

AQUAPHYTE Online

A Newsletter about Aquatic, Wetland and Invasive Plants

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Center for Aquatic and Invasive Plants

Institute of Food and Agricultural
Sciences

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The Florida Department of Environmental
Protection,
Bureau of Invasive Plant Management

The U.S. Army Corps of Engineers,
Waterways Experiment Station,
Aquatic Plant Control Research Program

The St. Johns River Water Management District

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About Aquaphyte

This is the newsletter of the Center for Aquatic and Invasive Plants and the Aquatic, Wetland and Invasive 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 managers, researchers, and agencies in 71 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.

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APIRS Database Update

After 22 years of assiduous work, the **APIRS** database contains more than 60,000 annotated citations for scientific articles and reports about uncounted species of aquatic, wetland and invasive plants. Beginning as a mainframe, punch-card database with a few hundred references about water hyacinths, the **APIRS** database has grown to be the largest free database of its kind in the world. After a recent period in which the database was unavailable due to computer crashes, it is now up and running and better than ever. It has retained the quick searching speed which is now combined with an easy-to-use web interface. The database has been used many thousands of times by researchers, government agencies, companies, teachers, students and private groups and individuals.

The History of **APIRS**

APIRS originally was meant to be a source of information for "aquatic weed" workers in developing countries, and was funded by the U.S. Agency for International Development (USAID) for that purpose. It quickly became a source of information for workers in Florida as well, gaining the support of the then Bureau of Aquatic Plant Management of the Florida Department of Natural Resources (now the Bureau of Invasive Plant Management of the Florida Department of Environmental Protection (DEP)). USAID ceased sponsorship of the database in the early 1980s. The DEP Bureau continues to be a primary sponsor of the **APIRS** program. The U.S. Army Corps of Engineers Aquatic Plant Control Research Program supports national and international **APIRS** services. The program also is supported by the St. Johns River Water Management District, with occasional special-project support coming from other agencies and companies such as the U.S. Environmental Protection Agency and Cerexagri.

APIRS was developed by Mr. Victor Ramey, who continues to manage the overall program. Ms. Karen Brown now manages the database itself, while Ramey works to develop other informational and educational products about aquatic, wetland and invasive plants. Ms. Mary Langeland is the cataloger of all materials placed in the database.

The Value of **APIRS** - (It's *FREE!*)

Essentially, **APIRS** is a bibliographic database devoted to the research of aquatic, wetland and invasive plants. Databases abound, but none of them are entirely devoted to these specific plants, and few, if any, are free. A researcher or an institution can subscribe to journals, but these are very expensive, ranging in price from a few hundred to a few thousand dollars each per year. In addition, journals are focused on a specific subject, and this is clear by the journal titles: *Aquatic Botany*, *Plant Physiology*, *Journal of Ecology*, etc. But subjects in aquatic and invasive plant

research often cross disciplinary boundaries. Invasive and aquatic plant information can be published in ecology journals, weed science journals, or journals covering crop science, natural areas, wildlife management, ecological restoration, biogeography, and more. In the book, *Life Out of Bounds - Bioinvasion in a Borderless World*, Chris Bright comments that "Information on exotics is badly fragmented - it is scattered about in hundreds of technical newsletters and publications. . . ." Peter Pysek, in a chapter titled "Recent trends in studies on plant invasions" from *Plant Invasions - General Aspects and Special Problems*, states that "the available information on plant invasions is scattered . . . in at least 189 journals," and that journal literature comprises 80% of the total published information. Pysek names the top 13 journals and goes on to explain that in his sample, which covered the literature on any aspect of the ecology of non-native species, nine journals covered 28% of the published studies, and 20 journals covered almost 50% of the published studies. That is a lot of expensive journals to sub-scribe to. Pysek went on to say that approximately 15% of the literature on invasive plants was published in books or proceedings, and 4% was published in internal reports or theses. These types of items have been cataloged and entered into the **APIRS** database since its inception.

Many of the scientific journals are indexed, and sometimes abstracted, in commercial databases such as *Biological Abstracts*, *Cambridge Scientific Abstracts*, *Current Contents* and others. However, unless you subscribe to these databases, or belong to an institution that does, you do not have access to them. These databases often are even more expensive than individual journals.

APIRS collects and catalogs journal articles, books, book chapters, theses, conference proceedings, agency reports and other published scientific literature. To build the **APIRS** collection, we write to authors for reprints, reports and books to be cataloged and entered into the database. Authors usually are happy to contribute their published research to the database, thus making it widely known to others in their field. Many regional research centers around the world also contribute relevant publications. We rely on these contributions to maintain a comprehensive collection. In exchange, researchers have access to a free bibliographic database of references specific to their field. To contribute publications to **APIRS**, please send reprints, photocopies or PDF's.

Searching APIRS

To search **APIRS**, go to <http://plants.ifas.ufl.edu> and click on [APIRS Online Database](#). From this page, you can select [Helpful Hints and Specific Examples](#) for better searching of the database; [Some Keywords in the Database](#) for a simple list of keywords commonly used in the database; [Category and Keyword Use](#) for a list of definitions of the categories and keywords that we use when cataloging references; or [Search](#) to search for references in the database. Actually the database is straightforward enough even for first-time users to search without any instructions being necessary. However, to obtain the best results, it is best to consult the help pages. If difficulty or confusion is encountered when using the database, please contact [Karen](#)

Brown. She will assist you with any problems or help you create a search strategy that will optimize your search results.

Finding Full Text

The **APIRS** database contains fully annotated citations for each reference, but not full text. We would like to be able to provide copies of publications to users of the database, but we are not permitted to do so under copyright law.

For those with access to an academic library, many books and journals may be available there. Also, most academic libraries participate in "interlibrary loan" (ILL) agreements, enabling them to borrow items from other libraries for their patrons. ILL requests can cost approximately \$10 per item for non-members of the university and can be free for members, but this will vary between libraries.

Some articles may be downloaded directly from a journal's web site, but many require a fee.

To purchase the full text of cited articles, visit the document delivery services listed below. These services comply with copyright law. They can provide documents for fees ranging from \$15 to \$45 per article, with payment via online transaction or invoicing. These sources are not guaranteed to have references cited in **APIRS**, but they are the most likely document delivery services for science related journal articles. Although most of these sources have databases in their own right, none of them has the comprehensive coverage of the literature on aquatic, wetland and invasive plants found in **APIRS**.

ISI Document Solution - Institute for Scientific Information, 800/523-1850. Scanned articles are provided and various methods of delivery are available, including fax, Federal Express and standard mail delivery.

Ingenta (formerly CARL UnCover) - 800/787-7979. Full text articles are available by fax, Ariel (a digitized format used between libraries), or 24 hour electronic display/download. Payment by credit card.

ScienceDirect - a pay-per-view ordering process which allows 24 hour access to full text articles in PDF format, payable by credit card.

CAB International (UK) - Mail or fax delivery available.

British Library Document Supply Centre - ". . . a rapid and comprehensive document supply and interlibrary loan service from our extensive collections to researchers and scholars in all kinds of libraries and organisations." Self-described as the leading document provider in the

world.

[Canada Institute for Scientific and Technical Information \(CISTI\)](#) - One of the largest scientific and technical libraries in North America. Copyright-cleared document delivery services provided.

[National Library of Australia](#) - Australia's largest document supply center.

[DocDel.net](#). A directory for document delivery services and users - hundreds of resources and providers.

For items that cannot be found using these document delivery services, contact Karen Brown for assistance at 352.392.1799 or **kpb@mail.ifas.ufl.edu**

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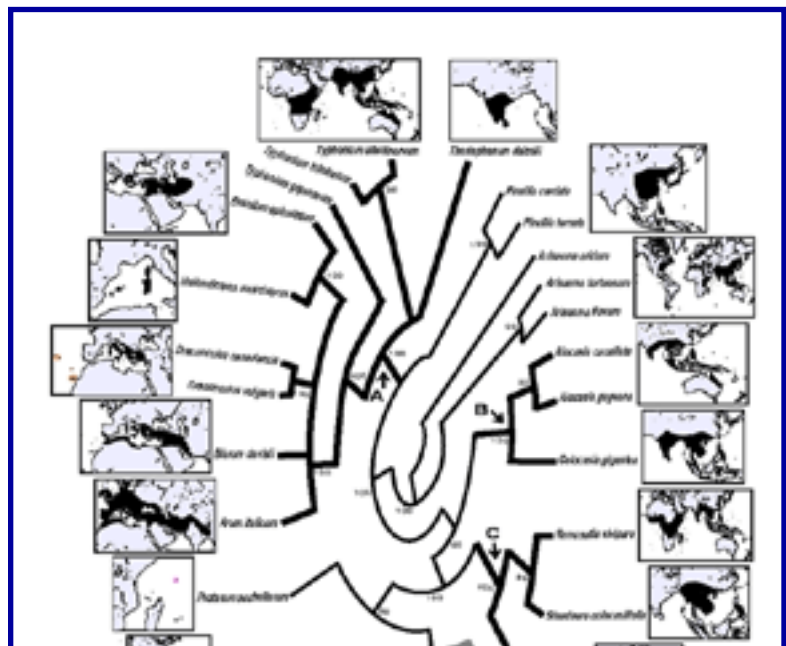
Closest relatives of *Pistia stratiotes* resolved with combined chloroplast and mitochondrial DNA sequences

about the work of [Dr. Susanne Renner](#), Menzinger Strasse 67, D-80638 Munich, Germany, renner@lrz.uni-muenchen.de, and [Dr. Li-Bing Zhang](#), Department of Biology, Colorado State University, Fort Collins, CO 80523, Libing.Zhang@ColoState.edu

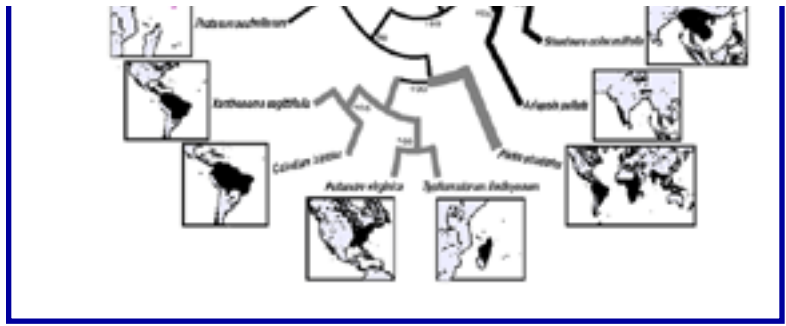
At long last, the closest relatives of *Pistia stratiotes* (water lettuce) have been identified. Previous hypotheses about the plant relationships of *Pistia* had to be based on morphology alone, which in its case is difficult because of the plant's much-condensed flower and other reproductive structures. The great morphological distinctness of *Pistia* is reflected in classifications of Araceae, which place this single species in a subfamily or tribe by itself. This work was conducted by S. Renner and L.-B. Zhang, systematists at the Missouri Botanical Garden and the University of Missouri-St. Louis.

The scientists used sequences from three sections of chloroplast DNA, called 'introns' and 'spacers' because they are inserted between and inside genes, and one intron in a mitochondrial gene. (A manuscript on their discovery has been submitted and the sequences have been made public in the genetic sequence database GenBank, an annotated collection of all publicly available DNA sequences which also contains the human sequence.)

The figure is a phylogenetic 'tree' (drawn as a circle) based on all combined sequences. The tree represents the most likely relationships between *Pistia* and its closest relatives in the Araceae family, given the data and a model of sequence evolution based on the specific sequences in the analysis. The numbers on the branches represent statistical confidence (100 is the highest possible level).



Pistia stratiotes appears in the lower right, and it is the sister group to the entire circle of genera 'above it' in the tree. In other words, ***Pistia* is not closely related to any single living species**. Rather, its ancestor diverged from the ancestor of all the genera in the tree before those other genera had diversified.



Most of the genera in the 'tree' have but a few species, but a few, such as jack-in-the-pulpit (*Arisaema*, with 150 species), are species rich. The distribution maps next to the genera show that the species related to *Pistia* all occur in the Old World tropics. The only exceptions are three species of jack-in-the-pulpit that entered North America across the Bering land bridge, sometime in the Miocene as indicated by 16-18 million year old fossils from Spokane. The oldest fossils of *Pistia* are seeds from the Late Oligocene/Early Miocene (24 million years) of Europe and Russia. These fossils, however, 'underestimate' the true age of *Pistia* because some of the genera in the *Pistia* sister group have 45 million year old fossils. Also, the group at the very bottom of the tree, *Peltandra* (in Florida) and *Typhonodorum*, are known from 60 million year old leaves from the Late Paleocene/Eocene of eastern Europe, Kazakhstan, North Dakota, and Tennessee (Wilde et al., in press).

The combined molecular and fossil evidence led the researchers to infer that the early evolution of *Pistia* took place between 60 and 45 million years ago somewhere around the Tethys sea, that is the proto-Mediterranean sea which opened into the Indian Ocean, and that *Pistia* in geologic terms may be a relative newcomer to the New World tropics. More detailed comparisons of gene sequences from different populations of *Pistia* are needed to test whether New World *Pistia* populations on average are younger than Old World *Pistia* populations. It is tricky, however, because *Pistia* is so mobile, and there is likely to have been much local extinction, followed by re-invasion.

References cited:

Renner, S.S., L-B. Zhang. *Submitted*. Phylogeny and evolution of the pantropical aquatic weed *Pistia stratiotes* (Araceae).

Wilde, V., Z. Kvacek, and J. Bogner. *In press*. Fossil leaves of the Araceae from the European Eocene and notes on other aroid fossils. *Int. J. Plant Sciences*.

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APIRS Picks

Particularly interesting new items in the **APIRS** database.

Selections by reader/cataloger, Mary Langeland; elaborated by Karen Brown.

The population of *Myriophyllum quitense* (Haloragaceae) at Laguna Toro in the high Andes of Bolivia was noteworthy for possessing some unusual characteristics. Numerous individuals (ca. 5-10% of the population) were noted with leaves arrayed in 5-merous whorls. By contrast, *M. quitense* typically possesses leaves in 4-merous (occasionally 3-merous) whorls (Orchard 1981). Leaves in 5-merous whorls have only been reported for the species from a single herbarium specimen from North America (Orchard 1981), and, more recently, from Cochabamba's Laguna Alalay (Ritter and Crow 1998).

Ritter, N.P. 2000. *Biodiversity and Phytogeography of Bolivia's Wetland Flora*. Ph.D. Thesis, University of New Hampshire, 399 pp.

Where the species [*Nelumbo lutea*] occurs in pure stand the rhizomes form a complex underground network which totals a length of 45 miles per acre. The rate of colonization is phenomenal since a small patch was observed to extend itself radially an average of 45 feet in one growing season. This represents a growth rate of 0.23 feet per day for the entire summer. On this basis six properly spaced patches of lotus (10 feet across) would produce an acre of lotus during one growing period.

Hall, T.F., and Penfound, W.T. 1944. *The Biology of the American Lotus, Nelumbo lutea (Wild.) Pers.* American Midland Naturalist 31(3):744-758.

Management of nonindigenous species is a crucial aspect of maintaining native biodiversity and normal ecosystem functions. We attempt to guide researchers in developing projects that will be of use to conservation practitioners, tangibly improving applied conservation measures. We advocate a directed approach for conservation research to aid in prioritizing nonindigenous species for intervention by resource managers. This approach includes outlining what needs to be known to make such relative

judgments about the impacts of nonindigenous species and the most promising methods by which to obtain such information. We also address active measures that should be taken once priorities have been set, highlighting the roles of risk assessment and research in improving control efforts. Ultimately, a better match between research and practical conservation needs should result in more effective reduction of the effects of nonindigenous species on native species.

Byers, J.E., Reichard, S., Randall, J.M., et al. 2002. *Directing Research to Reduce the Impacts of Nonindigenous Species*. Conservation Biology 16(3):630-640.

We present the results of a 14-year common garden experiment with the Chinese Tallow Tree (*Sapium sebiferum*) from its native range (Asia), place of introduction to North America (Georgia) and areas colonized a century later (Louisiana and Texas). Invasive genotypes, especially those from recently colonized areas, were larger than native genotypes and more likely to produce seeds but had lower quality, poorly defended leaves. Our results demonstrate significant post-invasion genetic differences in an invasive plant species. Post-introduction adaptation by introduced plants may contribute to their invasive success and make it difficult to predict problem species.

Siemann, E., Rogers, W.E. 2001. *Genetic Differences in Growth of an Invasive Tree Species*. Ecology Letters 4:514-518.

In an effort to help modernize neo-tropical plant studies and to make GIS more accessible to botanists, The New York Botanical Garden has developed a digital base map of the Americas with multiple registered map layers that can be superimposed in any combination and may be used to create digital distribution maps from collection lists for dissemination and analysis. The [Americas Base Map](#) may be utilized by any botanist affiliated with a nonprofit institution and with access to ArcView®, and it is available on CD or in electronic form by request.

Bletter, N., Janovec, J., Brosi, B., et al. 2003. *A Digital Basemap for Studying the Neotropical Flora, The New York Botanical Garden*.

We report that an eelgrass bed *Zostera marina* L. at the Aland Islands, northern Baltic Sea, is dominated by a single genotype which extends over an area of approximately 160x40 m. . . To our knowledge, it represents the largest marine plant identified thus far. Based on estimates of horizontal rhizome growth rates, this clone may be more than 1000 years old. The remarkable phenotypic plasticity of a single genotype which dominates this site illustrates that there is no simple one-to-one relationship

between genetic diversity and population persistence in changing and stressful environments.

Reusch, T.B.H., Bostrom, C., et al. 1999. *An Ancient Eelgrass Clone in the Baltic*. Marine Ecology Progress Ser. 183:301-304.

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NEW!
Two PHOTO-MURALS
INVASIVE NON-NATIVE PLANTS

A Collaborative Effort:

Center for Aquatic and Invasive Plants, University of Florida
Bureau of Invasive Plant Management, Florida Department of Environmental Protection
and
Cerexagri

Classroom size, *Free* to Requesting Teachers (K-12)
Send your non-virtual letter for immediate delivery.



Here are two large photo-murals of **75 invasive non-native plants** in the U.S. Of the plants depicted, 100% are found in Florida, 50% are also found elsewhere in the Southeast U.S.; 50% are also found in Hawaii; 15% are also found in the West; 15% are also found in the East; and 17% are also found in most of the rest of the U.S.

All plants are depicted in large, strikingly attractive color photographs. [Here is the list of plants.](#)

At the request of teachers and enviro-trainers, these photo-murals were produced to be attention-grabbing teaching tools for science classes and management agency training, and for

homeowners' forums, ecology clubs, environmental advocacy groups and others concerned about the onslaught of non-native plants in the United States. **It was produced by** the University of Florida and the Florida Department of Environmental Protection, with printing support from Cerexagri. Additional printing support came from Sea Grant, the national Aquatic Plant Management Society, the Florida Aquatic Plant Management Society, and from the U.S. Army Corps of Engineers Jacksonville Office.

The photo-murals are available:

-- free-to-teachers:

fully laminated copies of the murals are free to teachers (U.S., K-12) and public agency trainers (U.S.) who request them in writing, on letterhead, to the non-virtual **APIRS** address below. - **there is a limited number of free copies available** -

Please do not telephone or e-mail us about the free photo-mural s offer; we are happy to accept letters on letterhead from teachers (U.S., K-12) and *public* agency trainers (U.S.) who want their free copies. Send your request letters to: **APIRS** Photo-Mural, Center for Aquatic and Invasive Plants, 7922 NW 71 ST, Gainesville, FL 32653.

-- All four plant photo-murals are for sale to anyone from 1-800-226-1764:

They may be purchased singly or as a complete set.

1) SP-293 - Native Freshwater Plants Photo-Mural - fully laminated 62 in. X 23 in.
\$20 each plus S/H.

2) SP-329 - MORE Native Freshwater Plants Photo-Mural - fully laminated 27 in. X 39 in.
\$12 each plus S/H.

3) SP-292 - Invasive Non-Native Plants - fully laminated 62 in. X 23 in.
\$20 each plus S/H.

4) SP-328 - MORE Invasive Non-Native Plants - fully laminated 27 in. X 39 in.
\$12 each plus S/H.

OR SAVE MONEY - BUY ALL FOUR!

**SP-336 - ALL FOUR PHOTO-MURALS AS DESCRIBED ABOVE: \$39.50
plus S/H**

**Purchase copies from the IFAS Publications Office, 1-800-226-1764.
(Credit cards accepted.)**

Remember that **WHEN YOU PURCHASE A COPY**, you also are buying a copy
for a K-12 teacher!

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FOUR CLASSROOM-SIZE, LAMINATED PHOTO-MURALS FOR YOU!

Two - NATIVE FRESHWATER PLANTS

and

Two - INVASIVE PLANTS, AQUATIC AND TERRESTRIAL

A Collaborative Effort:
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Bureau of Invasive Plant Management, Florida Department of Environmental Protection
Cerexagri

All four plant photo-murals are for sale to anyone from 1-800-226-1764; or by visiting the **[IFASBOOKS](#)** website:

They may be purchased individually or as a complete set.

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OR SAVE MONEY - BUY ALL FOUR! SP-336 - ALL FOUR PHOTO-MURALS AS DESCRIBED ABOVE: \$39.50 plus S/H Purchase copies from the IFAS Publications Office, 1-800-226-1764; or visit the **[IFASBOOKS](#)** website (Credit cards accepted.)

These photo-murals were produced at the request of teachers and enviro-trainers to be attention-grabbing teaching tools for science classes and management agency training, and for homeowners' forums, ecology clubs, environmental advocacy groups and others interested in marshes, swamps and other wetlands of the United States. The murals were produced by the University of Florida and the Florida Department of Environmental Protection, with printing support from Cerexagri. Additional printing support came from Sea Grant, the national Aquatic Plant Management Society, the Florida Aquatic Plant Management Society, and from the U.S. Army Corps of Engineers Jacksonville Office.

NATIVE AQUATIC PLANTS



Lest we forget, with so much current emphasis on invasive non-natives, **most plants in the U.S. are native**; beneficial to animals, humans, and the environment; and often beautiful. So, here are two photo-murals of 76 native freshwater plants of the U.S.. Of the plants depicted, 100% are in Florida; 97% are also found in the rest of the Southeast U.S.; 50% are found in the Eastern U.S.; 22% are found in the West; and 22% are found throughout most of the U.S.

[Click here for the list of plants](#) featured on the two "native" murals.

NON-NATIVE INVASIVE PLANTS, AQUATIC AND TERRESTRIAL



Here are two large photo-murals of 75 invasive non-native plants in the U.S. Of the plants depicted, 100% are found in Florida, 50% are also found elsewhere in the Southeast U.S.; 50% are also found in Hawaii; 15% are also found in the West; 15% are also found in the East; and 17% are also found in most of the rest of the U.S. As in the other photo-murals of this series, all plants are depicted in large, strikingly attractive color photographs.

[Click here for the list of plants](#) featured on the two "invasive" murals.



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Journals for Sale

The Aquatic Plant Management Society, Inc. (APMS) has complete sets of back issues of the **Journal of Aquatic Plant Management** for sale (four issues are available as photocopies only.) The set of journals represents forty years of research into the management of aquatic plants. The semi-annual Journal was first published in August 1962, with the most recent issue being Volume 41, January 2003.

Sets are priced at \$250.00, plus postage. The average cost of shipping to a U.S. address is \$25.00 (parcel post rate), and to an international address \$35-\$40 (economy rate). The APMS treasurer can accept credit cards or checks as payment.

Contact [Dr. Linda Nelson](mailto:Linda.S.Nelson@erdc.usace.army.mil), USAERDC-WES, 3909 Halls Ferry Road, Vicksburg, MS 39180-6199, 601.634.2656. E-mail: Linda.S.Nelson@erdc.usace.army.mil

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Center for Aquatic and Invasive Plants Meetings

May 15-18, 2008; Palmetto, Florida - www.fnps.org

28th Annual Florida Native Plant Society Conference Uplands to Estuaries: Celebrating Florida's Native Plant Heritage

May 20-22, 2008; Imperial Palace Casinos, Biloxi, Mississippi - <http://www.se-eppc.org>

10th Annual Southeast EPPC Conference

June 23-27, 2008; International Weed Science Society, Vancouver, Canada - <http://iws.ucdavis.edu/5intlweedcong.htm>

International Weed Science Society

Aquatic Weed Management

Contacts:

Mike Netherland, USA | mdnether@ufl.edu

Kevin Murphy, UK | k.murphy@bio.gla.ac.uk

June 23-26, 2008; University of Florida, Gainesville, Florida - <http://www.conference.ifas.ufl.edu/soils/wetland082/site.htm>

Biogeochemistry of Wetlands: Science and Applications Short Course

August 25-26th, 2008; LSU Energy, Coast, and Environmental Building, Baton Rouge, Louisiana - <http://www.sce.lsu.edu/conference>

Sustainable Management of Deltaic Ecosystems: Integration of Theory and Practice

September 7-12, 2008; Daniel Boone National Forest, Olympia Springs, Kentucky - http://tfce.uky.edu/wri_2008.htm

2008 Eastern Regional Wetland Restoration Institute

September 23-25, 2008; Austin Carey Memorial Forest Education Building, Gainesville, Fl. - <http://soils.ifas.ufl.edu>

Hydric Soils Short Course - Specialized Training for Wetland Specialists

UF/IFAS

October 21-23 , 2008; Austin Carey Memorial Forest Education Building, Gainesville, Fl. - <http://soils.ifas.ufl.edu>

Hydric Soils Short Course - Specialized Training for Wetland Specialists

UF/IFAS

November 12-14, 2008; Stellenbosch, South Africa http://academic.sun.ac.za/cib/events/Elton_CIB_symposium.htm

Fifty Years of Invasion Ecology - the Legacy of Charles Elton

Centre of Excellence for Invasion Biology, Stellenbosch University

November 18-20 , 2008; Austin Carey Memorial Forest Education Building, Gainesville, Fl. - <http://soils.ifas.ufl.edu>

Hydric Soils Short Course - Specialized Training for Wetland Specialists

UF/IFAS

June 23-26, 2009; Guadalajara, Jalisco, Mexico <http://www.paleolim.org/index.php/symposia/>

11th International Paleolimnology Symposium

August 23-27, 2009; Stellenbosch, South Africa www.emapi2009.co.za or rich@sun.ac.za

The 10th International Conference on the Ecology and Management of Alien Plant Invasions (EMAPI)

Centre for Invasion Biology (CIB), Department of Botany & Zoology, [Stellenbosch University](http://www.sun.ac.za)



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Center for Aquatic and Invasive Plants

Books, Manuals, and Online Resources

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AQUAPHYTE ONLINE

Summer 2003

FROM THE DATABASE

Here is a sampling of the research articles, books and reports which have been entered into the aquatic, wetland and invasive plant database since Winter 2003. The database has more than 60,000 citations. To use the free APIRS database online, go to <http://plants.ifas.ufl.edu/search80/NetAns2/>.

To obtain articles, contact your nearest state or university library, or a [document delivery service](#).

Agwunobi, L.N., Angwukam, P.O., Cora, O.O., Isika, M.A.

Studies on the use of *Colocasia esculenta* (taro cocoyam) in the diets of weaned pigs.

TROP. ANIMAL HEALTH PROD. 34(3):241-247. 2002.

Anderson, L.W.J.

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The **UF/IFAS Center for Aquatic and Invasive Plants** is a multidisciplinary research, teaching and extension unit directed to develop environmentally sound techniques for the management of aquatic and natural area weed species and to coordinate aquatic plant research activities within the State of Florida. The Center was established in 1978 by the Florida legislature. Directed by **Dr. William Haller**, the Center utilizes expertise from many departments with UF/IFAS and its Agricultural Research and Education Centers throughout Florida.

The mission of the **CAIP Information Office** is to inform and educate all stakeholders about the impacts and management of invasive plants.



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