

Aquatics

Spring 1997

Victor Ramey
UF - Center for Aquatic Plants
7922 NW 71 St.
Gainesville, FL

32653-3071

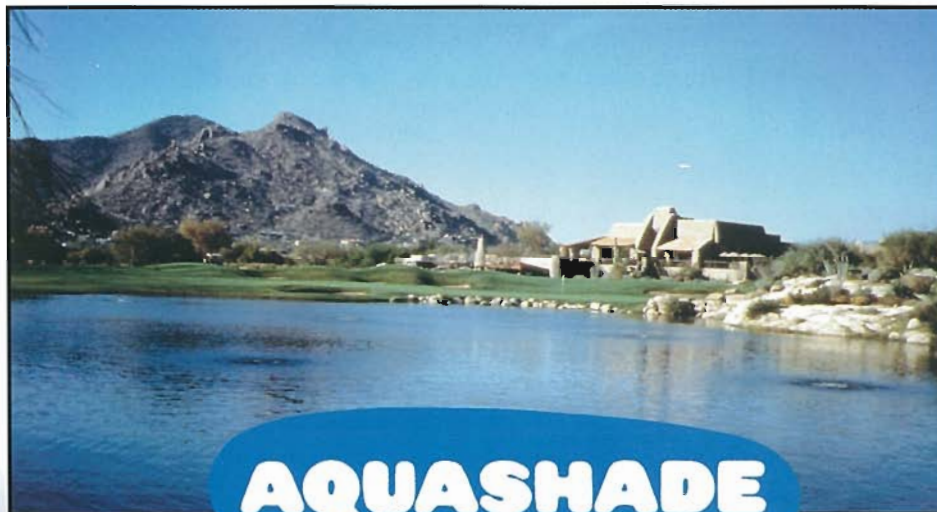
19

Bulk Rate
U.S. Postage
PAID
Tallahassee, FL
Permit No. 407

**IF YOU'RE JUST USING A
POND COLORANT, YOU JUST
"BLUE" IT**



**AQUASHADE COLORS WHILE IT
CONTROLS AQUATIC PLANTS.**



AQUASHADE
AQUATIC PLANT GROWTH CONTROL

®

- EPA REGISTERED
- CONCENTRATED - LOW DOSAGE
- LONG - LASTING
- PROVEN EFFECTIVE IN 20+ YEARS OF USE



applied biochemists

a division of Laporte Technologies & Biochem, Inc.

QUALITY PRODUCTS FOR WATER QUALITY

6120 W. Douglas Ave. • Milwaukee, WI 53218 • Dial 1-800-558-5106.

Letter to the Membership

Your Society has again taken on the task of finding an additional \$12 million for the management of hydrilla. Funding was increased significantly (\$6 million) during fiscal year (FY) 1996/97 through our efforts in the 1996 Legislative Session. However, there is less than \$1.5 million dollars available for hydrilla management in FY 1997/98. A lobbyist has again been retained by the Society to ensure legislators understand the desperate need for acquiring dedicated funding.

Each Society member can help by contacting legislators and supporting our efforts. The following are key legislators that need our support:

SENATOR CHARLES BRONSON-R
-CHAIRPERSON, SENATE
AGRICULTURE
1300 PINE TREE DRIVE, SUITE 2
INDIAN HARBOUR BEACH, FL 32937
W-407-779-11555 F-407-726-2891

SENATOR W.D. CHILDERS-R
-CHAIRPERSON WAYS AND MEANS,
SUB A
2889 MICHIGAN AVENUE
PENSACOLA, FL 32526
W-904-944-3900 F-904-484-5100

SENATOR RICK DANTZLER-D
-COMMITTEE ON NATURAL
RESOURCES
P.O. BOX 9225
WINTER HAVEN, FL 33833
W-941-294-2876 F-941-291-5288

SENATOR JACK LATVALA-R
-CHAIRPERSON, SENATE NATURAL
RESOURCES
35111 US HIGHWAY 19,
NORTH SUITE 203
PALM HARBOR, FL 34684
W-813-787-8991 F-813-298-1699

REPRESENTATIVE IRLO BRONSON-D
-CHAIRPERSON, HOUSE AGRICULTURE
P.O. DRAWER 422489
KISSIMMEE, FL 34742-2469
W-407-933-2307 F-407-847-6074

Continued on page 22



Nymphaea odorata in Amsterdam canal.
Photo by Jim Kelley
See page 21 for additional information.

Aquatics

Spring 1997/Vol. 19, No. 1



CONTENTS

Problem Freshwater Algae and Their Control in Florida
by Chance DuBose, Ken Langeland, and Ed Phlips 4

Butterflies of Florida's Wetlands Part I: Swallowtails, Whites, and Milkweed Butterflies
by Marc C. Minno 14

FLORIDA AQUATIC PLANT MANAGEMENT SOCIETY	Editor Ken Langeland IFAS/Center for Aquatic Plants 7922 N.W. 71st Street Gainesville, FL 32653-3071 (352) 392-9614, SC 622-9614, Fax (352) 392-3462	Vera Gasparini, Director (2st Year) 4169 Leafy Glade Place Casselberry, FL 32707 (800) 207-1440 Ed Harris, Director DEP 5882 S. Semoran Blvd. Airport Business Center Orlando, FL 32822 (407) 275-4004 or SC 343-4004 Fax 275-4007	Auditing Keshav Setaram (407) 836-7400
OFFICERS AND DIRECTORS, 1995	President Don Doggett Lee County Hyacinth Control 13060 Idylwild Rd Ft. Myers, FL 33905 (941) 694-2174, Fax (813) 694-6959	Ed Harris, Director DEP 5882 S. Semoran Blvd. Airport Business Center Orlando, FL 32822 (407) 275-4004 or SC 343-4004 Fax 275-4007	Awards John Teevans (941) 597-1505
President Elect Ernie Feller 80 South Hoagland Blvd. Kissimmee, FL 34741 407/847-5067 FAX 407/847-7429	DIRECTORS-AT-LARGE	Steve Smith, Director (1st Year) South Florida Water Management District Okeechobee Field Station 1000 NE 40th Ave Okeechobee, FL 33472 (941) 357-4011 Fax (941) 467-9086	By Laws Francois Laroche (941) 687-6193
Secretary Nancy Allen, USACE APCOSC, Crystal River P.O. Box 387 Crystal River, FL 34423 (352) 795-2239, Fax (352) 795-1082	Ron Hyatt, Director (3rd Year)	Brad Mann 100 NE 40th Ave. South Florida Water Management District Okeechobee, FL 33416 (941) 357-4030 FAX (941) 467-9086	Equipment Demonstration Steve Smith (941) 357-4011
Treasurer Catherine Johnson 688 Andover Circle, Winter Springs, FL 32708 (407) 380-2024 Fax (407) 359-1237	William Christian, Director (3rd Year) East Volusia Mosquito Control District 600 Smyth Street New Smyrna Beach, FL 32168 (904) 428-2871, Fax (904) 423-3857	Jay Heidt aqua-terra Services Inc. PO Box 6698 Seffner, FL 33584-6698 (813) 654-1790 Fax same	Governmental Affairs Mike Hulon (407) 846-5304
Past President Mike Hulon, GFC 600 N. Thacker Ave., Suite A-1 Kissimmee, FL 34741 (407) 846-5304, Fax (407) 846-5310	Jeff Schardt, Director (1st Year) DEP Innovation Park, Collins Building 2051 East Dirac Drive Tallahassee, FL 32310 (904) 488-5631, Fax (904) 488-1254	COMMITTEE CHAIRS	Historical Bill Haller (352) 392-9615
		Advisory Committee Representative, Ken Langeland (352) 392-9614	Local Arrangements Shelly Redovan (941) 694-2174
			Mailing List Coordinator DEP (407) 791-4720
			Merchandising Kieth Andrew (941) 694-2174
			Nominating Brian Nelson (352) 796-7211
			Program Alison Fox (352) 392-1808
			Publicity Ernie Feller (407) 847-5067
			Scholarship Joe Joyce (352) 392-1971

The Florida Aquatic Plant Management Society, Inc. has not tested any of the products advertised or referred to in this publication, nor has it verified any of the statements made in any of the advertisements or articles. The Society does not warrant, expressly or implied, the fitness of any product advertised or the suitability of any advice or statements contained herein.
1993 FAPMS, Inc. All rights reserved. Reproduction in whole or in part without permission is prohibited.
AQUATICS (ISSN 1054-1799): Published quarterly as the official publication of the Florida Aquatic Plant Management Society Registration No. 1,579,647. This publication is intended to keep all interested parties informed on matters as they relate to aquatic plant management particularly in Florida. To become a member of FAPMS and receive the Society newsletter and Aquatics magazine, send \$20.00 plus your mailing address to the Treasurer.
EDITORIAL: Address all correspondence regarding editorial matter to Ken Langeland *Aquatics* Magazine.

Problem Freshwater Algae and Their Control in Florida



Lyngbya sp., one of many mat forming, filamentous, blue green algae that can cause very undesirable conditions in lakes and ponds.

Chance DuBose,
Ken Langeland, and
Ed Philips
UF/IFAS Agronomy and
Fisheries and Aquatic
Science Department
And Center for Aquatic
Plants

Problem Algae

Problem freshwater algae are a growing concern in Florida's urban areas because of increased habitats created by stormwater ponds, and increasing population densities who live in close proximity to water.

Although algae are an essential component of aquatic ecosystems, excessive algal growths can have detrimental effects on both native organisms and human uses of water (Lembi, 1988). Two of the nine major divisions of algae, cyanophyta (blue-green) and chlorophyta (green), are the most problematic in freshwater environments (Lembi, 1988). Under specific environmental conditions some species of blue-greens produce toxins that are harmful to livestock and pets and represent an overall health risk. Many species of blue-greens are also associated with foul odors. Green algae cause a variety of problems but do not generally produce toxins (Edney, 1990).

Blue-green algae possess physi-

ological characteristics that make them strong competitors in freshwater environments (Canfield et al., 1989). Blue-greens possess dark pigments (phycobilins) that allow photosynthesis in reduced light and serve as stores of nitrogen that can be used when these nutrients are limiting (Kaplan D., Lembi, 1988). Many blue-greens can use bicarbonate (HCO_3^-) as a carbon source during periods when carbon dioxide (CO_2) availability is limited. Several species produce heterocysts, which are specialized cells that use the enzyme nitrogenase to convert elemental nitrogen into ammonia (Philips, Ilnat, 1995). Several planktonic species, like the bloom-formers, *Anabaena sp.* and *Microcystis sp.*, possess gas vacuoles that

Too many weeds spoil the fishing.

Selective aquatic weed control with **Aquathol®**.

A heavy weed population can take up as much as one-third of the total water capacity of a lake. Weeds can accelerate silting, destroy fish habitats and cause stunting of many popular game fish.

Weeds are no fun to swim or water ski in either. They can decrease property values, even cause havoc with irrigation and potable water supplies.

While Aquathol kills a broad range of weeds, including hydrilla and pondweed, it does not kill all plants. This selectivity leaves vegetation to provide food and cover for fish. Aquathol leaves no residues and has shown no adverse effects on marine life.

Get in touch with an aquatic weed specialist, aquatic applicator, or call Elf Atochem at 1-800-438-6071.

elf atochem
ATO



regulate buoyancy, which optimizes the harvest of light and nutrients (Spencer and King, 1989). This is the reason that certain algae blooms will appear to be more or less intense at different times of the day. Many blue-greens are efficient nutrient harvesters and can replenish depleted stores quickly when nutrients are available (Stewart, 1977). Some filamentous blue-greens (*Lyngbya sp.*) and greens (*Pithophora sp.*) form benthic (bottom) mats that continuously produce surface mats during the growing season. These benthic mats allow these species to persist from year to year (Lembi, 1988).

Control Methods

Algicides are the most commonly used method for controlling algae. They are relatively inexpensive, easy to use, and can provide acceptable levels of control (1-5 weeks). Algicides currently on the market have been tested in terms of environmental fate/toxicology and are considered safe when used according to labeled instructions (American Crop Protection Association, 1994). Copper, simazine, diquat, endothall, and acrolein have been used for algae control (Lembi, 1988).

Copper sulfate was first used as an algicide in the 1800's (Pearlmutter and Lembi, 1976). More recently, chelated and complexed copper compounds have been produced for use as aquatic herbicide/algicide (Rabe, Schuster, and Kohler, 1982). Two of these new formulations bind copper sulfate pentahydrate to special carriers that allow the active copper ion to remain in solution for an extended time. These formulations are called complexed copper compounds and are copper sulfate based. Other formulations, known as chelated copper, bind the copper ion to two nonmetal ions and are not copper sulfate based. Some chelated copper complexes (ethanolamine and triethanolamine) are more effective on algae and some (ethylenediamine) more effective on

vascular plants. Under alkaline conditions, copper reacts with dissolved carbonates and bicarbonates and is precipitated as insoluble copper carbonate where chelated copper compounds are more resistant to binding (Pieterse and Murphy, 1990). Copper sulfate controls unicellular and filamentous green algae, however if waters are treated with copper for many years, copper sensitive species are removed leaving the copper tolerant species (Muehelberger, 1969).

Simazine was one of the first chloro-triazines to be discovered, and is effective for algae control. However, simazine is no longer labeled for aquatic use (Pieterse and Murphy, 1990).

Diquat is a water-soluble herbicide whose properties were first described in the 1950's. It is a non-selective contact herbicide that rapidly desiccates green plant tissue by interfering with electron flow. Diquat at 0.75-1.5 ppm controls a number of mat-forming filamentous algae including *Cladophora sp.*, *Rhizoclonium sp.*, and *Spirogyra sp.* but some are resistant under field conditions (Pieterse and Murphy, 1990). Planktonic algae are also sensitive to diquat (Phlips et al. 1992).

Endothall is a heterocyclic compound first described in the early 1950's. Endothall is a contact herbicide, available as dimethylalkylamine that is an effective algicide and dipotassium salt that is used as a herbicide. Use of dimethylalkylamine endothall is limited because it is toxic to fish at levels above 0.3 ppm. However, rates of 0.05-0.2 ppm are effective for controlling many filamentous algae and rates up to 2.5 ppm are acceptable when no more than 1/10 of a water body is treated at one time.

Acrolein is a simple organic molecule that is toxic to both plants and animals. Acrolein causes skin and lung damage and its use is limited to irrigation canals for rapid control of weeds (Pieterse and Murphy, 1990). Acrolein is not registered for aquatic use in most areas including Florida.

As alternatives or supplements to chemical algicides, other practices have been developed for management of algae. Nutrient reduction, to reduce algal growth is perhaps the best optimal way to control algae (Lembi, 1988). However, reduction of nutrients to limiting levels is often not feasible. Draw-downs of water in lakes and ponds have been used to reduce the availability of nutrients. Draw-downs are not usually feasible in urban areas because those water bodies are primarily used for retention and (or) aesthetic purposes and odors may result that are not acceptable in residential areas. Completeness and duration of drying will determine how successful a drawdown will be. Draw-downs must last enough time for plant material to desiccate (Thayer, 1990). A drawdown followed by hand raking of *Lyngbya wollei* was successful for five years in a North Carolina pond (Speziale, personal communication). Aeration can also reduce planktonic blooms (*Microcystis*) in small stagnant ponds or large stratified lakes because mixing forces algae into less favorable environments (deeper or shallower water) (Zohary and Robarts, 1989).

Biological control of algae includes the addition of herbivorous fish, like grass carp, to water bodies. These fish will feed on various filamentous species such as *Cladophora sp.* and *Spirogyra sp.* (Sutton and Vandiver, 1986). Grass carp have been successful in ponds when stocked at high rates (25-30/acre) with young fish (10-12 inches) following an algicide treatment (Couch, 1993; Zolczynski, 1980). Grass carp are not, however, selective for algae and may detrimentally effect desirable macrophytes when present (Pauley, 1994). Therefore, prior to the introduction of grass carp the future uses of the water body must be considered.

Pond dyes are sometimes effective when filamentous algae mats are on the bottom in deep water. When growth is near the surface, initial physical removal or algicide treatment is recommended.

Looking for a better solution to aquatic weed and algae control?

It seems as if you've tried it all. You've sprayed. You've scooped. You've pulled them out by hand. Now take a whack at these nuisances with Komeen® aquatic herbicide and K-Tea™ algaecide.

Both Komeen and K-Tea now have new, expanded labels to include more weeds and algae. Komeen controls weeds such as Hydrilla, Water Hyacinth, Pondweed, Coontail, and Southern and Northern Naiads. K-Tea controls both planktonic and filamentous algae. And both are highly effective in virtually any type of water, even if it's hard or alkaline.

And not only do Komeen and K-Tea mow down aquatic weeds and algae, they require no re-entry or set-back restrictions, buffer zones or holding periods. After treatment you can use your water immediately for fishing, swimming, watering livestock and drinking.

See for yourself why Komeen and K-Tea are a cut above the rest. Contact Griffin Corporation, Rocky Ford Road, Valdosta, GA 31601, (912) 242-8635.

© 1994 Griffin Corporation. Komeen® is a registered trademark and K-Tea™ is a trademark of Griffin Corporation. Always read and follow label directions.

Griffin



A Survey of Current Problems in Florida

During the summer of 1996 we conducted a survey to identify the most common problematic genera of algae in various regions of Florida and the methods being successfully used for their control. Twenty ponds were surveyed in northeast, central, and southwest Florida. All ponds were in urban areas and used for water retention and/or aesthetics. Algae were identified to genera and a simple key was developed to identify the algae encountered in the survey

(Table 1). There are some discrepancies as to when a genera is considered problematic. For this project a species was considered problematic if it persistently grew to nuisance levels after all control efforts.

As reported by Lembi (1988) for other areas, all algae that occurred at problematic levels were blue-greens or greens (Table 1). The blue-green algae are viewed as the most noxious of the algae followed by the greens for the aforementioned reasons. Ponds surveyed were receiving chemical treatments with at least one or more of the three currently

labeled algicides; diquat, endothall, copper compounds, or pond dye (Tables 2-4). The algicide used did not seem to affect abundance, however the treatment rate and frequency affected occurrence of algae.

Maximized coverage and frequency of treatment seemed to be the most important factors determining algae abundance. It is recommended, for maximum coverage and effectiveness, to treat with lower rates more frequently e.g. instead of treating once with Copper sulfate at 1 ppm, treat daily

Table 1. Characteristics of problematic algae identified in northeast, central, and southwest Florida ponds.

Genus	Color	Texture	Other Features
<i>Lyngbya</i>	Blue, black to dark green	Blue-green Algae Filaments usually very slimy w/ no branching	Usually benthic with smaller surface mats, microscope needed for pos. id.
<i>Oscillatoria</i>	Blue, black, dark green to brown	Filaments usually very slimy w/ no branching	Microscope needed for pos. id.
<i>Hapalosiphon</i>	Dark green, blue	Filaments slimy w/ numerous irregular branches	Single branching, microscope needed for pos. id.
<i>Scytonema</i>	Jade green	Filaments not very slimy, w/ few branches	Branches irregular and sparse, microscope needed for pos. id.
		Green Algae	
<i>Spirogyra</i>	Bright green	Slimy "silk" algae, unbranched filaments	Chloroplast in spiral configuration in
<i>Pithophora</i>	Green with black swollen cells (akinetes)	Coarse "horsehair" algae, no slime	Long branches w/ akinetes (dark swollen cells)
<i>Rhizoclonium</i>	Bright green similar to <i>Spirogyra</i>	Less coarse than <i>Pith.</i> w/ little slime	Branches short w/o akinetes
<i>Microspora</i>	Green	Filament slimy and unbranched no swellings	Need microscopic evaluation of end walls
<i>Cosmarium</i>	Green, gives water green color	Microscopic cells, appear in pairs	All cells are spherical with interconnecting fibers (microscope needed)
<i>Coelastrum</i>	Green, gives water green color	Microscopic cells in globular colonies, connected by fibrils	Difficult to I.D. w/o microscope
<i>Closterium</i>	Dark green, sometimes brown	Gritty, texture of sand, highly silicate	Single, crescent-shaped cells, very uniform cell shape, (microscope may aid)

Table 2. Problem algae and algicides used for their control in northeast Florida ponds.

	Pond 1	Pond 2	Pond 3	Pond 4	Pond 5	Pond 6
Algae	<i>Spirogyra</i>	<i>Lyngbya</i> <i>Coelastrum</i> <i>Hapalosiphon</i>	<i>Closterium</i> <i>Oscillatoria</i>	<i>Pithophora</i>	<i>Spirogyra</i>	<i>Oscillatoria</i> <i>Spirogyra</i>
Algicides	Copper sulfate Endothall	Copper sulfate Endothall	Copper sulfate	Copper sulfate	Copper chelate Endothall	Copper sulfate
Frequency	monthly	monthly	monthly	monthly	monthly	monthly
Macrophytes	dense	sparse	sparse	dense	dense	sparse

Table 3. Problem algae and algicides used for their control central Florida ponds

	Pond 1	Pond 2	Pond 3	Pond 4	Pond 5
Algae	<i>Pithophora</i> <i>Lyngbya</i> <i>Microspora</i> <i>Dictyosphaerium</i>	<i>Spirogyra</i>	<i>Lyngbya</i>	<i>Spirogyra</i> and other green algae	<i>Spirogyra</i>
Algicides	Copper chelate Copper sulfate	Copper chelate w/surfactant Diquat	Aquashade Copper chelate	Endothall Diquat w/ Cide Kick	Aquashade Copper chelate
Frequency	weekly	weekly	weekly	weekly	weekly
Macrophytes	dense (mitigated)	sparse	sparse	moderate	moderate



For smooth sailing through tough aquatic weeds

AQUA-KLEEN®

Granular Aquatic Herbicide

- Easy-to-use, needs no special equipment.
- Effective and economical.
- Specially designed granules quickly sink to the bottom and release chemical into critical root zone.
- Treat large or small areas.
- No chemical buildup in bottom sediment.

Ask your chemicals supplier for AQUA-KLEEN® or write:

RP RHÔNE-POULENC

RHONE-POULENC AG COMPANY
P.O. Box 12014, 2 T.W. Alexander Drive
Research Triangle Park, NC 27709

AQUA-KLEEN is a registered trademark of Rhone-Poulenc.

for 3-5 days with 0.15 ppm. Maintaining copper sulfate at a concentration of 1ppm early in the growing season should give control for five weeks or longer because early treatment deters expansion by killing parent populations (Thomson, 1984). Ponds treated on a weekly basis had less visible algae than ponds treated every two weeks or monthly. Most ponds were receiving spot treatments only, targeting floating algae mats. Genera such as *Lyngbya* and *Pithophora* can have up to 85% of their biomass occurring benthically so for best results the entire water body should be treated and benthic mats targeted. Weighted hoses can be beneficial in treating benthic mats as well as granular forms of the algicides (Speziale, 1991; Pieterse and Murphy, 1990). Surface mats of filamentous algae can be difficult to control because the thickness of the mat protects algae underneath from lethal doses of algicide (Lembi, 1988; Speziale, 1988). Because algae are non vascular (lack water and food conducting tissues), no translocation occurs between cells so all cells need exposure to algicide for control. Coverage and effectiveness may be increased if mats are broken into smaller pieces or directly injected with algicide to increase contact of the algicide with cells.

All aquatic managers had aeration systems in some ponds. Aerators are beneficial in reducing planktonic unicellular algae through artificial mixing that disrupts its position in the water column (Edney, 1990). Two water managers were using grass carp but their effect on occurrence of algae was undetermined because of the

frequency of algicide application. As stated earlier, grass carp are effective when stocked in high numbers at a young age so periodic supplemental stocking of young fish would be pertinent to algae control (Couch, 1993). No one in this survey used mechanical harvesters due to expense and ineffectiveness. In all instances water bodies were used primarily for water retention and located in urban areas where decaying algae could produce offensive odors, therefore, drawdowns were not included in management programs. Aquatic managers did not report the presence of algicide resistant algae, but all genera were persistent and one pond had recently had a change in genera from a green to a blue-green. Algal shifts may be related to changes in water chemistry, however most managers had not assessed water parameters. It seemed that there was greater algal diversity in the southern portion of the state but this could be due to varying treatment rates and frequency, rather than specific environmental differences. All three areas surveyed had genera not found in the other two areas, but many genera were common to all areas (Tables 2-4).

Currently, there is no one-time treatment to control algal growths because it is impossible to destroy all algal cells using current control techniques and favorable conditions persist for re-establishment of populations. This survey demonstrated that aquatic managers can keep algal communities below problem levels. The key being appropriate application of the control methods available and keeping populations low with

frequent algicide applications, similar to maintenance control of waterhyacinth.

Acknowledgments

John Evertson (City of Orlando), Brad Hartman (Vegetation Management, Inc.), Tom Medel (Sarasota County) and Paul Myers (Applied Aquatic Management, Inc.) assisted with pond surveys and provided information. Mary Cichra (UF/IFAS Fisheries and Aquatic Sciences) assisted with handling and identification of algae.

Literature Cited

- American Crop Protection Association. 1994. From lab to label; the research, testing and registration of agriculture chemicals.
- Canfield, D.E., E.J. Philips and C. Duarte. 1989. Factors influencing the abundances of blue-green algae in Florida lakes. *Can. J. Fish. Aquatic Sci.* 46:1232-1237.
- Couch, R. 1993. Algae control using grass carp and simazine. *Aquatics*, pp. 15-16.
- Hamond, D. 1994. Florida game and fresh water fish commission concerns regarding the use of grass carp. Proceedings of the grass carp symposium, March 7, 1994, University of Florida, Gainesville. pp. 7-8.
- Harold, C.B., and M.J. Wynne. 1978. Introduction to the Algae Structure and Reproduction. Prentice-Hall, Inc. Englewood Cliffs, New Jersey
- Kaplan, D., A.E. Richmond, Z. Dubinsky, and S. Aaronson. Algal nutrition. Handbook of microalgal mass culture. pp. 147-198.
- Lembi, C.A., S.W. O'Neal and D.F. Spencer. 1988. Algae as weeds: economic impact, ecology, and management alternatives. In: Algae and Human Affairs, C.A. Lembi and J.R. Waaland (eds.). Cambridge Univ. press, Great Britain, 455-481 pp.

Table 4. Problem algae and algicides used for their control in southwest Florida ponds.

	Pond 1	Pond 2	Pond 3	Pond 4	Pond 5	Pond 6	Pond 7	Pond 8
Algae	<i>Pithophora</i>	<i>Scytonema Lyngbya</i>	<i>Rhizoclonium Lyngbya</i>	<i>Lyngbya</i>	<i>Pithophora</i>	<i>Spirogyra</i>	<i>Pithophora</i>	<i>Rhizoclonium</i>
Algicides	Copper sulfate Diquat	Copper sulfate Aquashade	Copper sulfate	Copper sulfate Diquat	Copper sulfate	Copper sulfate Diquat	Copper sulfate	Copper sulfate
Frequency	monthly	monthly	monthly	bi-weekly	bi-weekly	monthly	monthly	monthly
Macrophytes	sparse	moderate	sparse	sparse	sparse	sparse	sparse	sparse

- Lembi, C.A. 199-. Algal Identification. Midwest Aquatic Plant Mgmt. Society, newsletter. 6(1): 11-15.
- Muehlberger, C. 1969. The resistance to copper sulfate. Note. Morba/ Monatsschr. Ornithol., Vivarienkunde Angsg. B. Aquarien Terrarien. 16, (6), 208.
- Pauley, G.B. et. al. 1994. An overview of the use and efficacy of triploid grass carp as a biological control of aquatic macrophytes in Oregon and Washington State Lakes. Proceedings of the grass carp symposium, March 7, 1994. pp. 46-54.
- Paerl, H.W. 1988. Nuisance phytoplankton blooms in coastal, estuarine, and inland waters. Limnol. Oceanogr. 33: 823-847.
- Pearlmutter, N.L. and C.A. Lembi. 1976. Effects of copper sulfate on the green algae *Pithophora*. Proceedings North Central Weed Control Conference 1976. 31, pp. 103.
- Phlips, E.J., P. Hansen and T. Velardi. 1992. Effects of the herbicide Diquat on the growth of phytoplankton. Bull. Environ. Contamination Toxicology 49:750-756.
- Phlips, E.J. and J. Innat. 1995. Nitrogen fixation in a shallow sub-tropical lake (Lake Okeechobee, Florida). Arch. Hydrobiol. Beih. Ergebn. Limnol. 45:191-201.
- Pieterse, A.H. and K.J. Murphy. 1990. The Ecology and Management of Nuisance Aquatic Weeds. Oxford Science Pub., Oxford Univ. Press, New York, New York. pp. 136-161.
- Prescott, G.W. 1978. How to Know the Freshwater Algae. Wm. C. Brown Company Publishers, Debuque, Iowa. 293 pp.
- Rabe, R., H. Schuster, and A. Kohler. 1982. Effects of copper chelate on photosynthesis and some enzyme activities of *Elodea canadensis*. Aquatic Botany, 14, 167-175.
- Spencer, C.N. and D.L. King. 1989. Role of light, carbon dioxide and nitrogen in regulation of buoyancy, growth and bloom formation of *Anabaena flos-aqua*. Journal of Plankton Research. 11 (2): 283-286.
- Speziale, B.J., et al. 1988. Introduction to *Lyngbya wollei*. Aquatics: 10(2): 4-11.
- Stainer, R.Y. and G. Cohen-Bazire. 1977. Phototrophic prokaryotes: the cyanobacteria. Ann. Rev. Microbiol. 31: 225-274.
- Sutton, D.L. and V.V. Vandiver. 1986. A fish for biological management of hydrilla and other aquatic weeds in Florida. Bulletin No. 867, Institute of Food and Agricultural Sciences, University of Florida, Gainesville 32611.
- Thayer, D.D., K.A. Langeland, W.T. Haller, and J.C. Joyce. 1990. Weed control in aquaculture and farm ponds. Circular No. 707, Institute of Food and Agricultural Sciences, University of Florida, Gainesville 32611.
- Thomson, W.T. 1984. Agricultural Chemicals Book II. Thomson Publications. Fresno, CA.
- Whitford, L.A., G.J. Schumacher. 1984. A Manual of Fresh-water Algae. Sparks Press, Raleigh, NC. 324 pp.
- Zolczynski, S.J. and B.W. Smith. 1980. Evaluation of White amur (*Ctenopharyngodon idella*) for control of *L. wollei* in a 32 Hectare Public Fishing Lake. Proc., South. Weed Sci. Soc. 33: 196-203.

Aquatic Weed Control Products From Helena Chemical Company

Complete Line of Herbicides Including:
 Aqua-Kleen® Aquathol® Hydrothol® K-Tea™ Komeen®
 Reward® Rodeo® Sonar® Weedar®

Complete Line of Adjuvants Including:
 Kinetic® HV Optima® Quest® Induce® Dyne-Amic®

Aqua-Kleen® and Weedar® are registered trademarks of Rhone-Poulenc Ag Co.
 Aquathol® and Hydrothol® are registered trademarks of ELF Atochem.
 K-Tea™ and Komeen® are registered trademarks of Griffin Corporation.
 Reward® is registered trademark of Zeneca Professional Products, a business unit of Zeneca Inc.
 Rodeo® is a registered trademark of Monsanto Agricultural Products Co.
 Sonar® is a registered trademark of SePRO.

Helena Aquatic Specialist

F.E. "Chil" Rossbach
561-499-0486

Bonnie Figliolia
352-383-8139

Trace Wolfe
561-499-0486

Alochua, FL 904/462-4157

Hastings FL 904/692-3726

Dundee, FL 813/439-1551

Mt. Dora, FL 352/383-8139

Tampa, FL 813/626-5121

Ft. Pierce, FL 407/464-8660

Palmetto, FL 813/722-3253

Wauchoa, FL 813/773-3187

Immokalee, FL 813/657-3141

Belle Glade, FL 407/996-2011

Homestead, FL 305/245-0433

Delray Beach, FL 407/499-0486

HELENA People...Products...Knowledge...

Helena Chemical Company • 2405 N. 71st St • Tampa, FL 33619

FastEST for Sonar tells

*Sonar is a registered trademark of SePRO Corporation. FastEST is a trademark of SePRO Corporation. Always read and follow label directions. ©1996 SePRO Corporation



you what's up down here.



You already know how Sonar® effectively manages aquatic plant problems.

Now you can manage your Sonar application more accurately and economically with new *FasTEST*™ immunoassay technology.

FasTEST measures the level of Sonar to 1 ppb. So, whenever you need application management information or suspect a change in Sonar concentration — whether due to heavy rainfall, water movement or other environmental factors — *FasTEST* can tell you how to adjust your Sonar application.

And unlike other scientific tests, *FasTEST* is just what its name implies. Simply obtain a *FasTEST* kit from SePRO, gather a water sample and send it to the SePRO lab. You'll receive test results in 48 hours.

FasTEST™ for Sonar®

SePRO CORPORATION
internet: www.sepro.com
e-mail: sepro@worldnet.att.net

800-419-7779

Call today for a free *FasTEST* brochure. Or clip this coupon and mail or fax it to:

SePRO Corporation
11550 N. Meridian St. – Ste. 180
Carmel, IN 46032-4562
fax 317-580-8290



NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

DAYTIME PHONE () _____

BUTTERFLIES OF FLORIDA'S WETLANDS

Part I: Swallowtails, Whites, and Milkweed Butterflies

by Marc C. Minno
 St. Johns River Water
 Management District
 P.O. Box 1429
 Palatka, Florida 32178

Of the 160 or so species of butterflies that can be found in Florida on a regular basis, about 30% are closely associated with wetlands. Whereas some species rarely stray from home, others are good dispersers that may venture far outside of their natal habitat in order to find food or mates. Thus, it's not uncommon to find individuals of wetland species in xeric habitats, and upland butterflies in wetlands. A key element of the habitat that must be present in order to maintain a butterfly population is food for both the adult and larval stages. Adult butterflies usually feed on nectar in flowers, but some species also seek out fermenting fruit, sap flows, fresh dung, carrion, bird droppings, pollen, or concentrations of salt in wet soil. Wetland butterflies may be attracted to flowering plants and other resources in upland areas when little nectar is available in the wetlands. Butterfly caterpillars mostly feed on plant leaves, flowers, or developing fruit. The larvae of each particular butterfly species generally eat only a few species of plants.

I've classified the wetland affinity of Florida's butterflies based on a system first applied to plants by Reed (1988). Gerberg and Arnett (1989) provide a fairly current list of

butterflies found in the sunshine state. Since adult butterflies may easily move between different habitats, I've based my categories partly on the moisture requirements of the larval host plants (Mohlenbrock 1993). Butterflies are closely-linked to their hosts, and spend much of their lives as caterpillars. The wetland affinity categories and descriptions are as follows:

Obligate Wetland Butterfly

Adults are found in or near wetlands, and the larval hosts are all wetland species of plants.

Facultative Wetland Butterfly

Adults are usually found in wetlands, and the larval hosts are mostly wetland plants.

Facultative Upland Butterfly

Adults are sometimes found in wetlands, and the larval hosts occur equally in wetlands and uplands.

Obligate Upland Butterfly

Adults are usually found in uplands, and the larval hosts are mostly upland species of plants.

Obligate Upland Butterfly

Adults are mostly found in uplands, and the larval hosts are all upland species of plants.

This article deals with the families Papilionidae (Swallowtails), Pieridae (Whites and Sulphurs), and Nymphalidae: Danaeinae (Milkweed Butterflies). Eight butterflies (Figure 1), mostly of facultative wetland affinity, are described below. Table 1 summarizes the moisture requirements of their larval host plants.

Swallowtails (Family Papilionidae)

There are ten resident species of swallowtails in Florida. These are large butterflies that usually have tails on the hindwings. Four species of swallowtails regularly occur in wetlands.

1. *Papilio polyxenes asterius* (Eastern Black Swallowtail)

IDENTIFICATION: This is one of the smaller species of swallowtails in Florida. Wingspan ranges from 6.9 to 8.4 cm. Males are black with yellow bands. Females are mostly black with a flush of blue on the uppersides of the hindwings. The young caterpillars are brown with white markings, and resemble bird droppings. Older larvae are green with black bands and yellow spots. **HABITATS:** Uplands and herbaceous wetlands such as wet prairies and roadside ditches throughout Florida.

WETLAND AFFINITY: Facultative.

SEASON: Adults occur from February through November.

HOST PLANTS: The larvae eat the leaves, flowers and young seeds of *Oxypolis filiformis* (Water Dropwort), *Cicuta mexicana* (Water Hemlock), *Ptilimnium capillaceum* (Mock Bishop's Weed) as well as upland plants in the carrot family (Apiaceae).

2. *Papilio (Pterous) glaucus* (Tiger Swallowtail)

IDENTIFICATION: Adults are yellow with black borders and stripes. The upper hindwing has a blue flush in the female. Females have two color forms; yellow and

black like the male or entirely black with a blue flush. The dark stripes and borders typical of the Tiger Swallowtail can be seen on dark form females upon close inspection. About fifty percent of the females in Florida are of the dark form.

Wingspan ranges from 9.6 to 11.8 cm. The mature caterpillar is green with rows of blue spots on the abdomen and a pair of eyespots on the thorax. The caterpillar hides in a curled leaf that is lined with silk. HABITATS: Uplands and forested wetlands such as swamps, bayheads, and hydric hammocks throughout Florida, except the Keys and the southern tip of the peninsula.

WETLAND AFFINITY: Facultative in northern Florida; Facultative Wetland in central and southern regions of the state.

SEASON: Adults can be found from February through November. HOST PLANTS: The caterpillars feed on the leaves of trees including *Magnolia virginiana* (Sweet Bay), *Fraxinus caroliniana* (Pop Ash), as well as upland plants. Other species of ash are probably also used. Two races of the Tiger Swallowtail occur in Florida. The typical subspecies (*P. glaucus glaucus*) occurs in northern Florida and feeds on many different trees. The Southern Tiger Swallowtail (*Papilio glaucus australis*) is found in peninsular Florida, and appears to eat only Sweet Bay.

3. *Papilio (Pterous) palamedes* (Palamedes Swallowtail)

IDENTIFICATION: This large butterfly is very dark brown with bands of yellow spots. The underside of the hindwing has a narrow yellow stripe that parallels the body. Males and females are similar in coloration. Wingspan ranges from 7.5 to 11.0 cm. The young caterpillars are brown and white and resemble bird droppings. Older larvae are green above and reddish below. The abdomen has rows of blue spots. A pair of eyespots and a smaller pair of yellow spots occur on the thorax. The larvae do not make nests. HABITATS: Uplands and forested

wetlands such as the margins of swamps, bayheads, and hydric hammocks throughout Florida. The Palamedes Swallowtail is a rare visitor in the Keys.

WETLAND AFFINITY: Facultative.

SEASON: Adults occur from February through November.

HOST PLANTS: The caterpillars eat the leaves of *Persea borbonia* (Red Bay), *Persea palustris* (Swamp Bay), *Litsea aestivalis* (Pondspice), and a few upland trees in the laurel family (Lauraceae).

4. *Papilio (Pterous) troilus* (Spicebush Swallowtail)

IDENTIFICATION: The Spicebush Swallowtail is a large, black butterfly with a row of bluish spots along the outer margin of the wings, and an orange spot at the upper margin of the hindwing. The upper side of the hindwing is greenish in males and blue in females. Wingspan ranges from 7.2 to 9.0 cm. The caterpillar is very similar to the Palamedes Swallowtail, but has larger eyespots, is yellowish green

(especially along the sides), and lives in a folded or curled leaf lined with silk.

HABITATS: Uplands and forested wetlands such as the edges of swamps, bayheads, and hydric hammocks throughout much of Florida. The Spicebush Swallowtail is not found in the Keys.

WETLAND AFFINITY: Facultative.

SEASON: Adults occur from February through November.

HOST PLANTS: The larvae eat the leaves of *Persea borbonia* (Red Bay), *Persea palustris* (Swamp Bay), *Litsea aestivalis* (Pondspice), and several upland trees and shrubs in the laurel family.

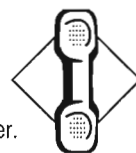
Whites and Sulphurs (Family Pieridae)

In Florida the family Pieridae is mostly represented by two groups, Whites (Pierinae) and Sulphurs (Coliadinae). As their names suggest, whites are mostly white and sulphurs are typically yellow. Pierids range in size from small to

**FRUSTRATED
LAKE MANAGERS,
.....
IT'S YOUR
CALL.**

**DON'T LET WEEDS PUT
YOUR LAKE ON HOLD!**

Clogged propellers, choked channels and bays, herbicide concerns, and swimming risks are minimized with an Aquarius Systems Aquatic Plant Harvester.



Water Managers worldwide recognize Aquarius Systems as the industry leader - proven by our 30 years of experience. For a complete product line catalog...

**CALL TODAY
1-800-328-6555**



**AQUARIUS
SYSTEMS**
A Division of D&O Products Inc.

220 N. Harrison St.
North Prairie, WI 53153
(414) 392-2162



medium. Of the 18 species of Whites and Sulphurs that have breeding populations in Florida, only a few are found in wetlands. The Barred Sulphur (*Eurema daira*) is a facultative upland species. This is a small yellow butterfly with dark borders and a black band across the lower forewing. The Barred Sulphur is frequently found in abundance near patches of American Joint Vetch (*Aeschynomene americana*). This plant has facultative moisture requirements, but often grows in disturbed, intermittently wet sites such as at the edges of ditches and retention ponds. The Falcate Orange Tip (*Paramidea midea*), a facultative species, has been found a few times in the Apalachicola basin of the Florida panhandle. It is a small white butterfly with orange patches at the tips of the forewings. The Falcate Orange Tip is probably established in Florida, but the ephemeral adults are only present for a few weeks each spring. The host plant may be *Cardamine bulbosa*, an obligate wetland plant in the cabbage family that grows at the edges of streams.

5. *Ascia monuste* (Great Southern White)

IDENTIFICATION: The Great Southern White is mostly white with a border of black wedges on the upper forewing. Males are pale yellow on the underside of the hindwings. Females usually have a small black spot near the upper middle of the forewing. The color of females varies from white to dark gray. Females are also grayish on the underside of the hindwing. Wingspan ranges from 4.5 to 6.0 cm. The caterpillar is yellow with gray stripes and small shiny black spots.

HABITATS: Salt marshes and uplands, especially coastal areas of south and central Florida.

WETLAND AFFINITY: Facultative.

SEASON: Adults occur all months of the year in south Florida.

HOST PLANTS: The larvae eat the leaves, flowers, and young seeds of *Batis maritima* (Saltwort), *Cakile*

spp. (Sea Rocket), and upland plants in the cabbage (Brassicaceae) and nasturtium (Tropaeolaceae) families.

Milkweed Butterflies (Family Nymphalidae, Subfamily Danainae)

The family Nymphalidae is a diverse assemblage that contains numerous subgroups, including milkweed butterflies. There are three species of milkweed butterflies in Florida. These are relatively large butterflies with black and orange or brown color patterns. All three species may be found in wetlands.

6. *Danaus gilippus* (Queen)

IDENTIFICATION: The Queen butterfly is mahogany brown with black borders and small white spots on the forewings. Males have a black pouch on the upper hindwing that produces pheromones used in courtship. Wingspan ranges from 6.4 to 7.6 cm.

The larva has three pairs of fleshy filaments, and is striped with black and white. There is a broad black stripe containing a dorsal pair of oblong whitish or yellow spots across the middle of each segment.

HABITATS: Wet prairies, margins of swamps, and uplands throughout the state, but uncommon in north Florida.

WETLAND AFFINITY: Facultative.

SEASON: Adults occur all months of the year in south Florida.

HOST PLANTS: The larvae eat the leaves of Pink Swamp Milkweed (*Asclepias incarnata*), Lance-Leaved Milkweed (*Asclepias lanceolata*), White Swamp Milkweed (*Asclepias perennis*), White-Vine (*Sarcostemma clausum*) and upland species of milkweeds.

7. *Danaus eresimus* (Soldier)

IDENTIFICATION: The Soldier is similar to the Queen butterfly, but is yellowish brown in color. Unlike the Queen the Soldier usually has a row of pale spots on the underside of the hindwing. The caterpillar is

I'VOD
the natural advantage

I'VOD Spray Technology

affords you all the above advantages for herbicide application. I'VOD is made with natural limonene oil that creates a thick mayonnaise-like droplet which controls drift, aids penetration and sticking and resists rain...all in **one** product. Improve herbicide reach without increasing drift...with I'VOD.

Contact the Adjuvant Experts for more information on I'VOD.

Toll Free
800-228-1833

BREWER International

P.O. Box 6006 • Vero Beach, FL 32961-6006 • 561-562-0555 • Fax: 561-778-2490



Figure 1. Swallowtails, whites, and milkweed butterflies that occur in wetland habitats of Florida. The uppersides of the males are shown.

Environmental Waterway Management Continues to Grow!

Services now include

- Lake Management
- Right-of-Way Vegetation Control
- Wetlands Planting & Maintenance
- Exotics Control
- Mechanical Harvesting
- Industrial/Agricultural/Vegetation Management

*We proudly announce
new services
and our new name...*



1-800-832-5253



Serving Sunbelt States Since 1974

also very similar to the Queen in having three pairs of fleshy filaments, but is uniformly striped with narrow bands of black, yellow, and white.

HABITATS: Uplands, wet prairies, and the margins of swamps in south and central Florida.

WETLAND AFFINITY: Facultative.

SEASON: Adults occur all months of the year in south Florida.

HOST PLANTS: The caterpillars eat the leaves of *Sarcostemma clausum* and upland milkweeds.

8. *Danaus plexippus* (Monarch)

IDENTIFICATION: The Monarch is orange with black borders and veins. The outer borders have two rows of small white spots. Males have a black scent pouch on the upper hindwing. Wingspan ranges from 8.1 to 10.0 cm. The caterpillar has only two pairs of fleshy filaments, and is striped with yellow, white, and black.

HABITATS: Uplands, wet prairies, and margins of swamps throughout Florida.

WETLAND AFFINITY: Facultative Upland.

SEASON: In north Florida, the monarch is usually present from April through June, and again from late August until December. In the south and central part of the state, resident populations occur, with adults present all months of the year.

HOST PLANTS: *Asclepias incarnata*, *Asclepias lanceolata*, *Asclepias perennis*, occasionally *Sarcostemma clausum*, and upland species of milkweeds.

Literature Cited

- Gerberg, E. J. and R. H. Arnett, Jr. 1989. Florida Butterflies. Natural Science Publications, Inc., Baltimore, Maryland. 90 pp.
- Mohlenbrock, R. H. 1993. Wetland and transition plants of peninsular Florida. Wetland Training Institute, Poolesville, Maryland. 61 pp.
- Reed, P. B., Jr. 1988. National list of plant species that occur in wetlands: national summary. U.S. Fish and Wildlife Service Biol. Report 88(24). 244 pp.

Table 1. Wetland host plants of swallowtails, whites, and milkweed butterflies of Florida, and host indicator status or degree of wetland tolerance [OBL = obligate wetland plant (always in wetlands), FACW = facultative wetland plant (usually in wetlands), FAC = facultative (equally likely to occur in wetlands and uplands), "+" = favors wetter habitats].

FAMILY	NAME	INDICATOR STATUS
Apiaceae	<i>Cicuta mexicana</i> (Water Hemlock)	OBL
	<i>Oxypolis filiformis</i> (Water Dropwort)	FACW+
	<i>Ptilimnium capillaceum</i> (Mock Bishop's Weed)	OBL
Asclepiadaceae	<i>Asclepias incarnata</i> (Pink Swamp Milkweed)	OBL
	<i>Asclepias lanceolata</i> (Lance-Leaved Milkweed)	OBL
	<i>Asclepias perennis</i> (White Swamp Milkweed)	OBL
	<i>Sarcostemma clausum</i> (White-Vine)	FACW
Bataceae	<i>Batis maritima</i> (Saltwort)	OBL
Brassicaceae	<i>Cakile</i> spp. (Sea Rocket)	FAC
Lauraceae	<i>Litsea aestivalis</i> (Pondspice)	OBL
	<i>Persea borbonia</i> (Red Bay)	FACW
	<i>Persea palustris</i> (Swamp Bay)	FACW
Magnoliaceae	<i>Magnolia virginiana</i> (Sweet Bay)	FACW+
Oleaceae	<i>Fraxinus caroliniana</i> (Pop Ash)	OBL

1997 SCHOLARSHIP GRANT

The South Carolina Aquatic Plant Management Society is seeking applications for its annual scholarship grant. If an appropriate applicant is found, the Society will award its fifth annual grant at its Annual Meeting in August 1997. The amount of the grant has been increased to \$2,000 for 1995. Grant funds may be used by the recipient to cover any costs associated with education and research activities.

Eligible applicants must be enrolled as full time undergraduate or graduate students in an accredited four year college or university in the United States. Coursework or research in an area related to the biology, ecology or management of aquatic plants in the Southeast is also required.

Applications must be received no later than April 1, 1997 and will be evaluated on the basis of relevant test scores (ACT, SAT, GRE, etc.), high school and/or college grades, quality and relevance of research or coursework, a proposed budget, information obtained from references, and other related considerations. Other factors being equal, preference will be given to applicants enrolled in Southeastern and South Carolina academic institutions.

The successful applicant may be requested to present an oral report on research activities at the Society's Annual Meeting.

Persons interested in applying for the scholarship grant should contact Danny Johnson, S.C. Department of Natural Resources, 1201 Main Street, Suite 1100, Columbia, South Carolina 29201, phone (803) 737-0800 for additional information on application procedures.

CALL FOR PAPERS

FAPMS 1997 Annual Meeting

October 7-9 are the dates. Sheriton West Palm Beach is the place. And NOW is the time to submit your paper for the 1997 FAPMS Annual Meeting.

DEADLINE FOR SUBMISSION IS July 11, 1997.

Submit this form to:

Mike Hulon
600 North Thacker Avenue, Suite A1
Kissimmee, FL 34741
Voice: 407/846-5300,
FAX: 5310

ATTENTION

Scholarships Available

Need cash to send your dependents to college? **New deadline** for the 1997 FAPMS Applicator Dependent Scholarships and Graduate Student Scholarships is **May 1, 1997**. Awardees will be notified by mid-June, 1997.

For Applications or Information

Contact Dr. Joe Joyce, Sec/Tres, FAPMS Scholarship and Research Foundation, Inc., University of Florida
P.O. Box 110180, Gainesville, FL 32611-0180
(352) 392-1971 or FAX (352) 392-6932
e-mail: jcj@gnv.ifas.ufl.edu

AQUAVINE



HARVESTING EQUIPMENT FOR SALE

Hess Lake Improvement Association of Newayge, Michigan offers for sale the following equipment:

1. 1983 8-foot cut harvester: Custom built by John Maey and Sons, diesel powered, twinscrew 8ft cutting bed, hydraulic operation.
2. Trailer: Dual axle, hydraulic winch, new cable and tires.
3. Hydraulic elevator: Mechanicals updated in 1995.
4. Diesel fuel tank cart.

Equipment meticulously maintained by our association. Replacement cost in excess of \$100,000. Our price is \$40,000 complete. Photos available. Financing available.

Call Dick Besser

Days: 616-458-5700 eves: 616-652-2009

ELF ATOCHEM Receives 24(C) Special Local Need Registration for Aquathol K in State of Florida

Philadelphia, PA—October 28, 1996—Elf Atochem North America, Inc., received a 24(c)—special local need (SLN) registration from the state of Florida for its Aquathol K aquatic herbicide for use in bodies of water used for potable water.

The 24(c) label allows the application of Aquathol K within 600 feet of potable water intakes in programs approved and permitted by Florida DEP. The SLN is in effect immediately for the state of Florida.

Product manager Gerald Adrian said, "the SLN allows for a broader use of Aquathol K by the aquatic weed management industry in Florida." Aquathol K effectively controls submerged aquatic weeds including hydrilla and milfoil in irrigation and drainage canals, ponds, and lakes. For a copy of the

We're Here To Help.

We've got the products you want—when and where you want them. Choose from a complete line-up of name-brand herbicides, algaecides, adjuvants and much, much more. They're in stock and ready for immediate delivery. Plus, we back each and every one of the products we handle with top-quality service and expert technical support. Let us help you. Contact your Terra aquatics specialist.

Northern Florida: Vera Gasparini
Mobile: 407-376-5073
Beeper: 800-207-1440

Southern Florida: Beth Foran
Mobile: 941-470-0298
Beeper: 800-207-1408



Terra Industries Inc.
4144 Paul Buchman Highway
Plant City, Florida 33565
1-813-752-1177 ext. 229
1-888-837-7235
www.terraindustries.com

aquathol k SLN label contact elf
atochem at 1-800-438-6071 or Bill
Moore at 352-242-2360.

MEETINGS

IFAS Center for Aquatic Plants 1997
Research Review and Aquatic Plant
Managers Workshop, University of
Florida J. Wayne Reitz Union
Auditorium Gainesville, FL, March
11-12, 1997, Contact the IFAS Office
of Conferences & Institutes at 352/
392-5930.

Aquatic Weed Control, Aquatic
Plant Culture and Revegetation
Short Course, Rolling Hills Hotel
and Fort Lauderdale Research and
Education Center, Fort Lauderdale,
FL, May 12-15, 1997, Contact the
IFAS Office of Conferences &
Institutes at 352/392-5930.

Aquatic Plant Management Society
37th Annual Meeting, Sanibel
Harbour Resort and Spa, Fort Myers,
FL, July 13-16, 1997, Contact Alison
Fox at 352/392-1808.

Florida Aquatic Plant Management
Society 1997 Annual Meeting,
Sheriton, West palm Beach, October
7-9, 1997, Contact Mike Hulon,
Program Chair at 407/846-5300.

First President Honored

A surprise luncheon was held for
Les Bitting at the Gold Club of
Plantation in Fort Lauderdale,
Florida on December 13, 1996. Les,
the Florida Aquatic Plant Manage-
ment Society's first president, was
presented with a plaque, which
bestowed on him the Society's first
Honorary Lifetime Membership
Award. The award was presented by
Harold Brown, the society's second
president. Les retired from Old
Plantation Water Control District on
March 31, 1995, where his career
began in aquatic plant management
on March 31, 1947.

Instigated by Bill Haller, attendees
heard stories about the early days of
FAPMS and memories of the "old
days" surfaced (just like hydrilla).

We will be forever grateful for
Les' vision and foresight, which led



Golf Club of Plantation

*Front Row left to right: Ross Hooks, Bill Haller, Harold Brown, Les Bitting, David Sutton
Back Row left to right: Alison Fox, Ernie Feller, Mike Bodle, Don Doggett, Harry O'Quinn*

to the formation of the Florida
Aquatic Plant Management Society.
We wish him a healthy and happy
retirement and hope to see him at
our annual meetings!

A special "thanks" to David
Sutton, who organized the luncheon.

**WANTED -
PICKERELWEED SITES**

Suitable sites are needed for
research into the growth and
herbivory of pickerelweed in
Florida. Requirements include:

- At least 1 acre dominated by
pickerelweed (any shape area)
- Minimal (<1 ft) or predictable
water level changes

- Frequent access possible from
shore or by boat

- Likely for plants, PVC poles,
and cages to be left undisturbed. If
you know of sites that fit all, or
most, of these requirements in
which research could be conducted
over the next three years, please
contact: Alison Fox, University of
Florida, Tel: (352) 392-1808, e-mail:
amfox@gnv.ifas.
ufl.edu.

Also, we will be looking for native
herbivores of pickerelweed, so please
let Alison know if during 1997 you
observe any clumps/areas of these
plants being damaged by insects.

**AMSTERDAM NORTH HOLLAND, THE NETHERLANDS
"DRASTIC DRAWDOWN"**

Jim Kelley

According to an old saying "God created the world but the Dutch created
Holland."

Almost 50% of the Netherlands has been created by pumping water out of
areas that were once swamps, marshes and shallow river estuaries. These are
now cities, farms, airports, and paved parking lots.

Dikes were built around wet areas and wind mills were used to pump the
water into canals that flow to the North Sea. Because much of the country is
below sea level the pumping is a never ending process. Today, electric pumps
are used but over 1000 wind mills have been restored and are being main-
tained with help from the governments.

In 1953, storms broke the dikes in the south western delta area and the
sea flooded the land. More than 1800 people were drowned.

Hundreds of miles of canals criss-cross the country and numerous
species of aquatic plants can be found in many of these canals, which include
duckweed, cattails and African eodea (Lagarosiphon sp.).

On our family trip to Holland this summer, I found the main mode of
transportation to be the bicycle. I hadn't been on one in about 30 years, so I
was glad to have leisurely checking the canals for new plant species as a
reason to stop every few hundred feet.

Continued from page 3

REPRESENTATIVE KEN PRUITT-R
CHAIR, APPR. SUB COMMITTEE ON
GENERAL COST
2400 SE MIDPORT ROAD, SUITE 110
PORT ST. LUCIE, FL 34952-4806
W-61 -335-8000

REPRESENTATIVE RANDY MACKEY-D
-APPROPRIATION SUB COMMITTEE
ON GENERAL GOVERNMENT
P.O. BOX 1541
LAKE CITY, FL 32056-1541
W-904-758-0480 F-904-758-0479

Contacting any or all of the above
legislators is a start to acquiring a
dedicated funding source. Please, if you
truly care about our natural resources
you will start today!

For more information contact me at
407-846-5300

Thank you,

Mike Hulon
Governmental Affairs
Committee Chair

You Might Be a "Nozzle-Head" If*

If the thought of public speaking
bothers you more than hand
propping an airboat.

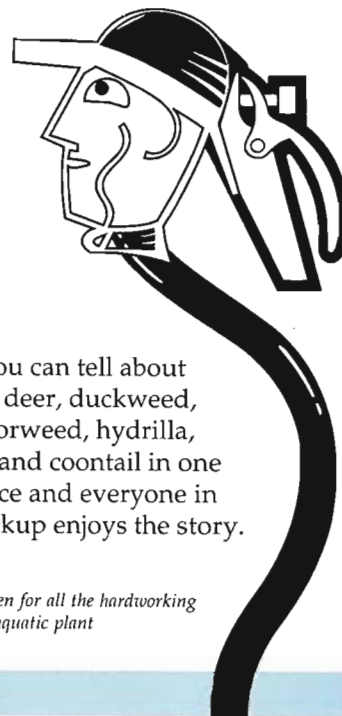
If you save the lids off 5 gallon
plastic buckets to give to your kids
as frisbees on Christmas morning.

If your bilge pump has been
bored out and has headers and an
overhead cam.

If there is more oil on the cage of
your cleanest sprayboat than inside
the oil pan.

** Copyright © and Disclaimer!*

Hopefully to be considered as light humor by most, this column is written for all the hardworking and caring professionals who dedicate their work afield to excellence in aquatic plant management. David Tarver



If you can tell about
killing deer, duckweed,
alligatorweed, hydrilla,
ducks and coontail in one
sentence and everyone in
the pickup enjoys the story.

Fatal Beauty

The water hyacinth is as insidious as it is beautiful. Left to its own devices, this proud beauty will continue to spread—eventually choking out waterways and making them unusable to man and uninhabitable to fish.

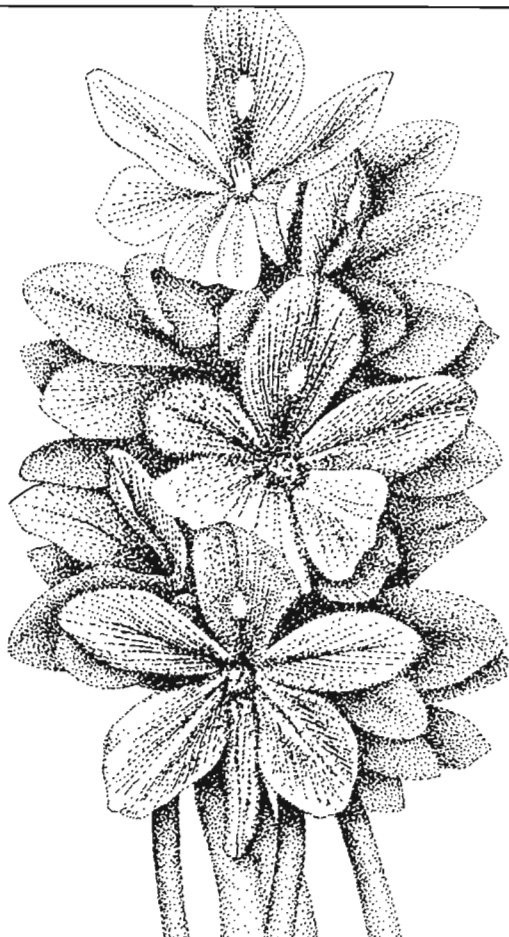
But you need not yield to this charming beauty. Reach for WEEDAR® brand 64 herbicide. WEEDAR 64 effectively controls water hyacinth, resulting in clean, usable waterways. Apply by surface or air when plants are actively growing and repeat applications as necessary to control regrowth.

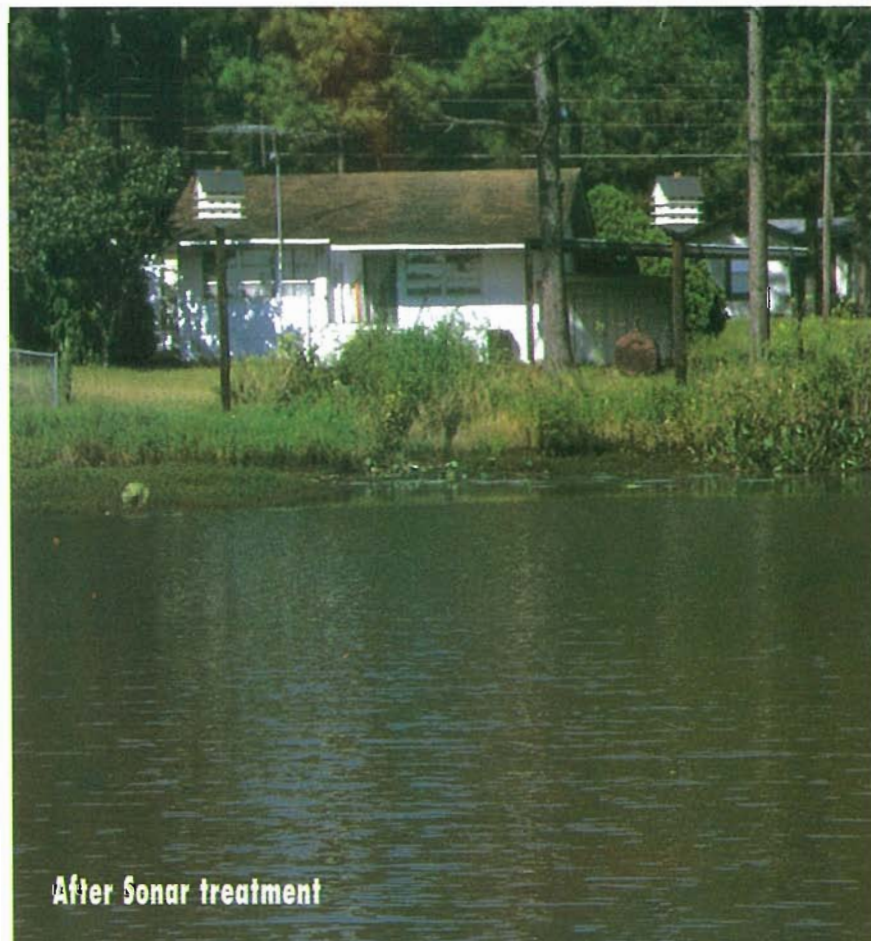
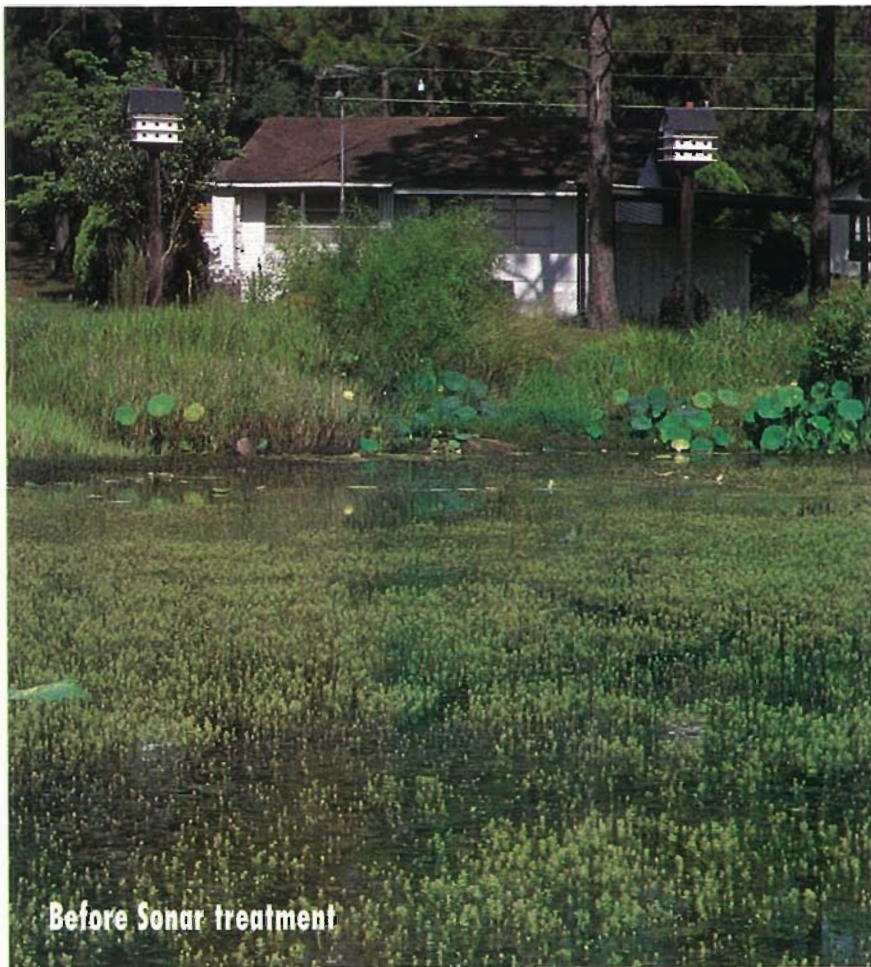
You might say—WEEDAR 64 is fatal, to the fatal beauty. Ask your chemical supplier for WEEDAR® 64 herbicide.



RHONE-POULENC AG COMPANY
P.O. Box 12014, 2 T.W. Alexander Drive
Research Triangle Park, NC 27709
800/334-9745

WEEDAR is a registered trademark of Rhone-Poulenc.





Sonar. Because you want to live on the water. Not in the weeds.

You love how the water shimmers in the afternoon sun. Somehow, it makes everything right with the world. That's the reason you live here.

But now, something's invading this tranquil place of yours. Aquatic weeds, growing in excess. Normally, they're important to water ecology, but too much Eurasian watermilfoil, Hydrilla, Duckweed and other weeds will start taking away the natural beauty you love so much. Not to mention all your recreational activities.

With Sonar,* however, you can make things right again. Sonar has been used for years by professional aquatic weed managers in public lakes and waterways. It's the most effective and cost-efficient treatment available because it offers selective, long-term control of the weeds you don't want, with only one application a year. Unlike other products, Sonar has very few restrictions. It's also convenient to use, and it allows you to enjoy the recreational activities you love.

You live here for the water, not the weeds. So, take back what you love, with Sonar.



For a **FREE 24-Page Sonar Brochure and information** about where you can purchase Sonar call:
1-800-419-7779

Clip this coupon and mail or fax to:



*Trademark of SePRO Corporation
11550 North Meridian Street
Suite 180, Carmel, IN 46032
Fax 1-317-580-8290

Internet: <http://www.sepro.com>

Name _____

Address _____

City _____

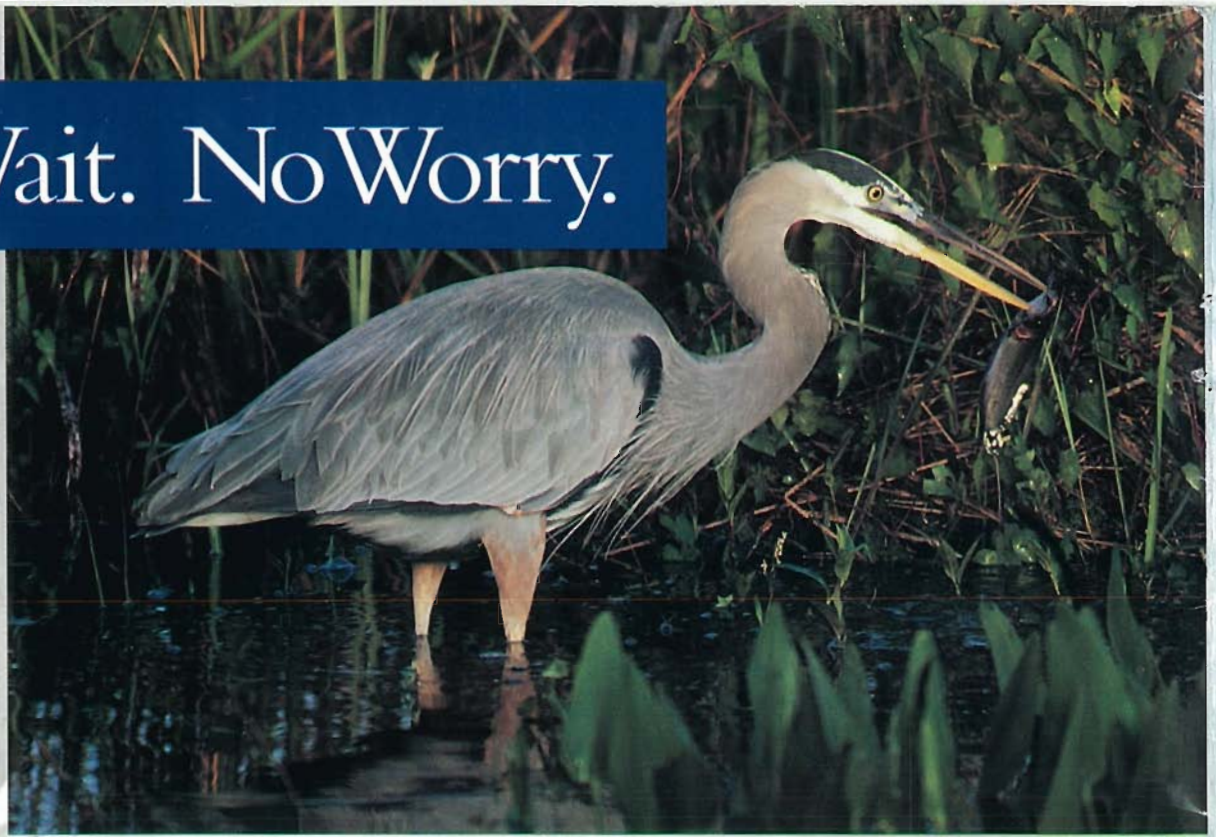
State/Zip _____

Daytime Phone (____) _____

Pond Lake Size in Acres _____



No Wait. No Worry.



**REWARD®. THE NO-WAIT,
NO-WORRY HERBICIDE FOR
AQUATIC WEED CONTROL.**

REWARD never makes you wait. Once applied, it spreads quickly through the water and makes fast contact with aquatic weeds. Absorbed by unwanted plants in just minutes, REWARD controls floating weeds in less than 10 days and submersed weeds in less than 30. Without worry about toxicity to fish or wildlife. For your aquatic weed problems above and below the surface.

REWARD, for broad-spectrum aquatic weed control without the wait and the worry.

**For more information, contact
your Zeneca representative, or
call 1-800-759-2500.**



REWARD®
Herbicide

ZENECA Professional Products

Always read and follow label directions carefully.
REWARD® is a trademark of a Zeneca Group Company.
©1996. Zeneca Inc. A business unit of Zeneca Inc.