



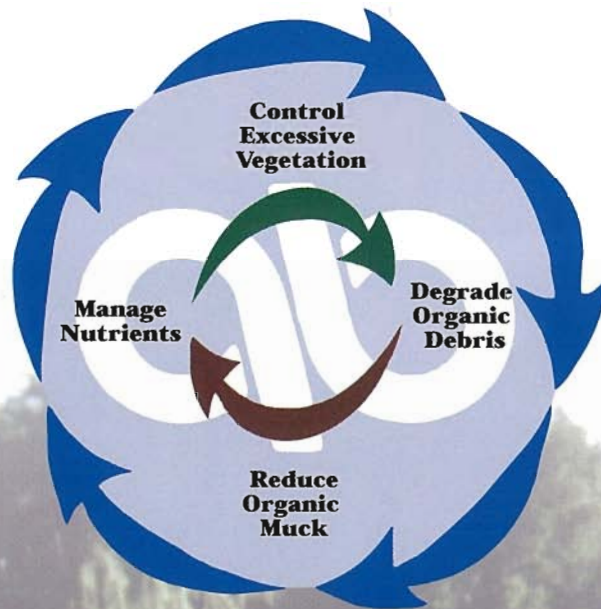
Aquatics

Summer 2007

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Editorial

***Aquatic Plant Identification:
Is An Update Needed?***

Aquatic plants of the same species can often display a wide range of characteristics such as general morphology, vigor, and color depending upon the waterbody and time of year. This range of characteristics often challenges the current training materials used by aquatic plant applicators. In addition, there are issues such as biotype differences in hydrilla, hybridity in milfoil populations, and herbicide resistance that often require molecular verification. These differences are certainly not obvious to the typical aquatic plant manager, but they

Continued on page 21



*Cover photograph
by Mary
Campbell. Glade
Creek Grist
Mill located in
Babcock State
Park, West
Virginia*

Aquatics

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APMS



■ Our Mission

The Aquatic Plant Management Society promotes environmental stewardship through operations, research, education, and outreach related to integrated vegetation management in aquatic systems.



Too Many Weeds Spoil the Fishing



Exotic invasive aquatic plants such as Hydrilla, Eurasian Water Milfoil, Curlyleaf Pondweed, Water Chestnut and Water Hyacinth can be detrimental to a healthy fishery in lakes across the country.

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Who We Are

The Aquatic Plant Management Society is an international organization of scientists, educators, students, resource managers, administrators, and concerned individuals interested in the management and study of aquatic plants. Membership reflects a diversity of federal, state, and local agencies; universities and colleges around the world; corporations; and small businesses.

What We Do

The Aquatic Plant Management Society is a respected source of expertise in the fields of biological, mechanical, and chemical aquatic plant management and aquatic plant sciences. The Society has grown to include several regional and state chapters. Through these affiliates, annual meetings, newsletters, and



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the *Journal of Aquatic Plant Management*, the APMS promotes the latest developments in the field of aquatic plant management.

Why We Do It

APMS is a not-for-profit organization whose officers, directors, and committee members serve on a volunteer basis. The objectives of the Society are to assist in promoting the management of nuisance aquatic plants, to provide for the scientific advancement of members of the Society, to encourage scientific research, to promote university scholarships, and to extend and develop public interest in the aquatic plant science discipline.



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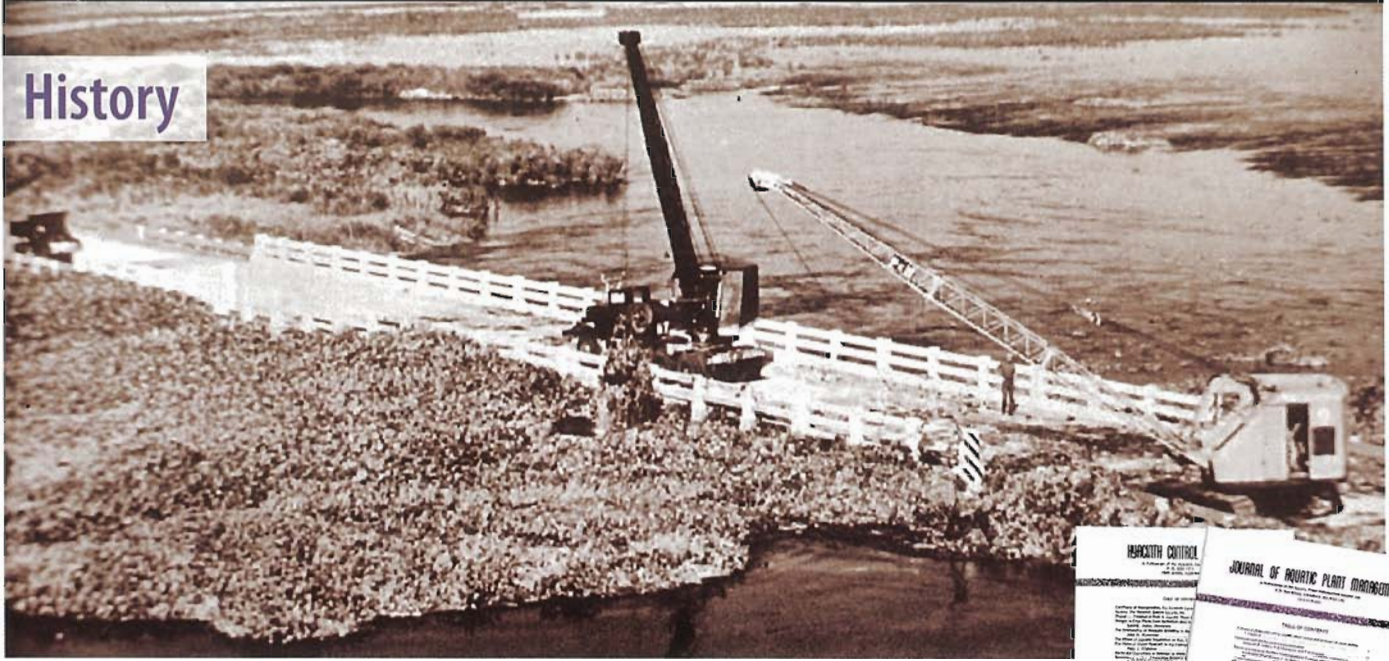
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History



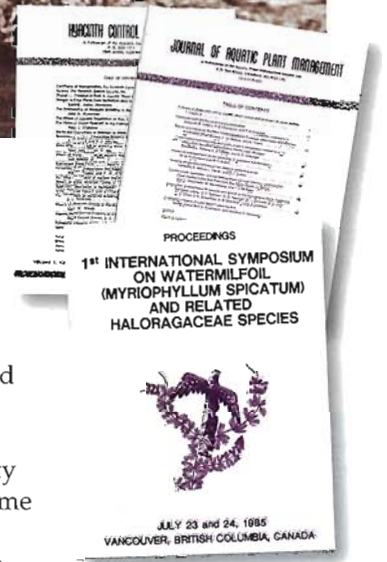
Water hyacinth jam on a south Florida bridge ca. 1960.

Then

The APMS is one of the first organizations formed exclusively to develop strategies to manage invasive species in natural areas. The APMS incorporated as the Hyacinth Control Society, Inc. on July 19, 1961 primarily for managers to share information on their efforts to control invasive water hyacinth growth in Florida's lakes, rivers, and canal systems.

Realizing that water hyacinth was only one of many invasive plant species infesting aquatic ecosystems and plaguing water resource managers, the Hyacinth Control Society expanded its focus to all aquatic plant species in all regions of the US, and in 1976 became the Aquatic Plant Management Society.

The APMS extended its outreach in 1985, sponsoring an International Symposium on Watermilfoil, and in 1992 with an International Symposium on the Biology and Management of Aquatic Plants. The latter was attended by more than 300 researchers and managers from 30 different countries.



Now

Today, APMS members reside in more than 50 states and countries with 15% of Journal contributions from outside the US. While the APMS focuses on applied research, chapters assist in developing operational solutions to local and regional problems.



Membership Makeup

Membership of the APMS is comprised of approximately 250 researchers, administrators, industry representatives, and resource managers from across the US and other countries. Seven regional chapters gather an additional 1,200 members under the APMS umbrella.

APMS Regional Chapters



- Florida www.fapms.org
- Midsouth www.msapms.org
- Midwest www.mapms.org
- Northeast www.neapms.net
- South Carolina www.scapms.org
- Texas www.tapms.org
- Western www.wapms.org

Information Sharing

Publications

APMS Members receive the *Journal of Aquatic Plant Management*, the banner publication of the Aquatic Plant Management Society. The *Journal* is published twice annually presenting peer-reviewed results of current research on plant physiology and management strategies. Members also keep in tune with current events through *Aquatic*

Plant News, a newsletter published three times each year, and through quarterly issues of *Aquatics* magazine. *Aquatics* is produced by the Florida Chapter of the APMS. Plant physiology and management articles focus on Florida; however, content is published from around the country and issues are relevant to all aquatic plant managers.



Member Benefits



The APMS actively supports members through a variety of platforms including: information sharing; student initiatives; instructional materials; and expert support.

The *Journal of Aquatic Plant Management* was first published in 1962. Issues three or more years older than the current issue are available online at www.apms.org.

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■ Annual Conference

The APMS holds an Annual Conference in mid-July as a venue to present the latest research developments and management results as well as a forum for

members to discuss research direction and management strategies. The conference features about 60 oral presentations and an evening poster presentation / reception for

attendees to interact with authors in a relaxed and personal setting.

Regional chapters assist in developing annual program content oriented toward the region in which the conference is held. Program directors assemble expert speakers to participate in half-day workshops at annual conferences to discuss matters of regional and national significance. Recent topics include: plant tolerance and resistance to herbicides; toxic and harmful algae and cyanobacteria; and the US Environmental Protection Agency herbicide registration process.



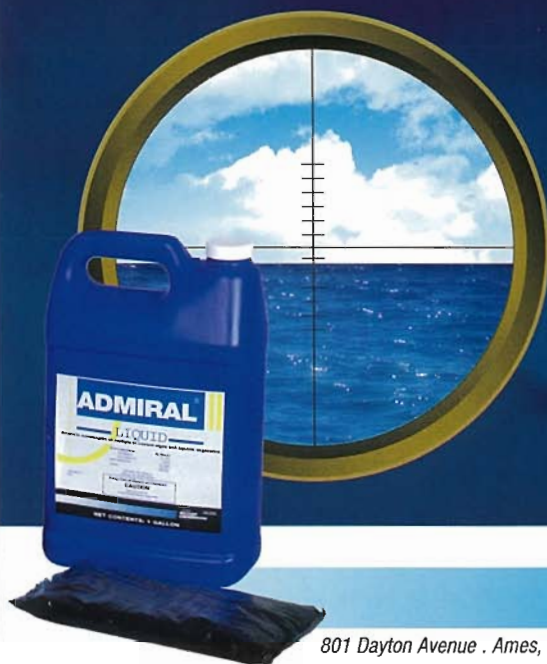
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Student Initiatives

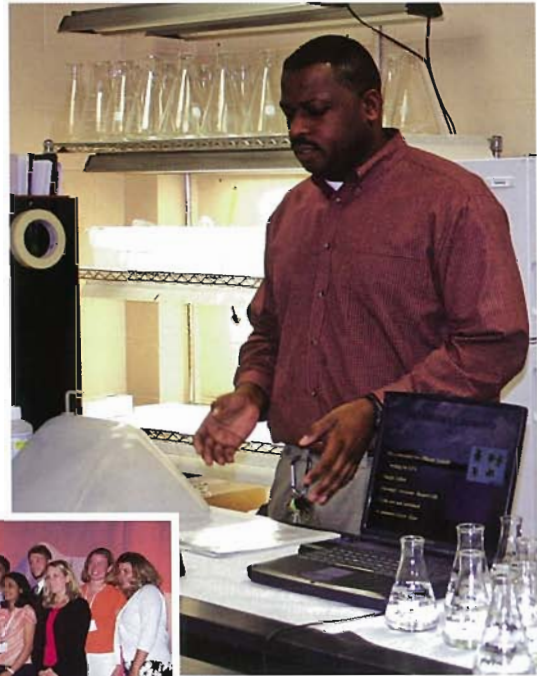
The APMS is committed to educational initiatives at all levels.

■ Student Participation

Realizing that students represent the future of aquatic plant management, the APMS sponsors a number of programs to promote student involvement in Society affairs.

Students compete for cash awards (\$300 – 1st place; \$200 – 2nd place; \$100 – 3rd place) in both oral and poster presentation categories at the annual conference. Also for students in this competition: registration fees are waived; lodging expenses are paid by the Aquatic Ecosystem Restoration Foundation (AERF); and students receive a choice of text or reference books.

The APMS Student Affairs Committee organizes student activities, and students appoint a representative to voice their perspectives at APMS Board of Director Meetings.



■ Graduate Student Stipend

The APMS awards graduate student stipends to a research institution from contributions from the APMS, regional chapters, the AERF, and individual sponsors. The recipient is chosen from a panel of APMS and regional chapter representatives to conduct research on nationally significant issues.



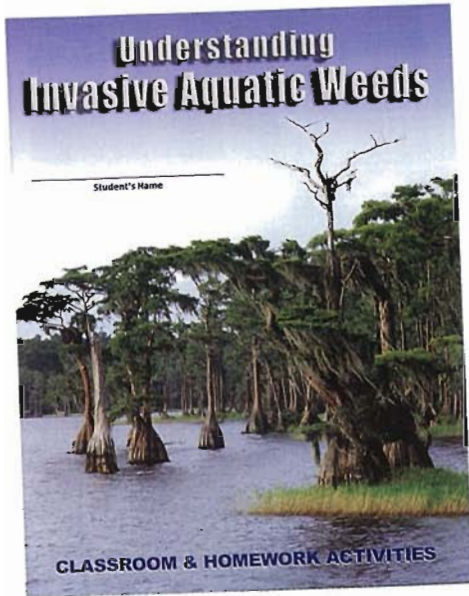
APMS President Eric Barkemeyer presents the 2005 Graduate Student Stipend to Dr. Susan Wilde of the University of South Carolina.

Previous Graduate Stipend Awards

- 2001 **Dr. Mary Bremigan, Michigan State University**
\$34,000 – Indirect effects of Sonar application on lake food webs
- 2003 **Dr. Katharina Engelhardt, University of Maryland**
\$40,000 – Controlling non-native aquatic macrophyte species in Maryland reservoirs
- 2005 **Dr. Susan Wilde, University of South Carolina**
\$60,000 – Relationships between aquatic plants and Avian Vacuolar Myelinopathy

Instructional Material

Through member and corporate sponsorship, the APMS publishes a 16-page workbook to introduce teachers and students to the problems and management strategies for five invasive aquatic weeds. Teachers collaborated in producing this workbook that meet state teaching standards and benchmarks in math and language arts appropriate for grades 4-7.



The APMS ships booklets free to teachers in 30-copy packages or boxes with 4 packages. Order through, or copy from, the APMS website at www.apms.org/activity.htm.



The APMS has sponsored a number of field guides and posters on native and invasive aquatic plants.

Expert Support

The APMS is a sponsor of National Invasive Weed Awareness Week held each year during the last week of February / first week of March.

APMS members are a good source of expertise for local, state, and national governments developing aquatic plant management programs. APMS members have participated in developing and refining aquatic plant management programs for several states including Minnesota, Texas Washington, Idaho, and Florida.

APMS members have expertise in addressing congressional and legislative committees as well as federal and state agencies on invasive plant-related issues such as management strategies, endangered species, herbicide registrations, and economics.





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Spray Adjuvants....

What Are They? Why Use Them? How Do They Work?

What are they?

An adjuvant is something which is added to the product formulation or spray solution to enhance the effectiveness of the herbicide, insecticide, or fungicide. Adjuvants are specialized chemicals which must be matched to a particular herbicide, weed spectrum and environmental range to ensure that they enhance, and not detract from the effectiveness of the herbicide.

Why use them?

There are two main reasons why adjuvants are used in spray solutions.

1. Reduce spray application problems
2. Improve herbicide performance

Researchers have found that up to 70% of the effectiveness of a pesticide can be dependent on the spray application. Spray Application is the weakest link the pesticide follow through its synthesis, testing, registration, and final use.

Spray tank problems that can be observed by the applicator can be corrected with adjuvants such as compatibility or anti-foaming agents. Many problems are invisible to the applicator but have a greater effect on the herbicide's activity than those that are more visible. Activator adjuvants correct many of these invisible problems by increasing the wetting, spreading, sticking, emulsifying, and dispersing of the herbicide.

How do they work?

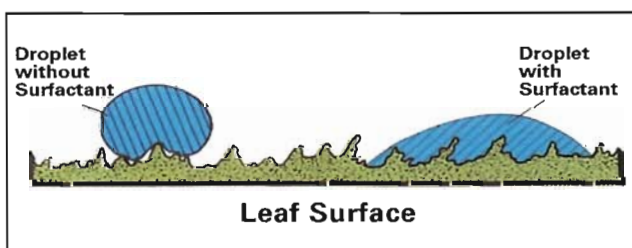
Activator adjuvants are the group of adjuvants that increase the biological activity of the herbicide beyond that obtained without the material added. Activator adjuvants are

usually classified by their physical characteristics. There are four major classes of activator adjuvants:

1. Non-ionic Surfactants
2. Crop Oil Concentrates
3. Fertilizer Solutions
4. Methylated Seed Oils

Activator adjuvants enhance the performance of the herbicide in the following ways: wetting, reducing surface tension and improving penetration. Wetting agents improve spray droplet spreadability by reducing the surface tension of the spray droplets. The greater the surface tension of a spray droplet, the more it will bead up on the surface of the leaf. This means the drop covers less area, and is also more likely to roll off the leaf. Reducing surface tension allows the droplet to spread out, thus aiding in penetration into the leaf and helping keep the droplet from rolling off the leaf. The waxy covering of the leaf surface also affects how much a droplet will bead up or spread out. This waxy covering varies with the species of plant and the environmental conditions under which the plant is growing.

The use of a high quality non-ionic surfactant will reduce the surface tension and contact angle of the spray droplet by 2/3's compared to water droplets alone.



Non-Ionic Surfactants "Surface Active Agent"

Non-ionic surfactants are classified as Activator Adjuvants. They increase the activity of pesticides such as contact or systemic herbicides. They increase chemical contact with plant surfaces and facilitate penetration of chemicals into small openings and help dissolve the wax in the cuticle of leaves. Surfactants lower the surface tension of the spray increasing spray coverage and penetration. Surface tension is a measure of the surface energy in liquid and is measured in terms of force or dynes/cm. Water has a surface tension of 72.9 dynes/cm, while oils and solvents have surface tensions from 20 to 40 dynes/cm.

"True" Active Ingredient Alcohol Versus Surfactant

Most herbicide labels state that a non-ionic surfactant should contain at least 80% Active Ingredient. Because non-ionic surfactants versus alcohol? The answer is to reduce cost. Alcohol costs less than half what a surfactant costs. Some non-ionic surfactants contain as much as 25% alcohol and as little as 55% surfactant and are called 80% active ingredient on the label.

Free Fatty Acids

Free Fatty Acids in the product resist wash-off compared to surfactants that do not contain them.

Methylated Surfactants

Methylated Oils

Methylated oils are derived from free fatty acids



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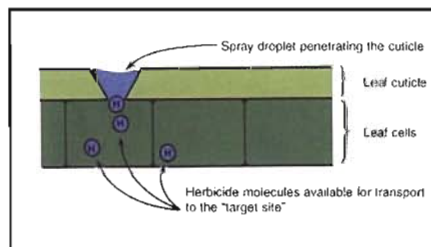
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extracted from oil crops such as soybeans. These fatty acids are then reacted with methanol alcohol to produce methyl esters of these fatty acids. Methylated Oils have properties that make them desirable as Spray Adjuvants.

1. **Methylated oils do not evaporate from the plant surfaces.** They have high boiling points that cause them to remain on the plant surface until they penetrate the cuticle.
2. **Methylated oils remain as an oily liquid on the plant surface for maximum contact with the plant surface.** A crystalline or solid form of a herbicide cannot easily penetrate the cuticle. Herbicides dissolved in a oily liquid are better able to penetrate plant cutices because liquids flow or move more easily than solids.



A major component of the plant cuticle is wax. Cuticular wax has a chemical structure similar to methylated oils. Methylated Oils tend to be liquids while cuticular waxes are solids. Because the methylated oils are liquids, they tend to lubricate the wax molecules and cause the wax molecule to "slip apart" as the methylated oils penetrate the waxy leaf surface. Because methylated oils begin to penetrate the plant cuticle as soon as the spray droplet is applied the herbicide molecules easily penetrate this cuticular barrier and are transported to the "target site" in the weed.

For more information contact: Steve Brewer, President, Brewer International www.brewerint.com 800-228-1833

Editorial *continued from page 3*

can have significant management implications. Bultemeier and Netherland¹ touched on the taxonomic puzzle of dealing with different growth rates, herbicide susceptibilities, and appearances of Cabomba (*Cabomba caroliniana*). Personal observations have been made of differences in growth rates and coloration of Tape grasses (*Valisneria spp.*) used in aquascaping. Godfrey and Wooten² acknowledged these color differences as differences between species (*V. americana* vs. *V. neotropicalis*), but the authors failed to describe them as being morphologically different. The authors referred to the key difference among tape grass species as "quantitative", leading one to believe that vigor determined the species, not morphology.

Are issues of vigor, hybridization, resistance, coloration, and biotypes adequately addressed in current training materials? Do aquatic plant training courses address these charac-

teristics adequately? Are members of APMS Chapters discussing plant varieties or differences in same-species characteristics? As researchers look into changes in herbicide susceptibility among same-species plants like Cabomba (*Cabomba spp.*), Duckweed (*Landoltia sp.*) Milfoil (*Myriophyllum spp.*), Hydrilla (*Hydrilla sp.*) and Bladderwort (*Utricularia spp.*), decisions will need to be made whether or not these differences require new taxonomic nomenclature or simply an update of educational material.

Editor

¹Bultemeier, B., and Netherland, M. (2007) Cabomba: a Taxonomic and Management Puzzle. *Aquatics*, 3(1): 12-16.

²Godfrey, R. K., and Wooten, J. W. *Aquatic and Wetland Plants of Southeastern United States*. Athens, GA: The University of Georgia Press, 1979.

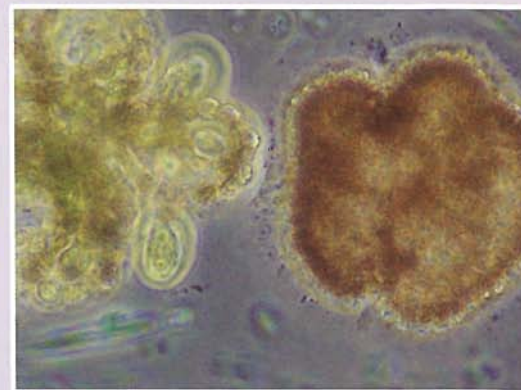


AQUAVINE

Blue-Green Algal Pages Posted

If you deal with blue-green algae, get online at www.NALMS.org and check out the new Web-Pages on cyanobacteria, or blue-green algae. There is a lot of useful information on those pages, plus links to many other pages with additional resources of considerable value to those working on or concerned with blue-green blooms and their effects on lakes and lake

uses. Photographs of key species, a glossary of important terms, information on sampling, taste and odor testing, toxicity assessment, implications for aquatic ecology and human health, advice for risk management, and a list of useful references are all included. These pages are meant to be dynamic, with new information added and revisions conducted as we progress in our understanding and organization of data. So check them out more than once.

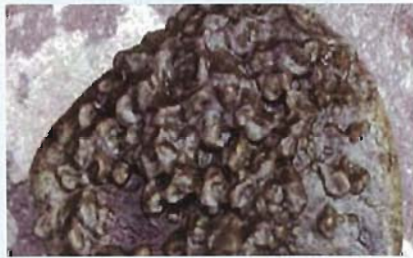


Invasive Species – *Didymosphenia* Alert!

NALMS reported on the alarming nuisance growths of the alga *Didymosphenia geminata* in the September NALMS Notes. Now scientists working for the USEPA and Federation of Fly Fishers have issued a white paper on this diatom, which has emerged as an organism with an extraordinary capacity to impact stream ecosystems on a global scale. In recent years, streams in New Zealand, North America, Europe, and Asia have been colonized by unprecedented masses of “didymo” with its copious and mucilaginous extracellular stalks. This diatom is able to dominate stream surfaces by covering up to 100% of substrate with gelatinous masses. This species is expanding its geographic range in North America, yet little scientific investigation of the phenomenon in North America has been initiated. The executive summary notes that this is the only freshwater diatom to exhibit large scale invasive behavior and that since it is not a new organism in many areas, it appears to have expanded its ecological range and tolerance for varied conditions. Whether this is a genetically induced change or involves some other trigger for the development of nuisance conditions is unknown. The potential for substantial ecological and economic damage is underscored. Recommendations are offered for study and evaluation of the development of nuisance growths, means of dispersal, and possible ecologically sound controls.

More info can be found at these two websites: www.epa.gov/region8/water/didymosphenia/archived/didymosphenia.html

http://watersheds.montana.edu/symposium/docs/Stromberg-Didymo_Whitepaper.pdf



Macroscopic view of Didymosphenia geminata growths. (Spaulding and Elwell, 2007)

Invasive Species – Izaak Walton League of America Launches Clean Boats Campaign to Combat Invasive Species

Every day, boaters and anglers unknowingly introduce harmful invasive species into their favorite lakes and streams. These plants and animals hitch a ride in boat hulls, propellers, muddy boots, and other equipment. The Izaak Walton League of America is launching the Clean Boats Campaign to raise awareness of this problem and educate boaters and anglers how to properly clean their gear. The campaign kicks off with a sweepstakes for a \$2,500 boater’s shopping spree and other prizes. Participants enter to win by visiting www.cleanboats.org and taking the Clean Boats Challenge to see if they know how to keep their boats and waterways clean and safe from invasive species.

Because invasive species such as zebra mussels and round gobies aren’t native to American waters, they are safe from the predators and diseases of their native habitat. As a result, they reproduce exponentially and out compete native fish and wildlife populations, threatening biodiversity. They can also ruin boat engines, jam steering equipment, increase the operating costs of drinking water and power plants, affect human health, and reduce property values. In the Great Lakes region alone, at least 184 aquatic invasive species are already established, with a new one discovered every eight months.

“Each year, the United States spends \$9 billion trying to control the spread of aquatic invasive species that are damaging our waterways and wildlife,” says Leah Miller, director of watershed programs for the Izaak Walton League. “If you can detect them early enough, it may be possible to eradicate them. But in most instances, it is too late. That’s why it is important for boaters, anglers, and other water users to inspect and clean their boats and gear

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every time they leave the water. This keeps invasive species from spreading to new waters."

For more information on the Clean Boats Campaign, please contact Leah Miller, (301) 548-0150, ext. 219, lmiller@iwla.org. Clean Boats Campaign public service announcements are available for download and use. For more information, please contact Jay Clark at (301) 548-0150, ext. 233, or jlark@iwla.org.

UF researchers and Extension Agents are looking for volunteers to help with a Hygrophila genetic diversity survey.

Hygrophila (*Hygrophila polysperma*) is a serious aquatic invasive plant in Florida. Also known as Hygro, green hygro, East Indian hygro, Miramar weed, oriental Ludwigia and Indian Swamp weed, hygrophila is believed to be native of India or broadly to the Southeastern Asiatic mainland. This plant was first recorded from Tampa, Florida in 1965. Hygrophila is capable of high biomass production and is adapted to a wide range of climatic conditions favoring its rapid growth throughout the state. Identification of the native origin of Florida hygrophila will be useful for targeting surveys for biological control agents. As such, we would like your help in collecting hygrophila from throughout its invasive range in Florida.

The project website (<http://kgioeli.ifas.ufl.edu/07courses/hygrophila.HTM>) includes collection protocols and plant identification. If you are interested in assisting please contact Ken Gioeli. Extension Agent III / Natural Resources, University of Florida. St Lucie County Cooperative Extension, Fort Pierce, FL. (772) 462-1660.

Aquatic Plant Management Series Videos Available

The Aquatic Plant Management Series video programs have been

converted to DVD format and repackaged as a set. The two DVD set (IFAS Publication DVD 085) retails for \$25.00 and contains the following:

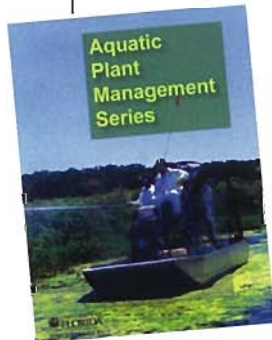
Aquatic Pest Control Applicator Training Part I & II -the basic knowledge necessary to be certified as a restricted use pesticide applicator in aquatic pest control (category 6). Topics covered include a brief history of aquatic plant management, laws, herbicide technology, biological control, mechanical control and environmental effects. Adapted from the Aquatic Pest Control Applicator Training Manual (IFAS Publication SM-3), edited by Dr. Kenneth Langeland, IFAS Extension Specialist for Aquatic Plants.

Calibration—A Field Approach - a practical approach which "takes the mystery" out of calibrating handguns, booms and granular spreaders, featuring Dr. William Haller.

How to Determine Areas and Amount of Aquatic Herbicide to Use

- an introduction to and a review of some of the mathematics essential to the proper use and application of aquatic herbicides.

This program features Dr. Kenneth Langeland, IFAS Extension Specialist for Aquatic Plants.



Maintenance Control of Aquatic Weeds—What it is Not! - Explains why regular management of aquatic weeds is the most environmentally sound and economical method of aquatic plant management.

All programs run approximately 30 minutes, with the exception of Maintenance Control, which is 12 minutes long. The DVD set can be purchased at the UF/IFAS Extension bookstore: 1-800-226-2764 or (www.ifasbooks.ufl.edu).

Calendar

June 4 - 7, 2007

18th Annual FLMS Conference
Naples, FL
<http://flms.net/index.html#>

June 6 - 9, 2007

Fourth North American Reservoir Symposium
Atlanta, GA. Sponsored by the Southern Division AFS Reservoir Committee.

July 15 - 18, 2007

47th Annual Meeting of the Aquatic Plant Management Society
Nashville, TN
<http://www.apms.org>

November 1 - 2, 2007

Hillsborough Community College
34th Annual Conference on Ecosystems Restoration & Creation
Plant City, FL
www.hccfl.edu/depts/detp/ecoconf.html

October 16 - 18, 2007, Right-of-Way & Aquatic Pesticide Applicator Training , Edgewater Beach Resort, Panama City Beach, FL

Up to 12 Alabama, Florida, Georgia, Mississippi, Louisiana, and Texas CEUs in Right-of-Way, Aquatic, General Standards (CORE), and Natural Areas pesticide application will be offered at this training. Register online by July 16, 2007 for the early REDUCED registration fee. For more information and to register, go online to <http://conference.ifas.ufl.edu/applicator/>. For questions or assistance contact Jhanna Crutchfield at jhanna@ufl.edu or 352-392-5930.

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