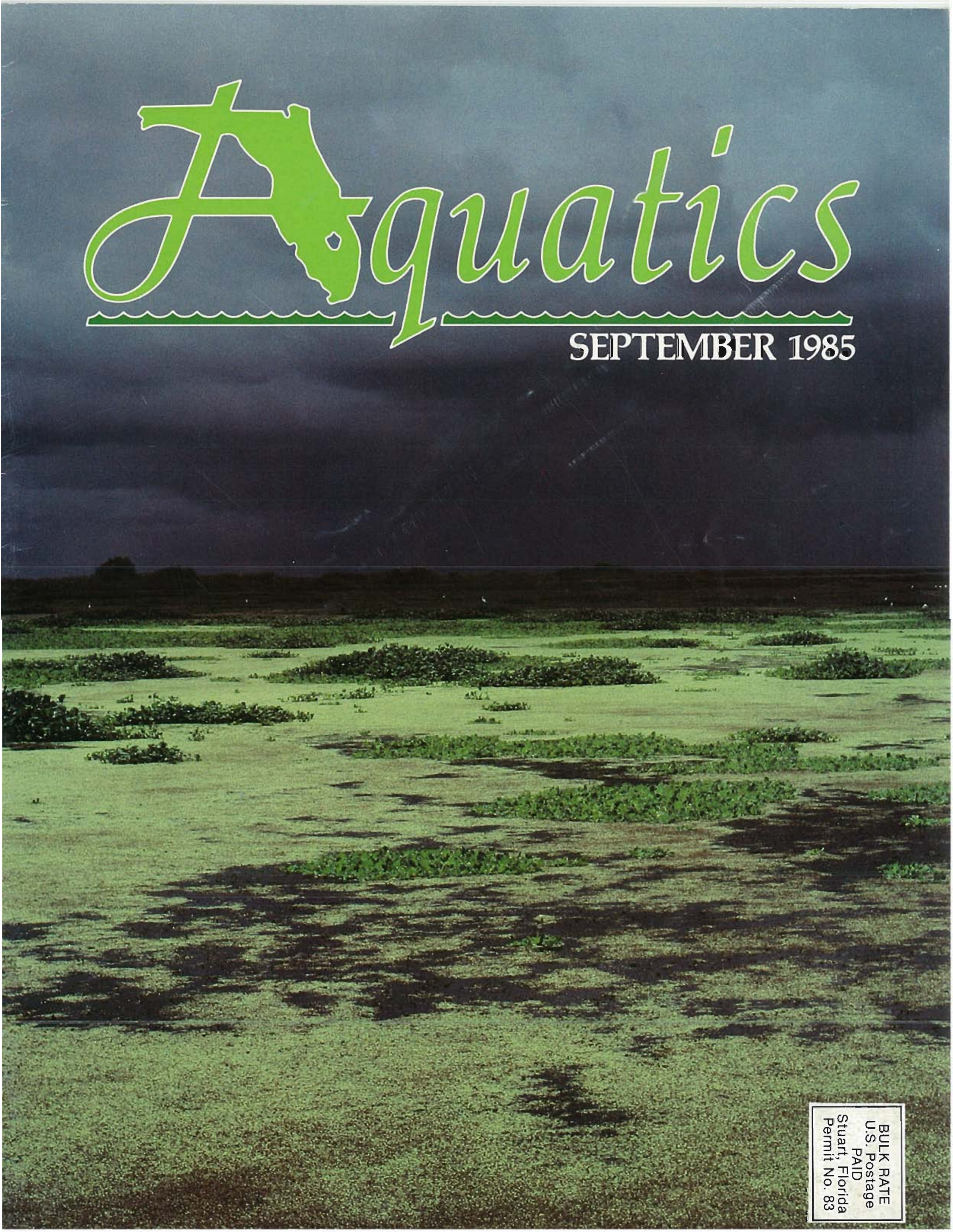
Aquatics

SEPTEMBER 1985



Applicator's Corner
ask the
"WEED DOCTOR"

Question:
I have noticed recently that several of my lakes that I take care of for aquatic weeds are experiencing an increase in baby-tears. First, is baby-tears native to Florida? Secondly, is anyone else experiencing problems and if so, what herbicides are they using for control?

Answer:
Two native species of baby-tears are often encountered in Florida waters. *Micranthemum umbrosum* is often found growing along the shoreline in lakes and rivers, on moist soils, and in shallow water. *Micranthemum glomeratum* may be found in deeper water and has been reported to form dense vegetation mats in Polk, Orange, Putnam, Osceola and Seminole counties.

Answer:
Chemical Control - Vernon Vandiver, Kerry Steward, and Thai Van. Ft. Lauderdale Agricultural Research Center. Adapted from Report FL-81-1, March 1981.

In Florida, problems caused by excessive growth of the native plant *Micranthemum glomeratum* (Chapm.) Shinners have been reported. This is normally a low-growing plant that is usually found in shallow, still water in peninsular Florida. Occasionally long-stemmed forms of the plant are reported to develop into dense mats of vegetation and extend to the water surface.

To determine the susceptibility of *M. glomeratum* to aquatic herbicides now available or under development, the plant was subjected to a standardized laboratory evaluation. The results are discussed below.

This plant species was most sensitive to diquat, diuron, the liquid amine formulation of endothall, and hexazinone. Of these herbicides diquat, diuron, and hexazinone produced complete control at concentrations of 0.63 mg/l (0.63 ppm). At concentrations above 0.63 mg/l (0.63 ppm), the most rapid control response was produced by the liquid amine formulation of endothall. This treatment gave 99% control after 4 weeks at the 1.25 mg/l (1.25 ppm) concentration.

Simazine produced 100% control at 1.25 mg/l (1.25 ppm) concentrations after 10 weeks. Fenac produced 100% control at 5 mg/l (5.0 ppm) concentrations after 10 weeks. The pelleted formulation of endothall amine had produced 99% control at 10 weeks.

In summary: diquat, diuron, hexazinone, and endothall amine appear promising as herbicidal controls for *M. glomeratum.* The results of these laboratory tests may indicate the relative performance of herbicides under field conditions; however, field studies will be required to confirm the effectiveness of a particular herbicide and to determine the most effective rates to be used.

Answer:
John Layer — Florida Environmental Consultants, Inc.

Over the past four years, baby-

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Aquatics

SEPTEMBER 1985 / Volume 7, No. 3

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EDITORIAL

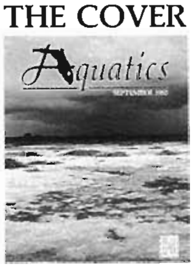
Lake Apopka was once renowned for its excellent sportfishing, but in more recent times has been viewed as a symbol of a "dead" or hypereutrophic lake. The blame for this change has been attributed to agricultural runoff and backpumping, sewage effluents, diking off of 20,000 acres of marshland, hurricanes and aquatic weed control.

It is unfortunate that the one action which was attempting to restore some form of ecological balance to the lake — the control of an exotic aquatic plant, has been selected to fund the restoration caused by the other more significant sources of degradation. This occurred during the past legislative session through the passage of House Bill 251. This Bill authorized the expenditure of $1.5 million from the Department of Natural Resources Aquatic Plant Trust Fund to implement a "pilot project" designed to restore Lake Apopka through nutrient removal with water hyacinths.

Logically you would think that since excessive nutrients cause algae blooms that nutrient removal would be the answer. Although this has never been tried on a large lake such as Lake Apopka, researchers have experimented with growing water hyacinth in small enclosures and found that it may have potential. However, there are no known studies where this concept has been attempted in any natural multiuse waterbody. In light of this it would seem more practical to fund a smaller scale study on a series of small lakes with nutrient budgets similar to Lake Apopka. This Society and DNR expressed their concerns over this Bill to the Governor and requested his veto. The Governor signed the Bill indicating that while the research methodology chosen for this effort had not been proven, some sort of restoration efforts needs to be implemented. The Governor's office did concur with several of the Society's concerns and stated that future funding for the Lake Apopka cleanup would not come from the DNR Aquatic Plant Trust Fund.

Hopefully, the Society's efforts had an impact and some benefit will come from this untested concept.

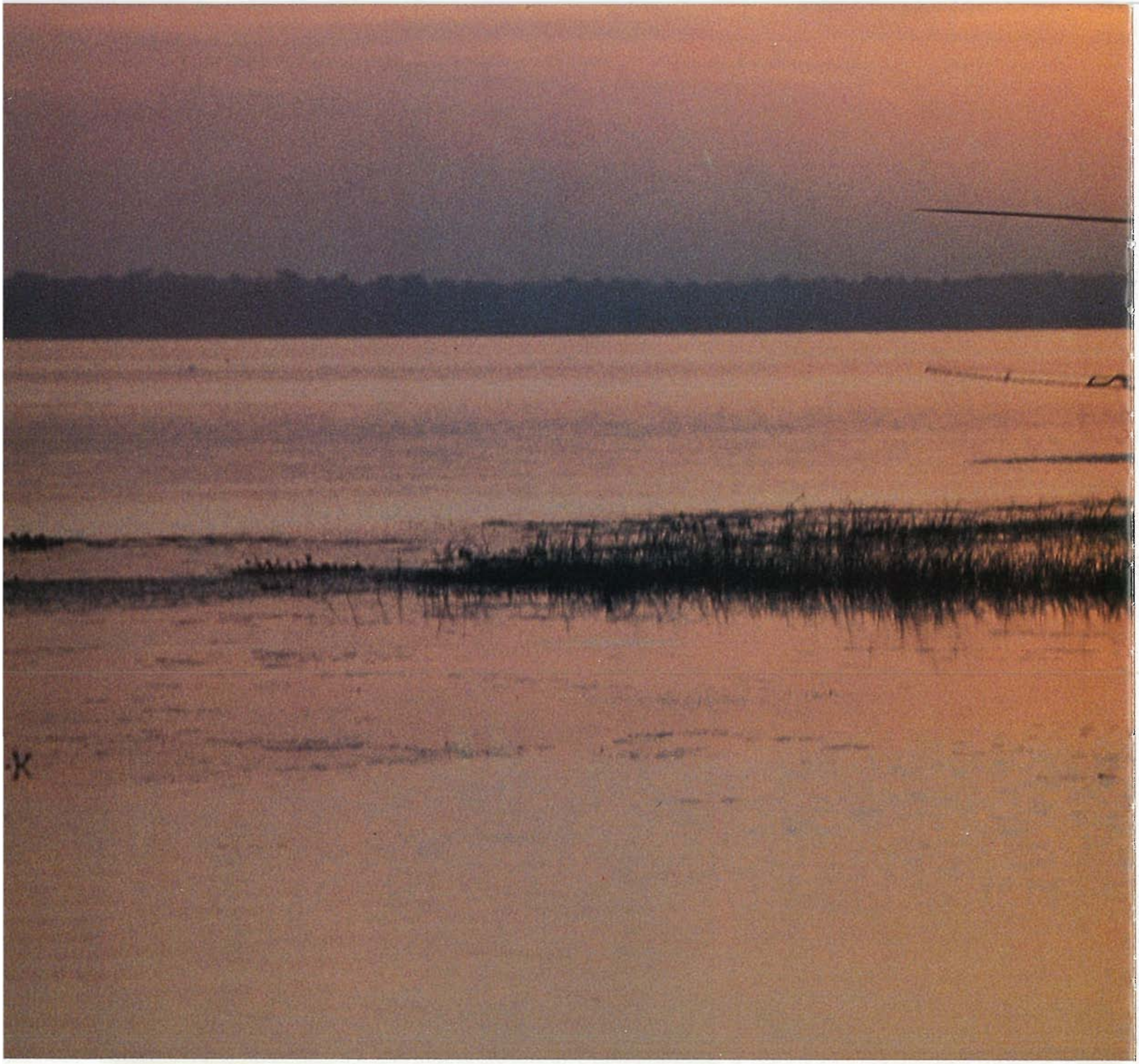
ABOUT THE COVER



It's hard to keep an Aquatic Scientist off the water. Even when the shortest distance to shore is through one of Lake Okeechobee's torrential rainstorms.
Photo by:
Dave Sutton
Fort Lauderdale
Research Center

AQUATICS: Published quarterly as the official publication of the Florida Aquatic Plant Management Society. This publication is intended to keep all interests informed on matters as they relate to aquatic plant management, particularly in Florida.

EDITORIAL: Address all correspondence regarding editorial matter to Daniel Thayer, Editor, "Aquatics" Magazine, 7922 N.W. 71st Street, Gainesville, FL 32606.



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Vallisneria and Its Interactions With Other Species

by
Gerda van Dijk
Center for Aquatic Weeds
Gainesville, Florida

Introduction

Vallisneria, which is commonly known as eel or tape grass, belongs to the *Hydrocharitaceae* or frog's bit family. It is found throughout the midwestern and eastern United States and occurs more frequently in the southern states to south Florida, east Texas, north Mexico and Arizona. Vallisneria grows in both quiet and swiftly flowing water, springfed streams and in clear and tannin stained waters. Vallisneria is considered to be a valuable plant around the margins of lakes, rivers or ponds due to its value as a protective fish spawning area. Furthermore, populations of Vallisneria provide habitat and food for aquatic invertebrates and it is a preferred food of waterfowl. Generally, Vallisneria causes only moderate problems in relatively clear water where large populations interfere with boating and fishing. Vallisneria is considered difficult to control chemically.

Taxonomy

The taxonomy of the genus Vallisneria is rather confusing concerning the literature. At the beginning of the 19th century Michaux distinguished the Vallisneria growing in America as a distinct species from the European species *Vallisneria spiralis* and named it as *Vallisneria americana.* Later, during the 20th century. *V. americana* and *V. spiralis* were considered as the same species but still both names are used. Furthermore, in Florida (and possibly other gulf states) and Cuba, another Vallisneria species is distinguished and named as *V. neotropicalis.* The main difference between *V. americana* and *V. neotropicalis* is that the latter has a larger size and grows in large springs and spring fed clearwater streams. However, in any spring or stream a range in size variation exists, particularly in the southern latitudes. In waters with nearly constant temperature during the entire year, Vallisneria may become a relatively large plant as a consequence of factors favoring continuous growth. This large plant apparently is identifiable as *V. neotropicalis.* In the following *V. spiralis, V. neotropicalis* and *V. americana* will be considered as one species, named *V. americana* or just Vallisneria.

Description

Vallisneria is a submersed perennial plant with ribbon-like leaves up to 3 m (12.5 feet) long and 2 cm (¾ inch) wide (Figure 1). Depending on the depth of the water the upper part of the longer leaves is more or less floating on the water surface. The leaves develop from

Figure 1. Vallisneria growing to the surface at Silver Glenn Springs, Ocala National Forest, Fla.

rosettes at the top of nodes on horizontal rhizomes.

Through the growing season, Vallisneria spreads by producing interdependent rosettes. Near the end of the growing season, the production of rosettes ceases and winter buds are formed in the axils of the leaves. These buds remain stationary in the sediment during the winter and emerge the following spring.

Vallisneria can also reproduce sexually. It is a dioecious plant, that is the male and female flowers are borne on separate plants. This makes pollination more complicated. Although Vallisneria is a submersed plant the pollination occurs at the surface of the water. The white female flowers, placed on a long winding stalk appear on the surface when the stigma is ready to receive the pollen. In the meantime the male flowers become detached from their short stems and rise up to the water's surface. Here the three leaflets which cover the stamen all fold back and form a kind of boat. The pollen is now free floating and can be blown by the wind. If it approaches a female flower, fertilization may occur.

Soon after pollination, the long stalk of the female flower coils and retracts the fruit below the water just above the soil. The fruits are cylindrical and about 8 to 18 cm (3-7 inches) long. Fruits bear 250 to 300 seeds, which are shed in a copious mass of gelatinous material. This fascinating mechanism of pollination is also known from the common species *Hydrilla verticilata* and *Elodea canadensis.* Both species belong to the same family as Vallisneria.

Vallisneria is many times confused with a similar looking plant species, *Sagittaria kurziana.* They are often found together sharing the same habitat and may be difficult to distinguish from each other. However, in general, the leaves of Vallisneria are smooth and have a blunt leaf tip, whereas the leaves of Sagittaria have raised veins or straps along the length and a more pointed leaf tip.

Interactions with Other Species

During 1983, Vallisneria underwent a statewide net coverage reduction. The largest reduction occurred in Lake Okeechobee due to competition with Hydrilla. To understand more about the phenomenon of plant competition, we will have a closer look at the morphology, growth and community structure of Vallisneria compared to Hydrilla. Vallisneria is a bold looking plant with relative thick and heavy leaves. It takes nearly four times more of the leaf area of hydrilla than for Vallisneria in order to obtain 1 pound of dry weight.

The total biomass per area is greater for Vallisneria than for Hydrilla, however about 40% of the total biomass of Vallisneria consists of roots compared to only 13% for Hydrilla. The function of roots for aquatic plants is quite different from land plants. Land plants take in the nutrients and water mainly by the roots. This means that the roots are of vital interest for the growth and maintenance of the plant. Aquatic plants, however can take up their nutrients by roots, stems, and leaves. Under experimental conditions a plant's entire nutrient intake may even come from either the water or the soil. Compared with land plants the contribution of the roots to the total uptake is of less importance, and the most important function of aquatic plant roots may be anchorage to the bottom.

The roots are non-photosynthetic tissues and they have to derive their energy from the leaves and stems, the photosynthetic tissues. Hence, the large amount of roots produced by Vallisneria represents a great deal of stored energy and roots still demand energy for growth and maintenance. For this reason, the large amount of root biomass contributes to the inability of Vallisneria to compete with Hydrilla which has only a small amount of roots. It even negates any advantage that its thicker leaves would seemingly give Vallisneria over Hydrilla.

The vertical distribution of the biomass of Vallisneria and Hydrilla have very different patterns. Vallisneria has the highest biomass near the bottom and it decreases up towards the water surface. Hydrilla, however, has nearly 20% of its total biomass in the top 10 cm (4 inches) of water in the form of an extensive canopy. This dense canopy shades out a high percentage of the surface light. It has been reported that up to 95% of the light is shaded out in the upper 0.33 m (12 inches) of a Hydrilla

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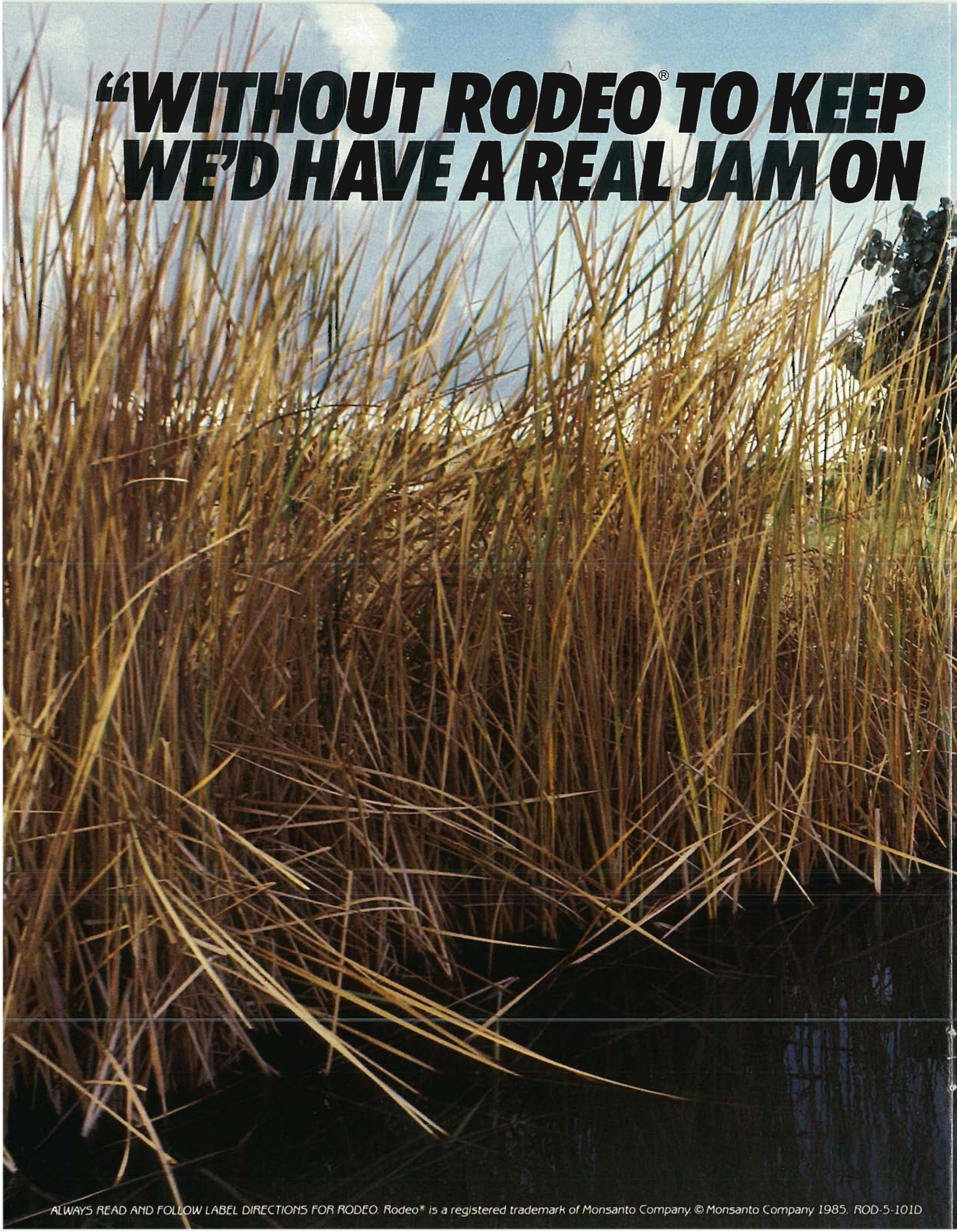
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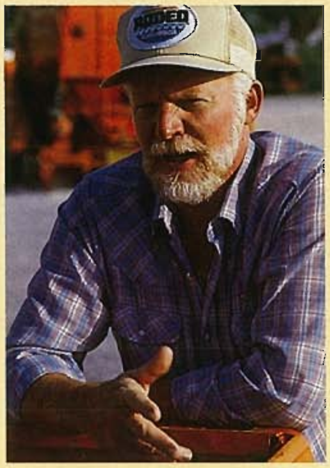

GORDON BAKER
Weed Management Coordinator
South Florida Water Management District

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RODEO. BROAD-SPECTRUM CONTROL FOR AQUATICS.

(continued from page 7)

canopy. At the same depth a shading percentage of only about 30% was measured in open water and about 45% in a Vallisneria population.

Besides competition, many other fascinating and complex interactions exist between species. Studies in Lake Chenango, New York, show that Vallisneria changes its growth pattern in the presence of neighboring plants. In the presence of other plants, Vallisneria seems to allocate more biomass to vertical extension by forming taller leaves and fewer rosettes than in the absence of neighbors. As a consequence of the elongated leaves the availability of stronger light is increased and it appears to compensate in this matter for the presence of neighbors, as the biomass and winter bud production remain the same.

The above described interactions between species indicate that the composition and changes of plant communities which we may find in the field, is the result of many characteristics and abilities of plant species to interact with their environment, including other plants. This should be kept in mind when an aquatic plant becomes an aquatic weed. A weed problem may concern much more than just the apparent over population of one species. A better understanding of interactions between species may even lead to a control method based on the existence of those interactions. Why not out compete a weed with another weed if the latter doesn't cause as much problems or is easier to control?

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tears, (micranthemum umbrosum) has invaded nearly 80% of the water bodies that we have under contract.

Growing emergent on exposed shorelines it is relatively easy to control with aquatic herbicides such as: glyphosate, 2,4-D, diquat, etc. However, even in these situations it has contributed to increased costs due to increased uses of herbicide where aesthetics are a prime consideration.

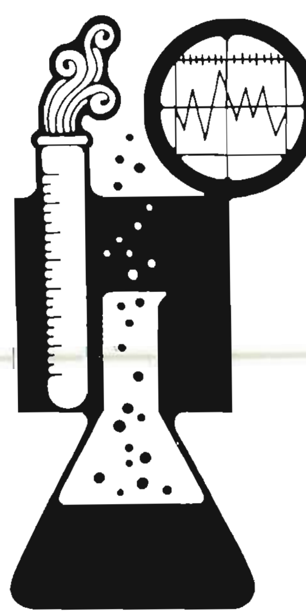
In certain instances where baby-tears grows submersed it can pose quite a problem. In some water bodies, perhaps due to hydrosoil composition, the plant grows along rooted to the bottom to a certain depth, then breaks loose to form thick floating mats on the surface. These mats are blown about by the wind and can be quite difficult to control.

Where the water is not too muddy we've had good results with inverted diquat and copper complex (2 gallons diquat, 2.5 gallons copper per acre). In shallow muddy water endothal granular at 150-200 lbs. per acre has been effective. Often, repeated applications are required.

Answer:
Robert Blackburn — Vice President, Joyce Environmental Consultants, Inc.

Baby-tears *(Micranthemum umbrosum)* belong to the Scrophulariaceae or figwort family. These two plants occur as both emersed and submersed aquatic in the same water body. Baby-tears appears to be associated with water bodies that have bottoms composed primarily of organic or detrius materials.

Baby-tears is resistant to most aquatic herbicides. Our major problems with the plant is in the coastal areas of South Carolina. Diquat, endothol, 2,4-D and copper appear to have little effect on the plant. Aquazine at high concentrations does have an effect in non flowing ponds. Hydrothol 191 will give temporary control but only at rates toxic to fish. Mechanical control has proven to be the most successful method of control.



Publicly Funded Aquatic Plant Management Operations in Florida During 1984

by

Brian V. Nelson[1] and J. Michael Dupes[2]

The management of aquatic plants in Florida's public waters is conducted under two separate funding programs, the Cooperative Aquatic Plant Control Funding Program (Federal Program) and the State Funding for Aquatic Plant Control Program (State Program). Navigable rivers and lakes with established public boat ramps are managed under the Federal Program. Flood control systems and public waters not having access by way of a public boat ramp are managed under the State Program.

Through the Federal Program the U.S. Army Corps of Engineers funds aquatic plant control operations in the State of Florida under the Removal of Aquatic Growth Project (RAGP), and the Aquatic Plant Control Program (APCP).

Table 1
Acreage of Vegetation Treated by Watershed in the Federal Program During FY 1984

Watershed	Floating Plants	Hydrilla	Minor Plants
St. Johns River	6,775	588	693
Withlacoochee River	903	1,760	278
Kissimmee River	8,704	592	244
Oklawaha River	5,148	687	96
Lake Okeechobee	16,492	323	43
Alafia-Manatee	76	197	0
Lake Istokpoga	3,184	469	41
Suwannee-Santa Fe	565	419	11
Peace River	1,030	191	0
Hillsborough River	253	0	0
Myakka River	738	73	0
Gulf Coast	310	1,305	18
East Coast	0	0	0
Aucilla-Wacissa	158	130	5
Ocklochonee	22	109	348
Apalachicola River	83	0	59
Northwest Area	0	0	22
Caloosahatchee River	237	318	23
Nassau River	85	0	0
Lake Trafford	0	0	0
Subtotal	44,763	7,161	1,881
		Total	53,805

The RAGP is funded totally by the Corps of Engineers and is restricted to Federal navigation projects. Waterbodies treated under this program are the St. Johns, Withlacoochee, Crystal, Caloosahatchee, and Kissimmee Rivers; and Lake Okeechobee. The APCP is a cooperative program that covers other public navigable waters in the State not included in the RAGP. This program is funded 70 percent by the Corps and 30 percent by the State or local governments. The State provides the 30 percent funds for waterbodies which lie in more than one county. Matching funds for intracounty waters are the responsibility of the local governments.

Control operations on the St. Johns River north of Lake Washington are performed by Corps field crews working out of Palatka, Florida. The remainder of the work is performed under a contract with the Florida Department of Natural Resources. The Department has in turn subcontracted the work to five water management districts and seven counties.

During Fiscal Year 1984 (1 Oct 83-30 Sep 84) 53,805 acres of vege-

[1] Florida Department of Natural Resources
[2] U.S. Army Corps of Engineers

tation were controlled. Floating vegetation (water hyacinths and water lettuce) made up 88.2 percent (44,763 acres) of the total and was controlled at an average cost of $56.00 per acre. Hydrilla made up 13.3 percent (7,161 acres) and averaged $317.00 per acre. Minor plants comprised only 3.5 percent (1,881 acres) of the total and were controlled at an average cost of $126.00 per acre. Of this amount 446 acres of hydrilla and 162 acres of minor plants were controlled by mechanical methods. The remaining vegetation was treated using herbicides. Acreage figures are broken down by watershed and are shown in table one. Chemical usage is shown in table two.

Table 2
Chemical Usage in the Federal Program During FY 1984

Herbicide/Adjuvant	Amount
2,4-D Amine	19,120
2,4-D (Granular)*	54,000
Diquat	7,004
Copper Complex	6,195
Hydrothol 191	282
Hydout*	210
Aquathol-K	23,940
Aquathol (Granular)*	50,621
Sonar A.S.	591
Sonar 5p*	16,261
Rodeo	307
Invert Oil	9,830
Diesel	162
Xylene	687
Polymers	1,910
Other Adjuvants	3,973

*Indicates pounds, all other amounts are gallons.

Total cost of operations for the RAGP during the year was $2,544,465. The total cost for the APCP was $2,498,800. Local sponsors provided $749,640 of the total APCP expenditure. These costs include contract reimbursement to the State and actual Corps field operations. They do not include the cost of contract administration by the Corps.

The Florida Department of Natural Resources disburses funds through the State Funding for Aquatic Plant Control Program to local authorities charged with the responsibility of controlling or eradicating aquatic plants. Participants in the program are cities, counties, and special districts. Waters eligible for funding under the program are permanent bodies of water accessible to the general public for recreational activities or managed as part of a flood control system. Most waters managed under the program are man-made and include canals, ditches, and small lakes.

Monies for the State Program are provided through the Aquatic Plant Control Trust Fund. The trust fund is established from a portion of the monies collected from gas taxes and registration of motorboats.

Budgets totaling $9,094,245 were received from sixty-nine participants prior to the beginning of Fiscal Year 1984. The amount of matching funds available through the Department was $2,001,004 allowing for a reimbursement of twenty-two cents on the dollar. The total amount of state and local funds actually expended was $6,998,259.

A total of 43,763 acres of aquatic plants were controlled. Plants requiring the greatest amount of control efforts were non-indigenous aquatic grasses followed by algae, ditchbank brush, hydrilla and water hyacinth (Table 3).

The majority (85%) of plants controlled were chemically treated. A total of $4,744,395 was spent to control 38,007 acres of plants for an average cost of $125.00 an acre.

Table 3
Aquatic Plants Controlled Under the State Program During FY 1984

Control Method	Plant Type	Acres
Chemical	Aquatic grasses	13,705
	Algae	6,721
	Ditchbank brush	3,710
	Hydrilla	3,545
	Water hyacinth/lettuce	3,297
	Cattail	1,992
	Alligator weed	903
	Bladderwort	755
	Musk-grass	722
	Misc. aquatic plants	684
	Spatterdock	555
	Southern naiad	402
	Duckweed	349
	Slender spikerush	346
	Hygrophila	121
	Pondweed	61
	Water sprite	53
	Brazilian elodea	30
	Coontail	25
	Salvinia	18
	Azola	13
	Subtotal	38,007
Mechanical	Aquatic grasses/ditchbank brush	4,445
	Hydrilla	1,025
	Mixed species	236
	Water hyacinth/lettuce	50
	Subtotal	5,756
	Total	43,763

This amount includes chemicals, equipment rental, salaries, and benefits (which includes indirect costs of 15%). Table four lists the herbicides and adjuvants used.

A total of $2,251,799 (32% of funds expended) was spent to mechanically control 5,756 acres of plants for an average cost of $391.00 an acre. This amount includes salaries, benefits, and equipment rental. The majority of mechanical control was accomplished with ditchbank mowers, towboats and A-frames, draglines and hydroscopic cranes.

A total of 97,568 acres of aquatic vegetation was controlled in both the Federal and State Programs during Fiscal Year 1984 at a combined cost of $12,041,524. This total includes administrative costs, salaries and benefits, equipment rental and herbicides. These figures represent only the work performed in public waters by governmental agencies participating in the Federal and State Programs. Operations conducted by private individuals and agencies not participating in the public funded programs would make acreage and cost estimates for aquatic plant management in Florida somewhat higher.

Table 4
Herbicides and Adjuvants Used in the State Program During FY 1984

Herbicide/Adjuvant	Amount
Aquathol	7,230*
Aquathol K	2,744
Aquazine	267*
Banvel 720	2,255
Banvel 4WS	2
Copper sulfate	3,268*
Copper	2,022
Copper (granular)	193*
Dalapon	7,080*
Diquat	9,041
Diuron	1,740*
Hydrothol 191	898
Hydrothol 191 (granular)	3,660*
Hydout	150*
Rodeo	10,296
Roundup	272
Scout	3
Sonar AS	16
Sonar 5P	2,960*
System L	635
2,4-D	5,934
2,4-D (granular)	1,083*
Velpar	136*
Velpar L	1,693
Polymers	1,384
Invert oils	2,534
Diesel	2,557
Surfactants	3,655
Foam reducers	11

*Indicates pounds, all other amounts are gallons.

A Bit About Bacopa

By: Gerda van Dijk
Center for Aquatic Weeds
Gainesville, Florida

The genus Bacopa, belonging to the family of Scrophulariaceae, consists of about one hundred species all occurring in the warmer regions of the world. More species are found in America than anywhere else; nevertheless, only two native Bacopa species occur in Florida: *Bacopa monnieri* (L.) Pennell and the more common species *Bacopa caroliniana* (Walt.) Robins.

Bacopa monnieri:

Bacopa monnieri is a creeping perennial with succulent rarely branched stems up to 30 cm (12 inches) long, which can form thick glossy-green mats. The leaves are placed oppositely on the stem. They have a spoonlike form 5-15 mm (¼-½ inches) long and 3-7 mm (¼ inches) wide with one evident central vein.

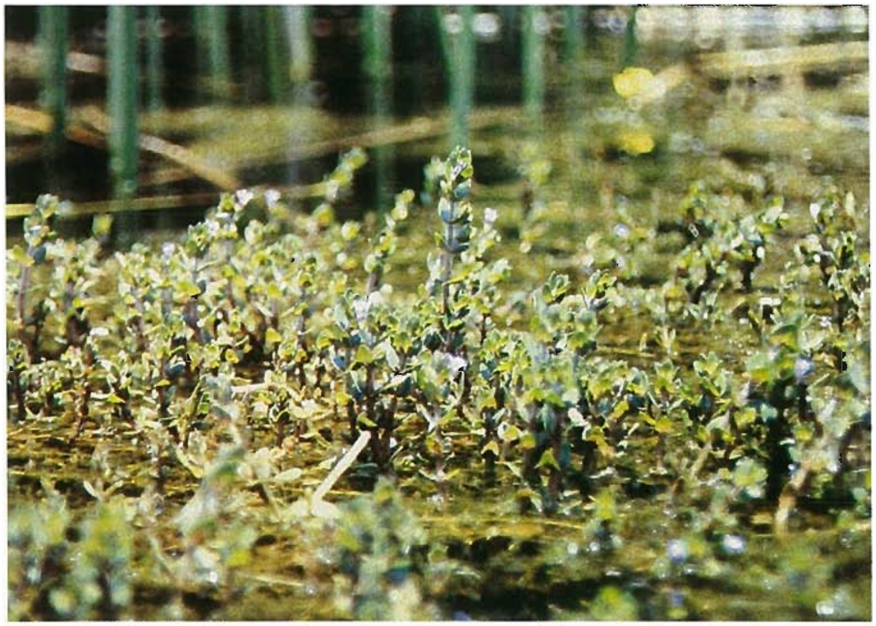


Figure 1. Bacopa caroliniana *flowering in Lake Tohopekaliga, Fla.*

The solitary flowers are born in the axils of only one of the pair of leaves. They are placed on long stalks which elongate above the leaves. The flowers are bell-shaped, about 8 mm (⅜ inch) long and have a white or pale purple color. *B. monnieri* can reproduce sexually by the forming of seeds or vegetatively by fragmentation.

B. monnieri can be found in fresh or brackish marshes, sandflats, ditches and interdune swales. It is most frequently found growing near the shoreline. It is of slight importance to wildlife as a food source and when flooded, it is utilized by waterfowl.

Woman and man, sometimes use *B. monnieri* for medical purposes. It is used in the treatment of insanity, epilepsy and as a potent nerve tonic, cardiotonic and diuretic. In Florida, generally spoken, *B. monnieri* causes no economical nor recreational problems. Although in other parts of the world this species is frequently found as a weed in ricefields and irrigation ditches.

Bacopa caroliniana:

B. caroliniana attributes its popular name, Lemon bacopa, to its unique property of giving off a lemon fragrance when stems or leaves are crushed. This characteristic makes this species very easy to distinguish in the field. *B. caroliniana* has oval formed leaves, 1-2 cm (¾ inch) long and 1 cm (¼ inch) wide with three to seven palmate veins. Leaves are opposite and placed close together on the stem. The flowers are borne in the axils of the leaves and placed on relative short stalks (Figure 1). They have a pale or bright blue to violet blue color and are about 9-13 mm (½ inch) long.

Like *B. monnieri, B. caroliniana* can reproduce either by seeds or by fragmentation. *B. caroliniana* grows commonly in shallow, calm water near shores of ponds and streams. Furthermore it grows in bogs, drainage and irrigation canals and ditches and in clear acidic lakes. It can be found throughout the state, primarily in the central region.

B. caroliniana can form very extensive mats with flowering stems commonly dense over large areas. Emersed and submersed leaf forms appear in the same waterbody. These thick mats provide good habitat and protectional cover for game fish and aquatic invertebrates, but they can also create problems with boat traffic or fishing. In 1983 (according to the DNR aquatic plant survey) *B. caroliniana* was established as the 23rd most abundant aquatic plant in Florida waters. Compared with the years before it had increased its area significantly. The highest coverage was found in Lake Tsala Apopka (2,500 acres) where it caused moderate problems. Effective methods of controlling the growth and spread of this plant have not been well established.

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Management of Lemon Bacopa in a Dade County Canal System

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Those of us who have been involved in any of the biological sciences, and in particular aquatic plant management, for a number of years, realize that there is nothing so constant as change. This is consistent with Nature's law that states she abhors a vacuum. All applicators realize that when you attempt to control, eradicate, or manage one species, there is at least one other species waiting to fill the niche. Such is the case with lemon bacopa (*Bacopa caroliniana* — [Walt.] Robins., for the taxonomically minded).

Several years ago while performing a diving inspection of the canals in South Dade County, a few small patches of a "new" plant were seen growing on the bottom of the canal. At first it appeared to be Ludwigia, only a larger sized form. After several more inspections, debating whether or not it was Ludwigia, lemon bacopa, or something else; and finally obtaining an official identification, it turned out to be lemon bacopa.

BUT, whoever heard of lemon bacopa growing to lengths of 10 to 12 feet from the bottom of canals? If one checks several references on the plant, almost all indicate that it is a low growing plant, usually with creeping stems, growing (usually) in marshes, pond margins, and shallow streams. In DNR's *Aquatic and Wetland Plants of Florida*, reference is made to lemon bacopa in clear acidic lakes. Generally speaking, the canals we're experiencing the problem with, have pHs ranging from 6.7 to 9.1, that is, from neutral to basic.

The District has attempted numerous methods of controlling the growth and spread of the plant with only minimal results. Mechanical removal of the plant is effective, but very costly, and the fragments produced help to spread the infestation to other interconnecting canals of our system. We've noticed that different submersed weeds are more easily removed than others when using machinery to accomplish the task. Hydrilla for example, lends itself to mechanical removal because the plant, once ripped, torn or cut from the bottom, tends to float at or near the surface for a longer period of time than other plants. This allows time for pick-up operations using basket-mounted boats or draglines, Chara, on the other hand, does not float but rolls up in large mats on the bottom making removal almost impossible. Lemon bacopa will float for a short period of time then sink back to the bottom of the canal and resprout.

Herbicide treatments have yielded at best only inconclusive results. The "standard" treatments for submersed vegetation control (diquat and copper, endothol products, and copper alone) have been tried. The most significant result from these treatments was chelated copper applied at 1 ppm or 20 gallons per acre. At this high rate, all that happened was a slight browning of the leaves and a small amount of leaf stripping from the stems. Repeat treatments gave no better results. We have also sent plant samples to the USDA laboratory in Ft. Lauderdale for screening in jar tests. Results from these tests indicate that Diquat at a rate of 40 gallons per surface acre would control the plant. Obviously, however, that rate, if effective in the field, would be completely cost prohibitive. Elanco applied Sonar pellets in a field trial to determine if it would control the plant. Again, there were very few signs of efficacy. Finally, we looked at Casaron at labelled rates for submersed weed control (maximum of 150 lbs./acre). Indications following a couple of trials are that Casaron may be an answer to the problem. We've been able to show that Casaron at 150 lb./acre may be acting like a growth retardant. The first operation was to remove the biomass mechanically. Then after two or three weeks, a herbicide treatment was made. Finally the regrowth, which had begun immediately after the mechanical removal, began to show signs of "falling out." Field personnel reported that some patches looked like a mass of "baling wire." Two to three months after the treatment, the plants in the treated area appear healthy, however, they are a couple of feet shorter than those in the untreated area.

Uniroyal and P.B.I. Gordon chemical companies are working with Casaron and Norasac, respectively, and have indicated a desire to obtain the data necessary for label amendments. These amendments would include new species, new rates and more tolerable water use restrictions. In this regard, when Experimental Use Permits are obtained, we would like to try a rate of 250 lbs./acre to determine if we can obtain better control of lemon bacopa.

AQUA-VINE

IN MEMORIAM

On July 6th, the aquatic plant management industry suffered a tragic loss when David Strickland of Miramar, Florida lost his life in a head-on collision with a drunk driver. David, who was only 29 years old, was the proud father of a 5 year old girl to whom he dedicated his life. David was employed by the Hollywood Reclamation District under the direct supervision of "Moon" Mullins. During his 8 years at the District, "Moon" reflects on David's ambition and dedication to his duties at the District, as well as his excellent working relationships with the other employees and the general public. Over the years, David had worked his way up to Field Superintendent and had aspirations of one day stepping into "Moon's" shoes. David was liked by everyone who knew him. The Society to which he so proudly belonged, extends their deepest sympathy for his close friends and loved ones.

A WINNER

Congratulations to Mark Rodgers, Aquatic Biologist with The Lake Doctors, Inc. Mark was the first person to correctly answer the June Aquatics crossword puzzle. Other correct puzzle entries included Paul Myers and Les Bitting.

NEW POSITION

Marty Allsup, who was previously employed with Aquatic Systems in Pompano Beach, has recently moved to West Palm Beach to work for the DNR's Grant's Administration Section. This new position will be located at the South Florida Regional Biologist office, and will assist in activities related to the participants of the State Funding Program. For information or assistance, Marty can be reached at 305/793-5666.

SCHOLARSHIP SOLICITATIONS

The annual meeting of the FAPMS is just around the corner, so those deserving students pursuing a field of study directly related to aquatic plant management need to get your rear's in gear and apply for the first William L. Maier Scholarship Award. This year's award should be in the range of $300-$500 and will be awarded October 15-17, 1985, at Plant City. To get a copy of the criteria and application forms, contact Clarke Hudson or Joe Joyce.

MIDSOUTH APMS

The 4th annual meeting of the Midsouth APMS will be held in Jackson, Mississippi, on October 9-11, 1985. Booth space is available and the first call for papers has been issued. For more information contact David Franks, Fisheries Lab-MAPMS, Route 3, Box 99, Canton, Mississippi 39046.

Common Names and Synonyms of Some Aquatic Plants Used in the Aquarium Plant Trade

by
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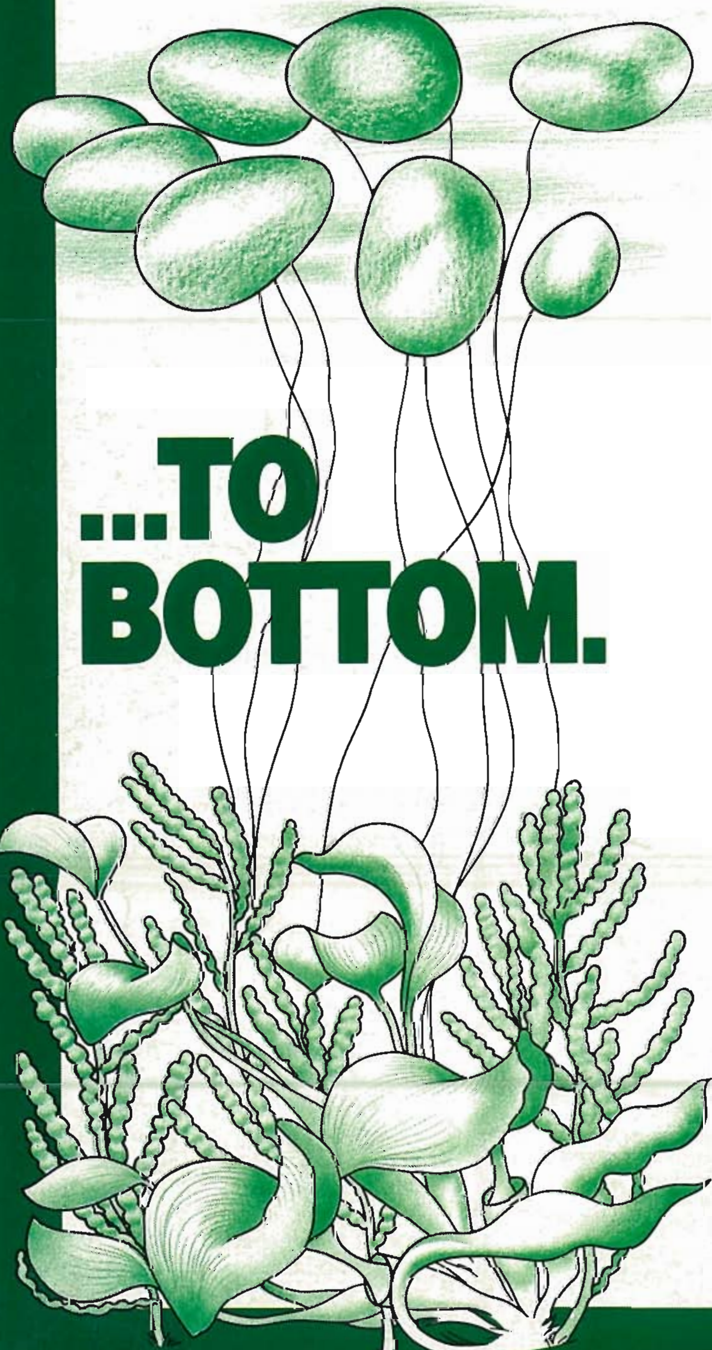
Florida Department of Natural Resources
Bureau of Aquatic Plant Research and Control

Editor's Note: In the interest of saving space, the comprehensive list of aquarium plants that the D.N.R. has put together had to be omitted. If you are interested in reviewing the list, you can get a copy from Don or Katherine at the address above.

Most aquarium plants have two or more common names. Different aquarium plant species may share the same common name. A number of species have two commonly used scientific names or synonyms. This situation can be confusing. Consequently, aquarium plant cultivators, scientists, government inspectors, and applicators often have difficulty in determining which species are being discussed. It is important to be able to identify these plants since most of them are exotic to Florida. To aid in the identification of these plants, the Aquatic Plant Research and Permitting Section has compiled a list of aquarium plant species that are commonly used in the aquarium plant industry. This list gives common names and synonyms. A number of these species are restricted or prohibited and this list does not grant approval for importation, transportation, wholesale, and cultivation of these aquatic plants.

DIQUAT CLEARS OUT WATER WEEDS FROM TOP...

...TO BOTTOM.



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