

A Q U A P H Y T E

Center for Aquatic Plants

with support from

The Florida Department of Environmental Protection,

Bureau of Aquatic Plant Management

The U.S. Army Corps of Engineers,

Waterways Experiment Station,

Aquatic Plant Control Research Program



UNIVERSITY OF
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Institute of Food and Agricultural Sciences

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APIRS Web Site A Hit!

When planning computer systems and usage, cyber wisemen say to "push the envelope": plan to use the newest technology, anticipate its maximum usage, then double your requirements before buying. This way, your computer system will be state-of-the-art and may possibly operate at maximum efficiency for at least 6 months.

We at APIRS attempted to follow this advice last year when designing our new computer system and Internet Web site. Our anticipated usage of this site was relatively low: after all, how many people would want to gaze at aquatic plant photos and line drawings in a day? Maybe as many as 50 Web browsers a day?

Well, the results are in for the first four full months of usage of the APIRS site, December 1995 through March 1996. The answer is that in December, our site was visited an average of 25 times per day; by March, the average number of visits had increased to 80 times per day, not including University of Florida visitors. **This is almost 2,500 times per month and climbing.**

We appreciate your interest in our Web site and thank you for your comments and suggestions: <http://aquat1.ifas.ufl.edu/>

[See Accessing the Aquatic Plant Database on Page 2]

Army Corps Aquatic Plant Program Under New Leadership

Mr. Lewis Decell, Program Manager of the US Army Corps Aquatic Plant Control Research Program (APCRP) retired at the end of 1995 after many years with the program he helped create. Under his leadership, APCRP established research work units for biological control, chemical control, and ecology of aquatic plants. He also created the Corps' new Center for Aquatic Plant Research and Technology in 1993 to provide a single facility to coordinate aquatic plant research and technology transfer.

Dr. John W. Barko is the new Program Manager of APCRP, taking over from Decell on January 1, 1996. Barko for years has been an aquatic plant ecology researcher, and previously served as the technology area leader for ecology under APCRP.

Among the first decisions Barko will make is how to re-focus the programs of APCRP, necessary after last year's federal budget cuts resulted in a 50% reduction in research money for the aquatic plant program this fiscal year. One silver lining to Barko's budget dilemma is that as of this writing, the President's budget proposal for 1997 does not further cut the APCRP budget.

Another silver lining is that Mr. Robert Gunkel continues to serve as the assistant manager of the program: Gunkel was instrumental in educating Congress as to the need for aquatic plant research and the need for funding at the federal level, thus saving APCRP from an otherwise certain demise.

Barko and Gunkel may be contacted at US Army Corps of Engineers, Waterways Experiment Station - EP, 3909 Halls Ferry Road, Vicksburg, MS 39180-6199, (800) 522-6937, ext. 3654, or (601) 634-3654.

Online Book - Nonindigenous Species of Florida

A timely and useful new book about nonindigenous species in Florida, three years in the making, is now available for viewing and downloading *ONLY* at the APIRS Web site. This 300+ page review of the scientific literature was initiated by the Aquatic Nuisance Species Task Force authorized under the federal Nonindigenous Species Prevention and Control Act of 1990.

The book, *Nonindigenous Aquatic and Selected Terrestrial Species of Florida*, by J.A. McCann, L.N. Arkin and J.D. Williams (National Biological Service, Gainesville, Florida), presents the status, pathway and time of introduction, present distribution, and significant ecological and economic effects of 154 introduced species of plants, mollusks, insects, fish, amphibians, reptiles, birds, mammals and crabs.

How did this worthy work, produced by a federal agency, come to be first "published" on a state agency Internet site? It's the economy, stupid! As a cost-saving measure, the NBS shut down its national publication and information unit in Colorado. Luckily, the University of Florida Aquatic Plant Information Office is still in business, and we were happy to suggest this most hi-tech way of paperless publishing. Our guess is that the book will gain wider distribution via the Internet than if 20 photocopies were produced and "made available" through traditional channels.

See the book at our web site:

<http://aquat1.ifas.ufl.edu/>

Accessing the Aquatic Plant Database

During March, 1996, almost 200 individuals from 23 countries gained access to and used the APIRS aquatic plant database through our Web site. The database now includes more than 42,000 citations. Use of the database, whether through our Web site or by contacting the APIRS office, is free of charge to anyone.

We have received many compliments and suggestions from successful Web users, and are grateful for them. Now we are certain that remote use of our database is a valuable service to those who are able to access and use it.

From our e-mail and telephone calls, though, we know also that many of you have tried but failed to get into the database, or to make it work properly, through our Web site. Here are a few answers:

You Get to the Database Through Telnet

To use the database, your computer must have a "telnet application" (such as QVTNET), **in addition** to your Web browsing software (such as Netscape). **When properly configured**, your browser will automatically start the telnet application when you click on "Telnet" on our Web site database page. Your computer will then present a text only window with the word (or prompt) "login:". Now you type "guest" as the password and follow the log on instructions as provided on our Web site database page.

Many users have no difficulty accessing the Web site, but when they go to the database page, and click on "Telnet" to get to the aquatic plant database, the message "unable to find application" appears. In short, Web users who get such a message have a problem at their end, and need to contact their local computer guru for help in further setting up their Web browsing and telnet capabilities.

The Database Interface Can Be Confusing

Because of financial considerations, the APIRS Web/Database interface is plain, old-fashioned, and user-noncomplaisant. The database "search" and "display" screens are obviously unlike the rest of the Web site, and are somewhat confusing as a consequence. About twenty thousand dollars, the cost of interface software compatible with our system, should fix the problem nicely.

"Sorry"

Sometimes users get to the database search screen but when they attempt to go further they get a message that only says, "Sorry". Because of software user licensing limitations and the unwillingness or confusion of users who do not "quit" their search sessions properly, the number of user channels can be reduced to zero. At this point the "Sorry" message appears, and no one else can get into the database until our office "unlocks" the channels. About ten thousand dollars, the cost of enlarging our user license, would reduce the "Sorry" messages by about three-quarters. When you are finished searching the database, **please quit according to instructions**.

The Database Is Not Easy to Use

Because of the aforementioned financial considerations, use of the APIRS database requires a reasonably knowledgeable user; one who has used other scientific databases such as those in DIALOG, for example. Users who want to search our database by themselves are expected to know, or to read and learn about, the standard Boolean search strategies and specific database commands. Instructions are provided on the "Search Survival Pages" that are accessible from the Web site database page.

For very limited telephone assistance to help solve your telnet problems, you are welcome to call the APIRS office and ask for Vic Ramey or Kimberly Meyer.



Freshwater Plants Poster Again Available

The good news is that the very popular *Freshwater Plants* poster has been printed for the third time. The bad news is that this time it will cost you (unless you are a teacher in Florida, in which case the poster is free.)

After giving away 10,000 copies of the colorful 2' x 3' poster, we now must recoup some of the costs: the posters now cost \$7 each plus S/H. No discounts will be given for multiple orders as the poster is being sold at cost.

To order, contact University of Florida, IFAS Publications, Box 110011, Gainesville, FL 32611, (352) 392-1764. Refer to *Freshwater Plants* poster, Publ. SM-51.

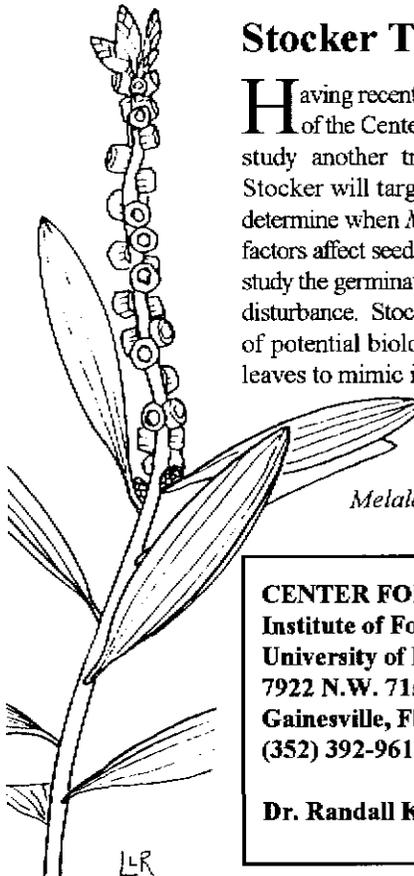
A T T H E C E N T E R

Fox Pounces on New Aquatic Weed

Dr. Alison Fox, Research Assistant Professor, is researching the invasive potential of a relatively new weed in Florida, the aquatic soda apple (*Solanum tampicense*) (pictured at right). Aquatic soda apple has been found proliferating in regularly flooded wetland habitats such as along rivers and in cypress domes. It does not appear to tolerate continuous flooding. The plant is believed to have come from Mexico, the West Indies, and Belize. It has been reported only in a fairly limited area of southwest Florida with the largest and densest single population approaching 150 acres. Dr. Fox is researching the weed potential and management of *Solanum tampicense* in hopes of heading off a potentially massive problem.

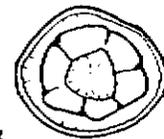
Aquatic soda apple has elongate leaves with indented edges and prickles on the veins of both leaf surfaces. Sprawling stems are up to ½ inch wide, 6 to 15 feet long, and covered in curved prickles. The leaf and stem prickles snag and interlock to form an impenetrable thicket. The stems can climb small trees and bushes to a height of 15 feet. White and yellow tomato-like flowers develop into clusters of up to 11 pea-size berries. The berries turn from green to orange to deep red as they ripen. The presence of the plant amongst a variety of wetland species indicates that it can invade and survive within existing vegetation. Aquatic soda apple grows in both full sunlight and in shade, and reproduces readily from seed. Although the plants do not tolerate frost, the seeds can survive freezing temperatures, indicating that the species could survive as an annual plant in north Florida. The plant also regenerates from stem sections in soil, water, or from cut stumps. It does not regenerate from root sections, nor does it appear to have rhizomes.

Dr. Fox hopes to learn more about the basic biology and ecological impacts of aquatic soda apple as well as methods for controlling the prickly species. She also is requesting confirmed sightings of the plant to more firmly delineate its distribution in Florida. If aquatic soda apple does not turn out to be a threat, another species will have been described. If it is a disaster waiting to happen, Fox hopes to get a jump on aquatic soda apple.



Stocker Targets *Melaleuca*

Having recently been transplanted to Florida as the new director of the Center for Aquatic Plants, Dr. Randall Stocker plans to study another transplant to Florida, *Melaleuca quinquenervia*. Stocker will target the reproductive ecology of the invasive tree to determine when *Melaleuca* begins producing seeds, and what other factors affect seed production, release and germination. He also will study the germination of seeds in seed banks and how it is affected by disturbance. Stocker also plans to explore the prediction of impacts of potential biological control agents of *Melaleuca* by clipping the leaves to mimic insect herbivory.



Melaleuca quinquenervia

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(352) 392-9613

Dr. Randall K. Stocker, Director

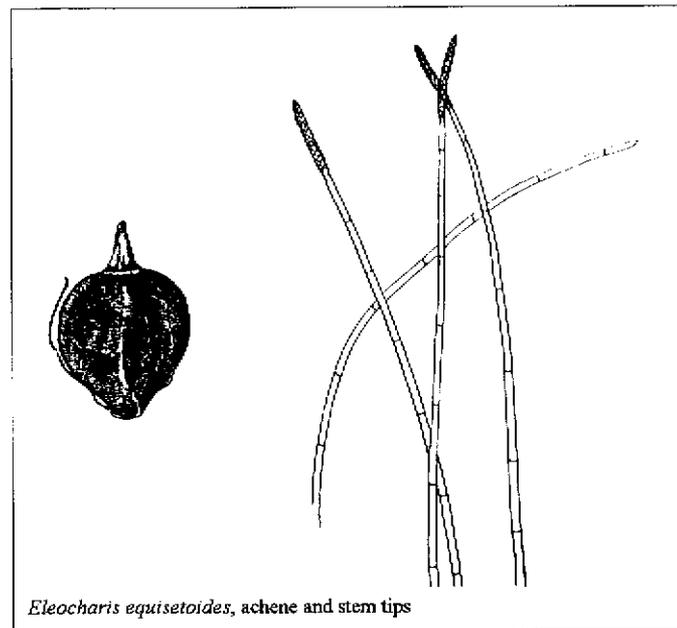
Getting to Know the Natives

THOSE KNOTTY SPIKERUSHES

by Kathy Craddock Burks, Botanist, Technical Services, Bureau of Aquatic Plant Management, Florida Department of Environmental Protection, 3917 Commonwealth Blvd., MS 710, Tallahassee, FL 32399, 904/487-2600.

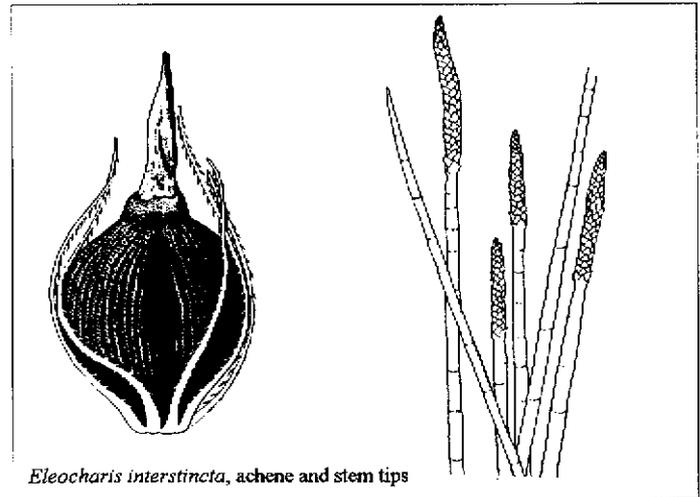
Most of Florida's 28 or 29 species of the sedge genus *Eleocharis* (spikerushes) are diminutive plants, their oft-tufted aerial stems reaching no more than 0.5 m in height. A few of our species, however, may soar to 1 m in height. Among these "large" *Eleocharis* are three species whose stems are nodose-septate, i.e., knobby or knotted with conspicuous joints where complete crosswalls (septae) occur.

Probably the most common of these knotted spikerushes is *E. equisetoides*, which grows in west, north, and central Florida, and ranges northward to Massachusetts, Michigan, and Wisconsin, and westward to Texas and Missouri. Like all spikerushes, this species has no leaf blades (only a bladeless sheath at the base of each unbranched stem); it produces a single flower spike (of spiralled scales) at the stem tips; and its fruits (achenes) have persistent style bases (tubercles). Unlike most *Eleocharis*, this one has a flower spike that is not much wider than the stem below it. You can distinguish this species from the other knotted spikerushes by the regular spacing of the septae, or joints, along the stem, all the way to the tip; by the usually bumpy (nodulose) stem surface between the joints; and by the thin achene bristles shorter than the achene.



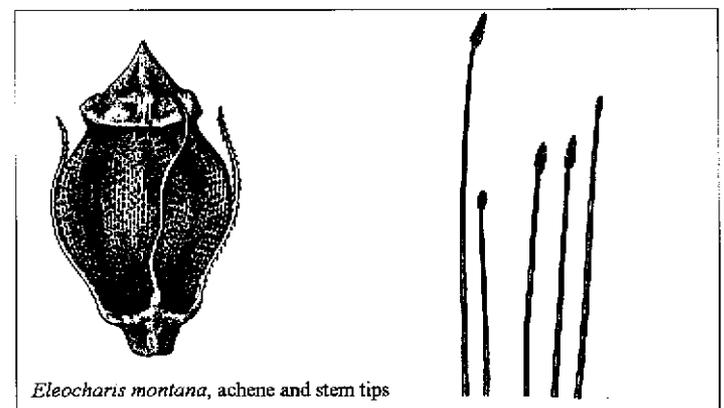
Eleocharis equisetoides, achene and stem tips

The other two knotty species found in Florida, *E. interstincta* and *E. montana*, have tropical affinities. More common in central and south Florida (occurring rarely in north and west Florida), *E. interstincta* also ranges west to Texas and south to Bolivia and Brazil. Its stem joints become crowded (closer together) near the stem tip; the internode stem surface is smooth rather than bumpy; and the robust achene bristles are longer than the achene.



Eleocharis interstincta, achene and stem tips

Least common of the knotted spikerushes in Florida, *E. montana* ranges north to south Georgia, west across the Sun Belt to Arizona and New Mexico and south through the Caribbean and Central America to tropical South America. Its stem joints are spaced regularly but closely together all along the stem (2-5 mm apart); the internode stem surface is smooth; the flower spike is distinctly wider than its stem (about twice as wide); and the achene bristles are of unequal length, some as long as the achene. Another obvious difference is in the tubercles: while the other two species have a narrow conical tubercle topping the achene, this species has a short broad tubercle hugging the achene body.



Eleocharis montana, achene and stem tips

All three species, as well as other spikerushes, provide a food source relished by waterfowl. For more information, contact the Bureau at the address above.

Illustrations from *Aquatic and Wetland Plants of Southeastern United States*, by R.K. Godfrey and J.W. Wooten. 1981. The University of Georgia Press, Athens. Used with permission.

Tropical Aquatic Plants from ... Denmark?!

by Claus Christensen, Tropica® Aquarium Plants, PO Box 3, DK-8530 Hjortshøj, Denmark, <http://www.tropica.dk>

During the past fifty years in Europe, a tradition has evolved of well-equipped aquaria with numerous plants. This has resulted in a suite of producers of aquarium plants. Tropica Aquarium Plants, an aquatic plant nursery in Denmark, is now twenty-five years old and has grown to be among the largest aquatic plant producers of the world. Thirty-two employees produce 1.5 million pots a year, 90% of which are exported all over the world, including Japan, Hong Kong, Germany, The Netherlands, and Canada. 160 different species of aquatic plants are produced, including many species of *Cryptocoryne*, *Echinodorus*, and *Anubias*.

Tropica's total indoor production area consists of 11 plant houses covering about 10,000 m², but less than 20% is in common tank production. A computer controls light, temperature, nutrition, and humidity so that growth conditions are optimal. During the dark winter season, automated high-pressure sodium vapour lights travel across the greenhouses to supply missing sunlight. Due to the salinity of the local water supply, an on-sight reverse osmosis plant is used to produce 20,000 litres of clean, basic water each day.

In the beginning, all plants were grown in indoor ponds. However, our first gathering tours to tropical areas revealed that many submerged plants are actually amphibious - during the dry season, they grow above the water level on lake and river banks. A fraction of our plants are grown submerged to allow the development of submerged leaves and true colors. But accommodation of submerged plants to new environments is often harder because they are more closely adapted to the water and light quality. Today, most of Tropica's plants are grown hydroponically in a substrate of "stonewool." This procedure allows us to control the nutrients to the plants and to apply well-tested production methods such as carbon enrichment of the air. In addition, the plants can be exported to most of the world because soil is avoided in our products. This method produces healthier plants due to the enhanced growth conditions, and they are much easier to handle. Therefore, they are better able to face the acclimatisation period when moved from one environment to another.

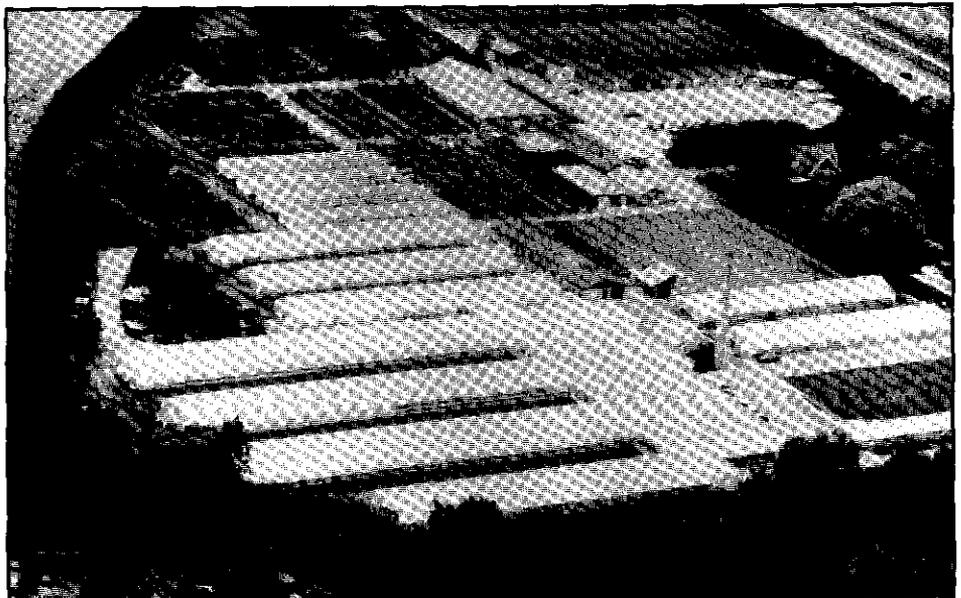
TISSUE CULTURE

In addition to vegetative and seed propagation of aquarium plants, Tropica produces some 75 species from tissue culture. Tissue culture propagation is an environmentally compatible mass production method. By starting with plant material free from bacteria, fungi and insects, we reduce the need for pest control. As well as generating disease-free plants, this technique significantly reduces propagation time. Tissue cultured plants are much more uniform in size and form, and many species show a more bushy growth with more adventitious shoots, qualities that many aquarists appreciate.

The first step in tissue culture is to take the plant from the greenhouse and disinfect it for further propagation. This is where we encounter the first hurdle because obtaining a clean plant in the sterilisation process can be very difficult. Often we sterilize 100 plants, but only one will be free from bacteria and fungus. Now we can propagate the sterile plant in the laboratory. After some weeks of growth in sterile glasses, the plants are divided. In this growth phase, the plants have an optimal supply of sugars and vitamins, but we illuminate the plants part of the day to develop the hormonal regulating system. The plants are divided in special laminar airflow benches where work in clean air is possible. In this way, no recontamination takes place. When enough plants have been produced, some are planted in the nursery to "harden off". New roots for further growth develop and the plants adapt to the natural environment. After a few weeks, the strong and healthy plants are sold.

IMPORT RESTRICTIONS

The USA is one of the few countries of the world to which Tropica can not export aquatic plants, because the US Department of Agriculture requires that imported plants be free of growth medium to avoid soil pests. Because Tropica's plants are grown in stonewool and part of the roots are hidden in this material, they can not be imported. Ironically, this leads to the import of plants collected in nature or from tropical open air nurseries. We know from our gathering tours that such specimens introduce numerous pests and pathogens. In addition, importing collected plants increases the risk of introducing plants with well-known potential damage to the native flora. These plants may enter as weeds or by incorrect use of scientific names. Even countries such as Japan, Australia, and New Zealand - which have very strict import rules - accept our plants for import, occasionally with some kind of quarantine.



Meetings

23RD ANNUAL CONFERENCE ON ECOSYSTEMS RESTORATION & CREATION. May 16-17, 1996. Tampa, Florida.

Sponsored by the Hillsborough Community College Institute of Florida Studies, this annual conference provides a forum for the nationwide exchange of scientific research results in the restoration, creation and management of freshwater and coastal wetlands, uplands and transitional areas.

Contact: F.J. Webb, Dean of Environmental Programs, Hillsborough Community College, Plant City Campus, 1206 N. Park Road, Plant City, Florida 33566; ☎ 813/757-2104.

2ND NATIONAL WORKSHOP ON CONSTRUCTED WETLANDS FOR ANIMAL WASTE MANAGEMENT. May 15-18, 1996. Fort Worth, Texas.

Sponsored by the Texas State Soil and Water Conservation Board, the U.S. Environmental Protection Agency, and Texas A&M University, this workshop will provide training sessions and field tours of constructed wetlands for many uses including treatment of swine waste, aquaculture, agriculture, dairy waste and private homes.

Contact: Paul DuBow, Department of Wildlife and Fisheries Sciences, Texas A&M University, College Station, TX 77843-2258; ☎ 409/845-5765; fax: 409/845-3786; e-mail: p-dubow@tamu.edu

INTERNATIONAL CONFERENCE ON PLANTS AND ENVIRONMENTAL POLLUTION. November 26-30, 1996. Lucknow, India.

Organized by the International Society of Environmental Botanists and the National Botanical Research Institute, the conference will discuss the role and potential of terrestrial and aquatic plants in bio-indication and -remediation of environmental pollution. Invited lectures and presented papers will be published in the form of a book.

Contact: K.J. Ahmad, Organizing Secretary ICPEP, National Botanical Research Institute, Lucknow 226 001, India; ☎ (0522) 271031-35, Ext. 209; fax: (0522)282849; e-mail: manager@nbri.sirneted.ernet.in

INTERNATIONAL CONFERENCE ON EUROPEAN LOWLAND WET GRASSLANDS - MANAGEMENT AND RESTORATION FOR BIODIVERSITY. September 17-20, 1996. University of South Bohemia, České Budějovice, Czech Republic.

Organized by the International Centre of Landscape Ecology, Department of Geography, Loughborough University, UK in association with the Darwin Initiative. The aim of the conference is to bring together those concerned with the biodiversity, management and restoration of European floodplain and coastal wet grasslands.

Contact: Gill Giles, ICOLE, Department of Geography, Loughborough University, Loughborough, Leicestershire, LE11 3TU, United Kingdom; ☎ 44 1509 223030; fax: 44 1509 260753; e-mail: G.Giles@lut.ac.uk

VTH INTECOL INTERNATIONAL WETLANDS CONFERENCE. September 22-28, 1996. Perth, Australia. University of Western Australia.

Co-sponsored by the Society of Wetland Scientists, *Wetlands for the Future* is the theme for the 1996 conference. The conference will emphasize our understanding of wetlands now, the importance of conservation and management, and the role of technology in maintaining wetlands in the future.

Contact: J. Davis, School of Biological and Environmental Sciences, Murdoch University, Murdoch, Western Australia 6150; ☎ 61 9 360 2939; fax: 61 9 310 4997; e-mail: davis@essun1.murdoch.edu.au

SECOND INTERNATIONAL SYMPOSIUM ON THE BIOLOGY OF SPHAGNUM. July 11-13, 1996. Quebec City, Canada. Laval University.

Held by the International Association of Bryologists, the symposium will include topics on population biology, community ecology, taxonomy, productivity and peatland ecology. The symposium will be followed by the Fourth Annual Canadian Peatland Restoration Workshop on July 13-14, also at Laval University.

Contact: L. Rochefort, Phytologie, FSAA, Laval University, Quebec, Canada G1K 7P4; fax: 418/656-7856; e-mail: LROC@vm1.ulaval.ca

THE AQUATIC PLANT MANAGEMENT SOCIETY. July 14-17, 1996. Burlington, Vermont.

The latest developments in aquatic plant science and aquatic plant management using biological, mechanical, and chemical control techniques will be discussed. For the first time, the APMS meeting is being held in the northeastern U.S. Current information on biology and control of weedy species in this area, such as Eurasian watermilfoil, water chestnut, and purple loosestrife, will be presented.

Contact: ☎ 904/429-4119

SOCIETY OF WETLAND SCIENTISTS 17TH ANNUAL MEETING. JUNE 9-14, 1996. KANSAS CITY, MISSOURI.

The theme for the 1996 meeting is *From Small Streams to Big Rivers*, and will include technical sessions and workshops, field trips and field workshops.

Contact: Society of Wetland Scientists, Allen Marketing & Management, PO Box 368, Lawrence, KS 66044; fax: 913/843-1274.

3RD INTERNATIONAL CONFERENCE ON RESERVOIR LIMNOLOGY AND WATER QUALITY. August 31 - September 5, 1997. České Budějovice, Czech Republic.

The aim of the conference is to bring together limnologists and water quality engineers dealing specifically with reservoir limnology or topics relevant to understanding, predicting and managing reservoir water quality.

Contact: Jaroslav Vrba, Conference Secretary, Hydrobiological Institute, Academy of Sciences of the Czech Republic, Na sádkách 7, CZ-370 05 České Budějovice, Czech Republic, ☎ 42-38-45484; fax: 42-38-45718; e-mail: hbu@dale.entu.cas.cz

39TH ANNUAL CONFERENCE ON GREAT LAKES RESEARCH. May 26-30, 1996. Mississauga, Ontario, Canada. University of Toronto, Erindale College.

Special sessions will cover a variety of current large lakes issues such as the effectiveness of international management agreements, non-native species, effects of UV radiation, human health, sea lamprey controls, satellite imagery, food web interactions, and wetland restoration.

Contact: W. Gary Sprules, Department of Zoology, Erindale College, University of Toronto, Mississauga, Ontario L5L 1C6, Canada; ☎ 905/828-3987; fax: 905/828-3792; e-mail: gsprules@cyclops.erin.utoronto.ca

THE AQUATIC WEED CONTROL, AQUATIC PLANT CULTURE & REVEGETATION SHORT COURSE. May 14-16, 1996. Fort Lauderdale, Florida. University of Florida.

Topics include plant identification, plant propagation and revegetation, biological control of weeds and herbicide technology.

Contact: University of Florida, IFAS Office of Conferences, PO Box 110750, Gainesville, FL 32611-0750; ☎ 352/392-5930; fax: 352/392-9734; e-mail: CONF@GNV.IFAS.UFL.EDU

16TH ANNUAL INTERNATIONAL SYMPOSIUM OF THE NORTH AMERICAN LAKE MANAGEMENT SOCIETY. November 13-16, 1996. Minneapolis, Minnesota.

The conference program title is *People, Lakes, and Land: Puzzling Relationships*. The symposium will address important developments in lake and watershed management for both professionals and lay people.

Contact: NALMS, PO Box 101294, Denver, CO, USA 80250; ☎ 303/781-8287; fax: 303/781-6538

FLORIDA LAKE MANAGEMENT SOCIETY ANNUAL CONFERENCE. May 22-24, 1996. Ocala, Florida.

The theme of this seventh annual conference is *Decision Making in Lake Management*.

Contact: M. Hoyer, University of Florida, Department of Fisheries and Aquatic Sciences, 7922 NW 71st St., Gainesville, FL, 32653; ☎ 352/392-9617 X 227.

FLORIDA AQUATIC PLANT MANAGEMENT SOCIETY. October 8-10, 1996. Fort Myers, Florida.

This will be the 20th annual meeting of the FAPMS. An equipment demonstration is planned in addition to presentations on aquatic plant management in Florida.

Contact: S. Redovan, ☎ 941/694-2174.

SIXTEENTH ASIAN PACIFIC WEED SCIENCE SOCIETY CONFERENCE. September 1997. Kuala Lumpur, Malaysia.

Contact: Baki Hj. Bakar, Organizing Secretary, The 16th APWSS Conference, c/o Botany Department, University of Malaya, 59100 Kuala Lumpur, Malaysia; ☎ 603-7594351; fax: 603-7594178; e-mail: baki@botany.um.edu.my

Books/Reports

FRESHWATER ALGAE, THEIR MICROSCOPIC WORLD EXPLORED

by H. Canter-Lund and J.W.G. Lund. 1995. 360 pp. ISBN 0-948737-25-5

(Order from Biopress Ltd., The Orchard, Clanage Road, Bristol BS3 2JX, England, UNITED KINGDOM. £49.50 plus S/H.)

Here is a science book that might also sell as a "coffee table" art book; the subject so fascinating, the photographs so captivating. Written by fellows of England's Freshwater Biological Association, this large-format volume is an introduction to all the major freshwater algal groups, together with parasitic fungi, protozoan and other invertebrate predators.

The very high quality alga portraits (387 in color, 640 altogether) are a delightful sampler of the many colors and shapes to be found among algae. They are complemented by a very readable text, written for laymen, which answers the basics: what are algae? where are they found? how do they live? This book will find its way into many libraries, from home to university.

RESTORATION OF STREAM ECOSYSTEMS - - AN INTEGRATED CATCHMENT APPROACH

edited by M. Eiseltova and J. Biggs. 1995. 170 pp.

(Order from the Natural History Book Service, 2-3 Wills Road, Totnes, TQ9 5XN, Devon, UNITED KINGDOM. IWRB Publ. 37. £20.00 plus S/H.)

Around the world, "restoration ecologists" are attempting to repair the damage to rivers and floodplains altered or destroyed by the construction of dams and by channelization for flood control and boat traffic.

This volume, the second in the series of IWRB's wetland management training handbooks, is aimed at ecologists, engineers and planners who are responsible for restoration projects, and also to agriculture, forestry and development planners and managers.

The book includes a dozen case studies about the "remeandering" (unchannelizing?) of rivers, structuring stream beds, and other essential acts for re-making rivers. The case

studies are focused on Central and Eastern Europe.

TROPICAL FRESHWATER WETLANDS, A GUIDE TO CURRENT KNOWLEDGE AND SUSTAINABLE MANAGEMENT

by H. Roggeri. 1995. 364 pp. ISBN 07923-3785-9

(Order from Kluwer Academic Publishers, Order Dept., POB 358, Accord Station, Hingham, MA 02018-0358. US\$134.00.)

The author of this wetlands management "guide" for professionals notes that even though wetlands have "an importance which is comparable to that of the tropical forest", many people in developing countries as well as many development and nature conservation planners and managers fail to appreciate the "highly valuable services and products" provided by wetlands, and some have yet "to become acquainted with wetlands".

The main purpose of the book is "to help provincial planners choose, develop and carry out" a "new" kind of wetland management, a kind that seeks "to make the best of the benefits offered by nature, rather than transform or eradicate nature." After sections in which freshwater wetlands are defined, wetland functions and values are reviewed, and "interventions" are examined, the author presents guiding principles and practical approaches to the sustainable management of wetlands.

Thirteen case studies of wetlands management in various developing countries are presented, including 7 in Africa. Several appendices, including a bibliography of some 900 citations, complete the volume.

VÍZINÖVÉNYEK, by Z. Tuba, illustrated by K. Biró, 1987, reprinted 1995, 64 pp. ISBN 96311-7263-5 (In Hungarian.) (For ordering information, contact Dr. Zoltán Tuba, Dept. Bot. & Plant Physiol., Agricultural University of Godollo, Pater K U 1, H-2103 Godollo, HUNGARY; tuba@fa.gau.hu)

This is a colorful guide to 122 species of aquatic plants of Hungary, complete with basic morphological and ecological information about each plant. Each plant is depicted in a nicely done water color. The small format book includes an index of common

names; *nyilfu* is the common Hungarian name for *Sagittaria sagittifolia*, *sarga vizitok vagy tavirozsa* is *Nuphar lutea*.

DEVELOPMENT OF AN AUTOMATED SYSTEM FOR DETECTION AND MAPPING OF SUBMERSED AQUATIC VEGETATION WITH HYDRO-ACOUSTIC AND GLOBAL POSITIONING SYSTEM TECHNOLOGIES, Report 1 - The Submersed Aquatic Vegetation Early Warning System (SAVEWS) - System Description and User's Guide (Version 1.0)

by B.M. Sabol and R.E. Melton. 1995. 37 pp.

(For information, contact Bruce Sabol, USACE, Waterways Experiment Station, EL-EN-C, 3909 Halls Ferry Rd., Vicksburg, MS 39180, sabol@ex1.wes.army.mil)

This report describes a portable system that can be managed by two people and is operable from a small boat, that is able to detect and map submersed (not topped out) plants from the surface in real time in areas of up to several thousand acres at one time.

It was made using commercially available, off-the-shelf components. The system's total cost was less than \$50,000, in 1993-94 US dollars.

COMMON PLANTS OF FLORIDA'S AQUATIC PLANT INDUSTRY, SECTION 3 OF AQUATIC PLANT INSPECTION MANUAL

by N.C. Coile. 1995. 131 pp.

(Order from Office of Technical Assistance, Division of Plant Industry, Florida Department of Agriculture & Consumer Services, POB 147100, 1911 SW 34 ST., Gainesville, FL 32614-7100, (352) 372-3505. \$15.00 plus postage.)

This looseleaf manual offers identification information about 87 species that are commonly sold by Florida's aquatic plant industry. While the publication was originally intended for the use of Florida Bureau of Plant Inspection workers, it also might be of interest to nurserymen and others. We suppose that such a manual as this would be useful in Florida insofar as many of the

species treated here are not included in other references which cover native Florida plants. Unfortunately, most of the images selected to represent the various plants leave something to be desired, and closeups or detailed drawings that might enable more accurate identification are lacking.

PLANT SURVIVAL: ADAPTING TO A HOSTILE WORLD,

by B. Capon. 1994. 140 pp.

(Order from Timber Press, Inc., 133 SW 2 Ave., Suite 450, Portland, OR 97204-3527, (503) 227-2878. Hardback: \$24.95 plus S/H; Paper: \$15.95 plus S/H.)

This introduction to plant ecology was "written especially for young readers" by a university botany professor. It tells how plants have adapted to live almost anywhere, from the arctic tundra to tropical jungles, from the deserts to lakes and oceans. Many interesting questions are simply answered: why do water lily leaves feel waxy? what is the purpose of bald cypress knees? how do high mountain plants protect themselves from ultraviolet rays? The answers are illustrated by colorful pencil drawings. Though written for middle school audiences, there is enough here to engage the interest of almost any science reader.

PRINCIPLES AND PRACTICE OF PLANT CONSERVATION,

by D.R. Given. 1994. 292 pp. ISBN 0-88192-249-8

(Order from Timber Press, Inc., 133 SW 2 AVE, Suite 450, Portland, OR 97204-3527, (503) 227-2878. Hardback: \$39.95 plus S/H.)

According to the author, "Strict preservationism is not the same as conservation. Conservation may advocate preservation of species and ecosystems but may also advocate use of them, providing this is not wasteful...A challenge for conservation is to seek a middle stance, sometimes promoting preservation, but at other times supporting controlled exploitation."

This comprehensive handbook for practicing conservationists is "the first detailed overview ever to be published of this vitally important subject"; it explains the concepts and principles underlying successful plant conservation. It was commissioned by the World Wide Fund for Nature (WWF) and

the World Conservation Union (IUCN).

Included are chapters on how plants become threatened or extinct; plant population management; managing protected natural areas; "off-site" conservation in botanic gardens and gene banks; as well as chapters devoted to ethics; education; conservation legislation; and the economics of plant conservation.

MANUAL DE IDENTIFICACION DE PLANTAS ACUATICAS DEL PARQUE NACIONAL LAGUNAS DE ZEMPOALA, MEXICO,

by J.R. Bonilla-Barbosa and A. Novelo Retana. 1995. 169 pp. ISBN 968-36-4335-3 (In Spanish)

(For information, contact Universidad Nacional Autonoma de Mexico, Instituto de Biologia, Apartado postal 70-233, 04510 Mexico, DF, MEXICO.)

This volume contains descriptions of the morphology and vegetation of seven Mexican lakes. Included are descriptions of 66 aquatic plant species which include information about flowering, fruiting, habitat, and distribution.

CACHE RIVER BASIN, ARKANSAS: ENVIRONMENTAL DATABASE, COMPACT DISK DATA ARCHIVE, AND META-DATA DOCUMENTATION,

by R. Kress and S. Bourne. 1995. 46 pp. and 1 CD.

(For information, contact Public Affairs Office, U.S. Army Engineer, Waterways Experiment Station, 3909 Halls Ferry Road, Vicksburg, MS 39180-6199, (601) 634-2502. Technical Report WRP-SM-13)

This investigation designed a digital database for numerical and spatial analysis of a wetlands system. The prototype was developed for the Cache River watershed. It is one of the first environmental databases to conform to new federal regulations and standards for geographic data, acquisition, storage and access, as ordered by President Clinton in Executive Order 12906, April 11, 1994.

The databases on the CD include those on topography, hydrology, soils, vegetation,

wildlife, meteorology, wetland maps, cultural boundaries, satellite images and field measurement locations.

AQUACULTURE IN THE UNITED STATES, A Historical Survey,

by R.R. Stickney. 1996. 372 pp.

ISBN 0-4711-3154-7
(Order from John Wiley & Sons, Inc., 605 Third Ave., New York, NY 10158, (800) 225-5945. \$49.95.)

The author defines aquaculture as "the rearing of aquatic organisms under controlled or semicontrolled conditions", a definition that includes plants as well as animals.

This history goes into detail about early U.S. fish culturists, Spencer Baird and the establishment of the U.S. Fish and Fisheries Commission (in 1871), the development of fish culture first as an industry and then as a science, species lists and shipping tonnage, the beginnings of the American Fisheries Society, on up to the establishment of the World Mariculture Society (1969) and finally to current day issues: "hatchery bashing", high land costs, protecting species vs. protecting stocks, etc.

WETLAND PLANTS FROM TEST TUBES,

by C.B. Burgess. 1995.

36 pp.
(Order from North Carolina Sea Grant, Box 8605, N.C. State University, Raleigh, NC 27695-8605. Publication No. UNC-SG-95-08.)

"No Wetlands, No Seafood." But, when wetlands are destroyed or are otherwise in need of restoration or "mitigation", where do we find the plants to plant in them?

Rather than raiding existing wetlands for plant material, we can now employ biotechnology and the methods of tissue culture, or "micropropagation", to produce as many plants as needed for wetland restoration.

This book, though not exactly a how-to manual, does answer the most often asked questions by resource managers, developers and others about tissue culture: What are the basics? What are the five steps of tissue culture? What about genetic variation (or lack thereof)? What laws apply and how is the industry coming along?

Chapters deal with seagrasses, as well as dune and wetland plants.

FROM THE DATABASE

Here is a sampling of the research articles, books and reports which have been entered into the aquatic plant database since December 1995.

The database has more than 42,000 citations. To receive free bibliographies on specific plants and/or subjects, contact APIRS at the address shown on the mail label on page 16, or use the database online at <http://aquat1.ifas.ufl.edu/>

To obtain articles, contact your nearest state or university library.

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SEXUAL PLANT REPRODUCTION 8(92):105-112. 1995.

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CHEMOSPHERE 30(3):579-591. 1995.

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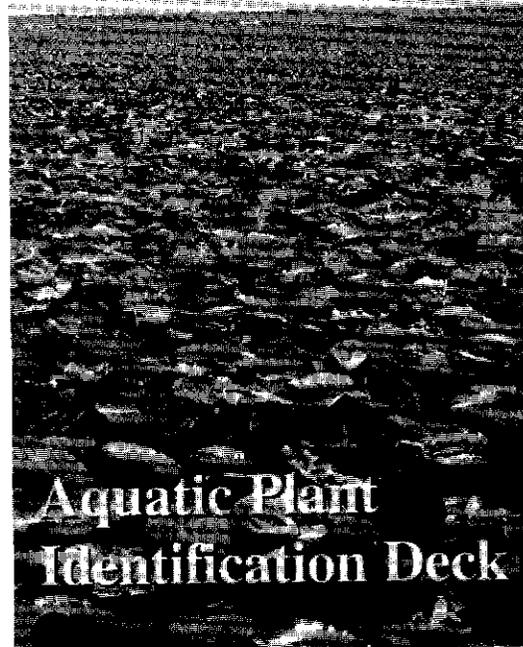
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Aquatic Plant Identification Deck

A 3" x 4" card deck of color photographs of 67 aquatic and wetland plant species, suitable for in-the-field reference, is available. The cards are alphabetized with two tables of contents, one by scientific name and one by common name. Each card has plant identification information on the back. The cards are laminated for water resistance and bound with a screw and fastener.

The ID deck (IFAS Catalog No. SM-50) is available from IFAS Publications Office, PO Box 110011, Gainesville, FL 32611, (352) 392-1764. The price for the newly reprinted decks is \$10 plus S/H.

A Small Mediterranean Island Needs Help!

- an appeal from Sylvia Haslam

I work partly in Malta, an island of less than 300km², with 330,000 people (excluding tourists). What population density! What human impact! Estimates of built-up area now range anything up to a third, and most of the rest is farmed, mainly in small fields (down to c. 20x5m) on often-terraced slopes. What remains? There are karst lands (semi-bare limestones) with garigue (very short woody plants with herbs), there are stream beds, now mostly dried by groundwater extraction. There are odd bits on building sites and by roads, the occasional small copse of maquis (Mediterranean sclerophyll) and little more.

All is now falling apart. Up to the 1960s, most people lived in towns and hardly ever left them. They have since colonised the countryside in a big way, acquiring cars and other attributes of affluence, and, naturally enough, they want country leisure activities. They have no tradition or experience of rural affairs or sustainability. The rural folk, almost a different nation, knew sustainable farming, but many emigrated, and the minority remaining have become too affluent to bother about keeping soil stable, repairing terrace walls, etc., activities once necessary for their survival.

The result poses huge problems. There are still gems of natural and historic heritage in the river valleys and elsewhere, but more of the river valleys is dry, disturbed or both.

Is anyone interested in studying the effect of excessive human impact, as a warning for other places? Including the effects of habitat fragmentation and loss on community, species and gene pools?

There is no money available, so researchers would have to bring their own grants. If coming for long enough, the University Departments of Agriculture and Biology and the (Government) Department of Afforestation and Horticulture welcome visitors. (Afforestation is mostly planting trees in towns.)

There is more here than I can do, and it is a worthwhile cause. Would anyone like to investigate - while there is still something left to investigate? If so, please contact, for further information: Dr. Sylvia Haslam, Department of Plant Sciences, University of Cambridge, England. *Dr. S. Haslam*

Recycling Pesticide Containers

Each year in the United States, more than 35 million "agricultural" pesticide containers (which includes aquatic herbicide containers) are manufactured and distributed. This is more than sixty million pounds of High Density Polyethylene (HDPE) plastic which must be disposed of one way or another.

Rather than take the trouble to burn the empty containers (and pollute the air), or to bury them in a landfill (and pollute the ground), why not recycle them into usable products, such as roofing shingles or faux wooden benches? After all, since 1992 pesticide manufacturers have supported the costs of collecting, grinding up, and recycling used pesticide containers. All that is needed to become part of the manufacturer's container recycling system is people to take responsibility for setting up and maintaining collection sites.

In Florida, more and more counties are setting up "pesticide container recycling collection centers" for the use of farmers, pest control companies, plant nurseries, golf courses, government agencies, and others who typically use pesticides that come in HDPE plastic containers. (This generally excludes homeowners, whose pesticides do not usually come in large bulk containers made of HDPE.)

The effort to set up collection sites in Florida is being coordinated by G. Tim Hurner of the Cooperative Extension Service, under a program being funded by the Florida Department of Environmental Protection. He will provide interested parties with motivational brochures, or will provide complete instructions on how to set up a local pesticide container recycling collection center.

To learn more, contact G. Tim Hurner at UF/IFAS, Florida Pesticide Container Recycling Program, 4509 W. George Blvd., Sebring, FL 33872-5803, (941) 382-2509.



Our Last Word on Balls ...

“In the Hokkaido district of Japan, there is a lake with especially fine *Cladophora* balls which form part of a summer festival connected with the folklore of the local Ainic people. Judging by the issue of a special stamp and a picture postcard [both depicting *Cladophora* balls], “*Cladophora* worship” seems to have become a tourist attraction. Moreover, there is (or was) a bar in Tokyo called Marimba, the Japanese name for these balls, where plastic *Cladophora* balls are on sale. It seems that the mythology surrounding these balls involves a young man and girl who drowned in the lake, their hearts turning into *Cladophora* balls. So popular have *Cladophora* balls become in Japan that they are now protected plants. It is said that plants of other non-ball forming species are rolled by hand into balls and sold as true Marimba.”

Excerpt from *Freshwater Algae: their microscopic world explored*, by Hilda Canter-Lund and John W.G. Lund (see review on page 8).

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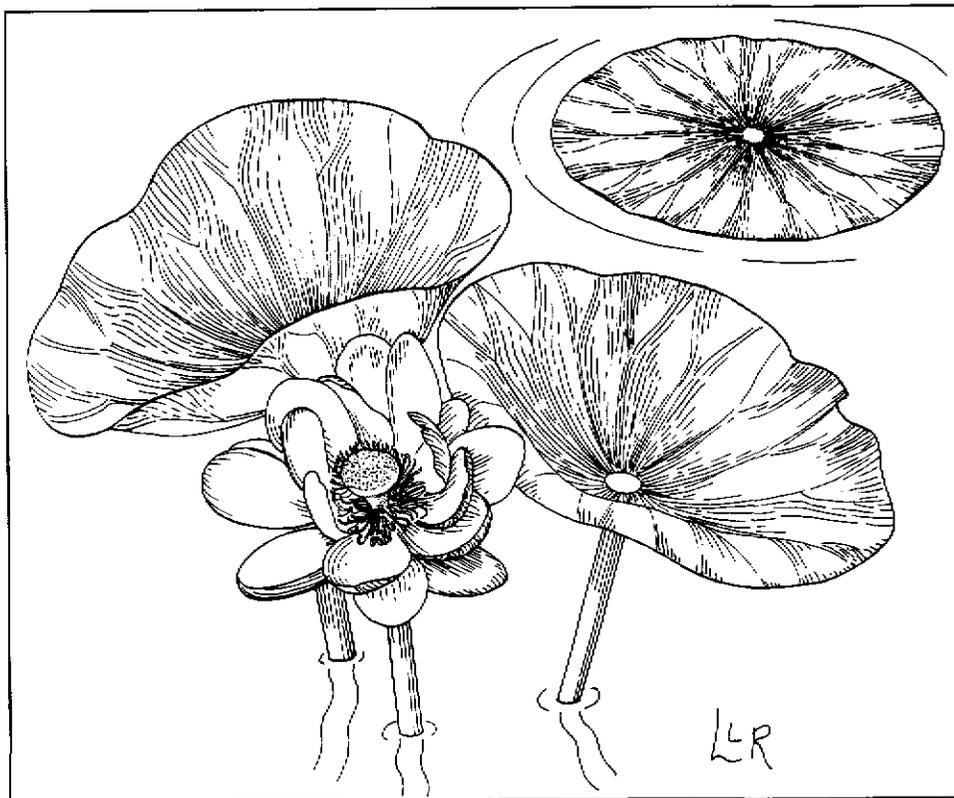
AQUAPHYTE

This is the newsletter of the Center for Aquatic Plants and the Aquatic Plant Information Retrieval System (APIRS) of the University of Florida Institute of Food and Agricultural Sciences (IFAS). Support for the information system is provided by the Florida Department of Environmental Protection, the U.S. Army Corps of Engineers Waterways Experiment Station Aquatic Plant Control Research Program (APCRP), the St. Johns River Water Management District and UF/IFAS.

**EDITORS: Victor Ramey
Karen Brown**

AQUAPHYTE is sent to more than 5,500 managers, researchers and agencies in 87 countries. Comments, announcements, news items and other information relevant to aquatic plant research are solicited.

Inclusion in *AQUAPHYTE* does not constitute endorsement, nor does exclusion represent criticism, of any item, organization, individual, or institution by the University of Florida.



“The Lotus beds of the Monroe marshes [Lake Erie] were for a great many years an advertising feature of Monroe to attract tourists and visitors to that city. These have practically disappeared since Michigan put the muskrat under game protection. The rats devoured the rhizomes for food and thus destroyed one of Monroe’s flourishing activities. The plants flowered by the thousands every year and visitors were taken out to the beds and allowed to cut the flowers at will and carry them away. I am putting it rather mildly when I say that in the forty years I was at Detroit I probably saw a million such flowers.” *Excerpt from O.A. Farwell, The Color of the Flowers of Nelumbo pentapetala, Rhodora 38:272. 1934. (Now recognized as Nelumbo lutea.)* Note: Dr. Edward Voss at the University of Michigan Herbarium reports that *Nelumbo lutea* still occurs in the area described by Farwell.