A Q U A P H Y T E

Center for Aquatic and Invasive Plants
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Update on APIRS

The Aquatic, Wetland and Invasive Plant Information Retrieval System (**APIRS**) continues to grow and change with the rest of the electronic information world, although some things stay the same. We continue to collect, catalog and make available published literature on the subjects of aquatic, wetland and invasive plant biology, ecology, management, conservation, utilization and much, much more. During the past year, almost 2,000 new items were cataloged and entered into the database, which now contains almost 47,000 items. As many of you already know, **APIRS** went online three years ago and is heavily accessed by users around the world via the World Wide Web. To use the **APIRS** database online, go to **http://aquat1.ifas.ufl.edu/** and follow the instructions. Some people still prefer to have literature searches performed for them. During the past year, approximately 300 custom bibliographies were prepared for over 200 patrons. Bibliographies can be prepared and sent to users via electronic mail or the postal service, usually the same day of the request. To request a personalized literature search and bibliography, contact Karen Brown at **kpb@gnv.ifas.ufl.edu** Although a lack of funding is an ever-present problem, for now database services continue to be available free of charge.

Other products of the **APIRS** information office continue to be popular among researchers, students, agency managers and personnel, schoolteachers, environmental groups and the general public. They are available from the IFAS Publications Office, University of Florida, P.O. Box 110011, Gainesville, FL 32611-0011, (352) 392-1764, Toll-free (800) 226-1764.

The **Aquatic Plant ID Deck** is a 3" x 4" card deck containing color photographs of 67 aquatic and wetland plant species with identification information on the back. The cards are laminated for water resistance and bound with a screw and fastener, making them suitable for in-the-field reference. Decks are $10 plus shipping.

Aquatic Plants in Pen-and-Ink is a collection of 115 original line drawings which may be used without copyright permission once purchased. The package costs $35 plus shipping. A **1997 Supplement** of 25 additional drawings is available for $10 plus shipping.

The **Freshwater Plants Poster** depicts 63 aquatic plants in a natural setting and shows both common and scientific names. The 2' x 3' poster costs $7 plus shipping, although it is available for free to Florida schoolteachers by request.

Over 15 **educational videotapes** are available on topics ranging from aquatic and wetland plant identification to training for aquatic pest control applicators to careers in Florida's freshwater environments. Programs may be borrowed, or purchased for $15 each, plus shipping.

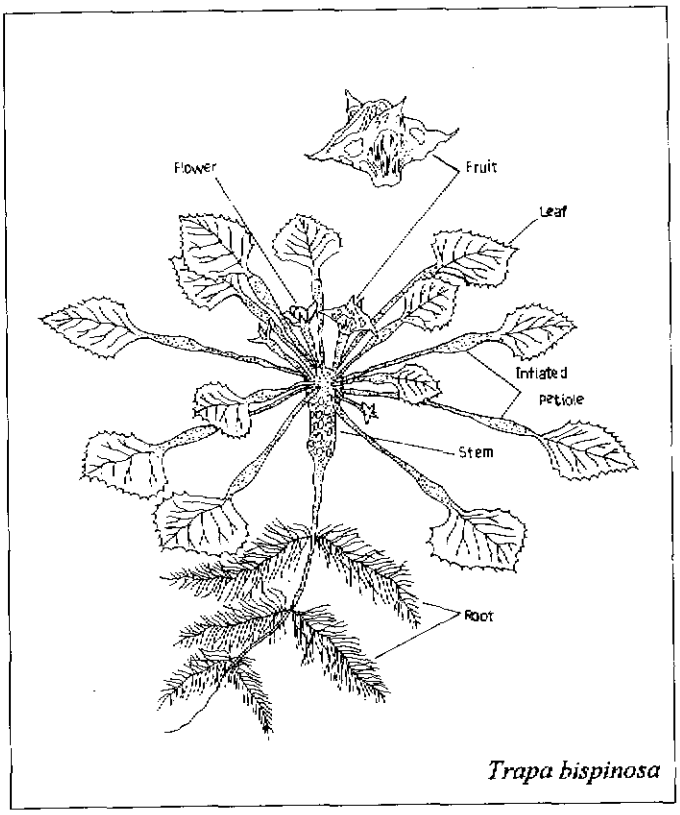
All of these items, plus a lot more, are described in detail on the Center for Aquatic and Invasive Plants' World Wide Web site. Examples of information to be found at the site include information on invasive, nonindigenous plants in Florida, photographs of aquatic plants; two online books; a photo gallery; *AQUAPHYTE* online; an aquatic and wetland plant glossary; information on biological control insects; a comprehensive list of aquatic and wetland plant manuals, field guides and textbooks; a resource guide for water gardeners and aquarium enthusiasts; links to other relevant web sites; and much more. Visit us online at **http://aquat1.ifas.ufl.edu/** or contact us at the address on the back page of this newsletter.

On the horizon are a few new products including a field identification deck on aquatic grasses and a CD-ROM of aquatic and wetland plant photographs. *Don't call us yet...we promise to keep you posted!*

The Freshwater Aquatic Fruit: Water chestnut

by **Syed Hasib Ahmad**, Advisor, Aquaculture & Fisheries, Institutional Finance & Programme Implementation Dept., Government of Bihar, India, and **Arun Kumar Singh**, Senior Lecturer, B.D.E. College, Magadh University, Patna, Bihar, India

Water chestnut *(Trapa bispinosa)* is an edible aquatic plant that grows abundantly in the lakes of Kashmir. At Wular Lake it is said to yield 4-5 million kilograms (approximately 4,000-5,000 tons) of nuts annually. These are scooped up from the bottom of the lake in small nets and constitute almost the only food for at least 30,000 persons for five months of the year. Water chestnut has been commercially cultivated in many parts of India from the most ancient times, particularly in the eastern and southern regions. Water chestnut is also known as water nut, horn chestnut, bull nut, and buffalo-head fruit. The plant is commercially cultivated in tropical parts of the world such as Pakistan, Sri Lanka, Indonesia, and Africa. The plant is abundant in Indonesia, southeast Asia, the southern part of China, and in the eutrophic waters of Japan, Italy and tropical America. It has become naturalized in a few places in the eastern United States, apparently through its use as a decorative aquatic plant.



Trapa bispinosa

This annual floating-leaved aquatic herb belongs to the natural order Trapanaceae, family Trapaceae. The genus *Trapa* comprises some 30 species that exclusively grow in eutrophic water. *Trapa natans* Linn. var. *bispinosa* Makino is a native of China. The Chinese name of the nut is Ling Ko, meaning "spiritual horn." Ling Ko is found all over China. It is harvested and consumed during the mid-autumn festival in September to celebrate the overthrow of the Mongolians during the Yuan Dynasty in ancient China. *Trapa bispinosa* Roxb. grows in India and also in Ceylon. The nut has two (sometimes four) short slender spines in place of the pronounced horns of the Chinese plant. The fruit with two spines is known as *Trapa bispinosa* Roxb., and the four-spined fruit is known as *Trapa quadrispinosa* Wall. There is also a four-spined European species, *Trapa natans*, commonly known as Jesuit nut, water caltrops, or water chestnut. These nuts are of a slate brown color whereas the Chinese nut is black. Based on the color of the husks, water chestnut is categorized into three types: completely green, completely red, and green blended with red.

About 2/3 of the water chestnut plant floats just beneath the water surface and thus forms a thick mat in the water column. Only its upper leaves float over the water surface in an artistic radial pattern with swollen, air-filled petioles that keep the upper part of the plant afloat. The reddish green leaves are villous on the dorsal side, and 6-8 cm in size. The submerged leaves (occurring on young plants and not shown in drawing) are laterally dissected into capillary segments.

Trapa has no primary root. The plant stem remains in the water and has one node of about 3-5 cm in thickness. The submerged stem bears two types of adventitious root. Those near the base of the stem fix the plant to the muddy substrate. The rest are free-floating fibrous roots borne in pairs below the leaf bases and are unusual in being green and photosynthetic.

The flowers are axillary, white in color, with a solitary peduncle. They open above the surface of the water towards the afternoon. After pollination, the flowers submerge to facilitate fruit formation. Fruits appear in September in the State of Bihar, and continue up to December and January, fully ripening in the cold season.

The plant bears edible nuts in hard-shelled fruits which resemble the head of a water buffalo with its two large curved horns. The fruit

has four angles and two out of four develop in the case of *Trapa bispinosa*. The fruit is a bony one-seeded nut having very unequal cotyledons and a top-shaped drupe. The fleshy pericarp covers a large 2-4 horned, stony endocarp. When ripe, the nuts fall to the bottom of the pond where they remain all winter as they must be kept moist to retain their viability.

Cultivation

Ponds which are otherwise unsuitable for fish culture are being utilized for farming of this fruit crop. It is best grown in shallow perennial ponds which hold abundant water throughout the year.

Trapa can germinate under a wide range of water depths and grows best at .5-1 m. The maximum water depth should never be more than 1 m, though the plant can grow to a depth of around 3 m. The plant requires full sunlight and the water level should be full by August. The pond water must have a high organic content and should be free of high concentrations of salts. Neutral to somewhat alkaline pH are best for proper growth of the plant.

In India, the traditional palm tree toddy collector known as "Pasi" by caste and also the fisher community are engaged in cultivating and marketing of water chestnut. Two methods are used in cultivation: natural seeding from previous crops, and preparation and transplanting of seedlings. After the harvest of the seed crop, disease-free, healthy and large sized fruits are selected for raising in the nursery. While selecting fruits for seeds, spines of the spinous variety are cut with sharp knives to prevent damaging the outer shell of seeds during curing and storage.

Selected seeds are stored only after curing with a special technique. The seeding material should be kept in large barrels or in earthen pitchers which are filled with freshwater and left undisturbed for two to three days. Afterwards water is changed daily for at least 5-6 days. This is one of the most essential operations. The practice is continued until the hard, thick outer skin of the fruit rots and the loose coating of the seed detaches from the fruits and the thin, stony, inner coat is visible. The curing of seed material is done at room temperature and is completed in about 35-40 days. The objective of curing the seeds is to prevent spoilage due to rotting of the loose outer shell of the fruits.

Seeds so cured can easily be stored in the same earthen pitcher or barrel, but without water and covered with a moist cloth or gunny bag to provide high humidity and low temperature. These containers are kept in a cool, shady place and can be stored for up to 3-4 months, without affecting seed viability. The seed nuts procured from 1/100 of a hectare of a normal crop are sufficient to raise seedlings for one hectare.

During the months of March-April, just after the seeds have started germinating, they are broadcast into small nursery ponds or in small, shallow ditches having 45-60 cm of water. Before broadcasting, the seeds are coated with a layer of soil on the opposite face of the germinated portion in order to add extra weight on the non-germinated face and to assure that after broadcasting, in the manner of a shuttle-cock, the seeds will settle at the bottom with the germinated face up and the coated face down. They also can be manually sown. The stem starts emerging and gradually spreads out. During the months of June-July, seedlings are lifted from the nursery pond and transplanted into larger ponds, ditches, or reservoirs. For transplantation, the uprooted stems are cut into several smaller pieces. Some growers fasten 3-4 seedlings together in a bunch, which is thrashed into the pond bottom by feet.

Lateral shoots commonly known as suckers can be detached from the main mother seed nut for transplanting. Single seeded water nuts can develop 20-30 and sometimes even up to 50 such lateral suckers. Each of these laterally developed suckers may very well be able to send out 5-10 further shoots after transplanting. From sowing to later such formations takes about 40-50 days. Shoots also arise from the nodes, forming roots and new plants. Thus, within a month or so, the entire water area gets covered with the luxurious growth of brownish-green leaves.

Fertilizing the pond with urea is a common practice. This is applied at the rate of 40-50 kg/ha of pond surface area in two installments at fortnightly intervals, with the first dose about 20 days after transplanting. The application of 40 kg of nitrogen, 40 kg of phosphate, and 60 kg of potash per hectare produces better results.

Pests of water chestnut include the beetle, *Galerucella birmanica*, which is reported to consume up to 40% of the leaf tissue. Insect pests are controlled by shaking the plants vigorously under water, by hand-picking, and by dusting or spraying exposed parts of the plants. Snails are another destructive pest, particularly during the later stage of growth. Growers remove the snails by hand. Rats also eat nuts and vegetative parts of the plant.

Harvesting of fruit is from September/October through December/January. The entire crop is harvested in four installments at intervals of 8-10 days because the fruits ripen in batches. At the time of harvesting, the size, softness of the pulp, greenness of color, and easy separation of the outer hard cover are the most important characteristics taken into consideration. Each fruit is plucked by hand after lifting the plants from the surface of the water. The plant is then put back in position for the next batch of fruits to ripen during the 8 day interval. Quantitatively, the maximum yield is obtained on the second and third installments of harvesting operations.

In traditional culture, the yield from 1 bigha (4 bigha=1 hectare) of pond area, on average, ranges from 2.4-2.6 quintals (quintal=100 kg. or 220 lbs.). With the application of inorganic fertilizer and pest control measures, an average yield of 10-12 quintals/bigha has been obtained.

The commercial marketing of water chestnut has not been fully investigated. Water chestnuts are sold fresh on the pond bank, or in local markets, where prices and profits tend to be low.

Editor's Note: All *Trapa* species are prohibited in the state of Florida. *Trapa natans*, introduced to New York State in the late 1800s, now infests sites throughout the northeastern United States. The plant has aggressive growth habits and forms extensive surface mats, restricting both recreational and commercial uses of infested water bodies. It is reported that seeds may remain viable for up to twelve years, making eradication of the plant especially difficult. Research continues on control methods for this species.

The Chinese water chestnut, *Eleocharis dulcis*, is grown legally and successfully in Florida as a food crop. Confusion is frequent since both plants share the same common name of water chestnut.

Books/Reports

GUIDELINES FOR CONSTRUCTED WETLAND TREATMENT OF FARM DAIRY WASTEWATERS IN NEW ZEALAND, by C.C. Tanner and V.C. Kloosterman. 1997. 67 pp.

(Order from The Publications Officer, NIWA, POB 11-115, Hamilton, NEW ZEALAND. E-mail: d.lee@niwa.cri.nz NZ$20 plus S/H.)

Required reading for anyone contemplating constructing a "wetland" for treatment of wastewater from farms and other organic pollution sources, this manual readily answers all the major questions to be asked on the subject. It helps the reader evaluate the options (surface-flow vs. gravel-bed vs. aerated pond combination constructed wetlands); it presents flow-charts and sequences for planning, constructing and aftercare of constructed wetlands; it includes engineering drawings of basic design, channel types, and inlet and outlet structures; project costs are described and estimated; suitable plant species are named; landscape designs to enhance wildlife values are offered; and weekly and monthly operation and maintenance "action lists" let the reader know what will need to be done after the wetland has been constructed.

INTRODUCTION OF NON-NATIVE PLANTS INTO THE NATURAL ENVIRONMENT, by J. Lambinon. 1997. 29 pp.

(Order from the Council of Europe Publishing, Council of Europe, F-67075 Strasbourg Cedex, FRANCE. Nature and Environment Series No. 87. E-mail: ed.publishing@seddoc.coe.fr)

This short report was commissioned by the Bern Convention on the Conservation of European Wildlife and Natural Habitats to "describe the problems caused to natural habitats by the spread of invasive non-native plants in Europe, to propose measures to limit the impact of introduced species and to control the release of non-native plants." The "xenophytes" of main concern in Europe are listed.

CONTROL OF NON-NATIVE PLANTS IN NATURAL AREAS OF FLORIDA, by K.A. Langeland and R.K. Stocker. 1997. 38 pp.

(Order from IFAS Publications, POB 110011, Gainesville, FL 32611-0011, (800) 226-1764. $2.00 plus S/H.)

This manual was published specifically for managers of Florida's natural areas. Though it reviews several possible methods for control of non-native plants, most of the information has to do with herbicides and their use. Specific instructions for using herbicides to control more than ninety species of non-native plants is included, naming herbicides and specifying application rates.

A GUIDE TO THE RESTORATION OF NUTRIENT-ENRICHED SHALLOW LAKES, by B. Moss, J. Madgwick and G. Phillips. 1996. 180 pp.

(Order from Broads Authority, 18 Colegate, Norwich, Norfolk, NR3 1BQ, ENGLAND. £14.95; or over the internet from Natural History Book Service: http://www.nhbs.co.uk/index.html

The ambitious purpose of the three scientists who wrote this guide is to present real-world and reliable step-by-step accounts of how to restore shallow eutrophic lakes, with emphasis on successful experiences in the UK, Denmark, The Netherlands, and Sweden. According to the authors, "This is a book for those wishing to restore severely damaged shallow lakes (those with pea-soup algal growth for much of the year and which have lost most or all of their water plants) for the purposes of conservation and amenity." Starting with Chapter 1, *How Lakes Work*, the book is perhaps the best organized and most easily understood instruction-book to be found in the large **APIRS** library of complex topics. In each of the book's case studies, for example, the questions are posed simply ("What was the problem?" "What was done?" "Why was it done?"), and the answers are written logically and without obfuscating jargon. The authors really do want readers to understand the subject; they really do want readers to succeed in lake restoration attempts. As they say in 7th grade: What a concept!

RIVERS OF LIFE: CRITICAL WATERSHEDS FOR PROTECTING FRESHWATER BIODIVERSITY, edited by L.L. Master, S.R. Flack and B.A. Stein. 1998. 71 pp.

(Order from The Nature Conservancy, (703) 841-5321 $5.00 per copy; or download free from their web site: http://www.consci.tnc.org/library/

This Nature Conservancy report, from its NatureServe publication series, focuses on the condition of freshwater biodiversity in the United States: "the first nationwide analysis of vulnerable fish and mussel species at the level of small watersheds." This report lists and briefly describes 8 US rivers as "hot spots of freshwater biodiversity": the Green, Clinch, Canasauga, Altamaha, Cahaba, Kiamichi, Guadalupe and Verde Rivers, located mainly in the southeastern United States.

THE STRUCTURING ROLE OF SUBMERGED MACROPHYTES IN LAKES, edited by E. Jeppesen, M. Sondergaard, M. Sondergaard, and K. Christoffersen. 1997. 423 pp.

(Order from Springer-Verlag New York, Inc. Phone: 1-800-Springer. $138.00 plus S/H.)

Here are many reviews as well as 18 case studies on the relationships between submersed macrophytes and grazing birds, herbivores, microbes, phytoplankton, zooplankton, snails, fish, molluscs, and other biological and biogeochemical components of lakes. According to the editors, research "so far suggests that submerged macrophytes are of significant importance for the food web interactions and environmental quality of lakes, even at relatively low aerial plant coverage ... by affecting the interactions between predacious, planktivorous and benthivorous fish and between fish and invertebrates ... Changes in these interactions in turn may have cascading effects on the entire food web in both the pelagial and the littoral zone."

POTIONS, POISONS, AND PANACEAS: AN ETHNOBOTANICAL STUDY OF MONTSERRAT, by D.E. Brussell. 1997. 176 pp.

(Order from Southern Illinois University Press, POB 3697, Carbondale, IL 62902-3697. Phone: (618) 453-6633. E-mail: danseit@siu.edu $69.95.)

This engaging book, with plentiful B/W and color photographs, catalogs the terrestrial and aquatic plants of the mountainous Caribbean island of Montserrat, and lists their ethnobotanical uses by the people there, where plants are still used in voodoo rituals, used as medicines and food, as aphrodisiacs and poisons, as insect repellents, as dyes, and as building materials and industrial chemicals.

WETLAND PLANTS OF ONTARIO, by S.G. Newmaster, A.G. Harris and L.J. Kershaw. 1997. 240 pp.

(Order from Lone Pine Publishing, 206, 10426-81 Ave., Edmonton, Alberta, T6E 1X5, CANADA. Phone: (800) 662-9017. $24.95 CDN; $19.95 US, plus S/H.)

This excellent and quite user-friendly field guide for non-botanists contains detailed descriptions, color photographs and line drawings of 475 species of plants that grow in wetlands across eastern North America. Included are sections on trees and shrubs; herbs; grasses, sedges and rushes; aquatics; ferns and allies; and bryophytes. Most sections include some sort of key for the plants of that section, including standard keys, flower color photo keys, and drawings keys. Written descriptions include information on general habitats, leaves, flowers, fruits, where found, and notes of interest. At $20 US, this book is a bargain.

THROUGH THE LOOKING GLASS... A FIELD GUIDE TO AQUATIC PLANTS, by S. Borman, R. Korth, and J. Temte. 1997. 248 pp.

(Order from NALMS Bookstore, POB 5443, Madison, WI 53705-5443. Phone: (608) 223-2836. $17.95 plus S/H.)

This new field guide to about 90 plants, exclusively using plant drawings for identification, was produced by the Wisconsin Lakes Partnership and the University of Wisconsin Extension Service. Carefully and succinctly written for the benefit of the interested layperson, it explains how aquatic plants benefit the environment and how they are used by wildlife from invertebrates to mammals. The plants are arranged in sections: emergent, free-floating, floating-leaf and submersed plants; and native, exotic and rare plants are identified. Each plant description includes basic characteristics, similar species, origin and range, habitat, the plant "through the year", and the plant's value in the aquatic community.

AQUATIC PLANTS OF NORTHEASTERN ILLINOIS, by L. Curtis. 1998. 64 pp.

(Order from Curtis to the Third Productions, POB 731, Lake Villa, IL 60046. $15.00.)

This 3-ring-notebook-bound book contains information on 37 aquatic plants. They are arranged in the book according to flower color: white, pink, yellow, green/brown under 3 mm, green/brown over 3 mm, "small" flowers, and no flowers. While the pictures are not very good (they are B/W and not well printed), the written descriptions are easily understood by the non-botanists for whom this book was written.

COMMON FLORA OF THE PLAYA LAKES, by D.A. Haukos and L.M. Smith. 1997. 196 pp.

(Order from Texas Tech University Press, Box 41037, Lubbock, TX 79409-1037. Phone: (800) 832-4042. E-mail: ttup@ttu.edu $18.95 plus S/H.)

This book is a survey of the playa lakes located in the flat, high plains region where Kansas, Colorado, Oklahoma, New Mexico and Texas come together. This region of 140,000 square miles contains somewhere around 30,000 playas, providing about 160,000 ha of wetlands. Playas are depressions in the flat landscape that were formed by several processes. Playas are nearly circular closed basins, with 87% of them being less than 12 ha (30 acres) in size. The 1995 plant survey of 235 playas counted a total of 346 plant species, which are listed in the book. According to the authors, playas provide high quality wildlife habitat. The book describes in good color photos 75 of the plants found in these playas. Accompanying text describes the species, its life form, growing season, wetland indicator status, abundance, soil moisture conditions, its value to wildlife, and other information. No key to the species is presented.

ECOLOGY OF SHALLOW LAKES, by M. Scheffer. 1998. 357 pp.

(Order from ITP, POB 6904, Florence, KY 41022-6904. Phone: (800) 487-5510. WWW: http://www.thomson.com ISBN/ISSN: 0-412-74920-3. US $74.95 plus S/H, tax.)

"It is not surprising that shallow lakes refuse to obey simple rules..." "Shallow lakes" here are defined as lakes that can have large colonies of macrophytes and where the entire water column is frequently mixed (polymictic lakes). This book "presents a theoretical framework for understanding the dynamics of shallow lake communities", and includes mathematical models and analyses. It is meant to be accessible to theoretical ecologists, as well as to lake managers, field biologists and students. Chapters include: The story of some shallow lakes; The abiotic environment; Phytoplankton; Trophic cascades; Vegetation; Managing the ecosystem; and a final chapter on The limits of knowledge. Some topics covered include storm effects on Lake Apopka; how light behaves under water; resuspension of sediment; competition between algae and cyanobacteria; the effect of planktivorous fish; effects of vegetation on turbidity; nutrient management, and many other topics.

NOTES ON FLORIDA'S ENDANGERED AND THREATENED PLANTS, by N.C. Coile. 1998. 119 pp.

(Order from Division of Plant Industry (DPI), Florida Department of Agriculture and Consumer Services, POB 147100, Gainesville, FL 32614-7100. Contribution No. 38, 2nd edition.)

As of January, 1998, Florida's "Regulated Plant Index" contains 418 endangered species, 108 threatened species and eight commercially exploited species. This is a listing of the plants by scientific name and includes common names, family, references, and very abbreviated descriptions, including locations by county. Among the wetland plants listed as endangered are *Eleocharis rostellata, Habenaria distans, Hypericum edisonianum* and *H. lissophloeus, Isoetes engelmannii, Juncus gymnocarpus, Justicia cooleyi, Justicia crassifolia, Lythrum curtissii, Lythrum flagellare, Oxypolis greenmanii, Panicum abscissum, Pinguicula ionantha* and *P. primuliflora, Polyradicion lindenii, Potamogeton floridanus, Rhexia parviflora, Rhynchospora crinipes, Ruellia noctiflora, Sarracenia leucophylla, Scutellaria floridana, Xyris chapmanii, X. isoetifolia, X. longisepala,* and *X. louisianica.*

FLORIDA WETLAND PLANTS – AN IDENTIFICATION MANUAL, by J.D. Tobe, K.C. Burks, R.W. Cantrell, et al. of the Florida Department of Environmental Protection. 1998. 598 pp.

(Order from IFAS Publications, POB 110011, Gainesville, FL 32611-0011. Phone: (352) 392-1764, Fax: (352) 392-2628. $35 plus S/H. Credit card ordering: 1-800-226-1764 weekdays during business hours.)

This is the latest "must have" new resource to help understand, appreciate and protect Florida's wetlands. With more than 800 color photos and 1,000 entries, this book covers a majority of the plant species listed in the Florida Wetland Delineation Methodology, 1994 (Chapter 62-340, F.A.C.). It will appeal to some nature lovers and other outdoorspeople, as well as to regulators, scientists, consultants and others who must help determine where wetlands begin and end. The volume is a "completely revised and rewritten update" to the Identification Manual for Wetland Plant Species of Florida (Dressler, Hall, Perkins, Williams), published in 1987. In this new volume, plants are treated in one-page descriptions which include plant morphology, tips for recognizing the species, habitat descriptions and general Florida distribution. The color photographs are reproduced well and the drawings are adequate. Each plant is placed into one of four "indicator" categories: Obligate, Facultative Wet, Facultative, and Upland; however, the book contains no definitions for what these terms mean, nor does it include a copy of Florida's wetlands delineation laws and plant lists. Nor does the book include a key to the plants included in it, nor some other means to help non-botanists to identify plant families, means such as are included in popular commercial field guides. With this manual, the user is simply expected to know what plant family the plant of interest is in, and then flip the pages until accidentally finding a matching picture or drawing. This can be an unsatisfactory procedure when considering a plant in the Cyperaceae (44 pages of plants) or in the Poaceae (86 pages). In addition, submersed aquatic plants are not included in the book, since they are excluded from the wetlands vegetation index. Submersed plants were included in the 1987 edition.

PESTICIDE SAFETY --A Reference Manual for Growers, by P.J. O'Connor-Marer. 1997. 120 pp.

(Order from University of California, Division of Agriculture and Natural Resources-Publications, 6701 San Pablo Avenue, Oakland, CA 94608-1239; Publication 3383. E-mail: danrcs@ucdavis.edu)

This well-produced and well-illustrated manual, aimed at farmers in California, would be a useful tool for many other users of pesticides in the US, no matter where they live. It is to be used as a reference for those wanting to take the Private Applicator Certification examination. Included are thorough chapters on The Pesticide Label, Mixing and Applying Pesticides, Recognizing and Avoiding Pesticide Hazards, and Pesticide Emergencies.

Note: The editors of **AQUAPHYTE** solicit books, reports, and other forms of information of interest to researchers, resource managers, professionals and students in the fields of aquatic, wetland and invasive plants. Items may be sent to the address on the back page of this issue.

Florida Exotic Pest Plant Council

The Florida Exotic Pest Plant Council (FEPPC) was founded in 1984 to focus attention on the impacts of exotic pest plants on biodiversity, the integrity of native plant communities, habitat, endangered species, and on the needs for their comprehensive management. The goals of the FEPPC are to build public awareness of the serious threat that exotic pest plants pose to native ecosystems, to secure funding and support for control and management of exotic pest plants, and to develop integrated management and control methods to prevent the further spread of exotic pest plants. The FEPPC is a member of the National Association of Exotic Pest Plant Councils. Other members include the California EPPC (www.igc.apc.org/ceppc/index.html), the Tennessee EPPC (www.webriver.com/tneppc), and the Pacific Northwest EPPC.

An exotic species is defined as one introduced or non-indigenous to the state and which has escaped into the wild and is reproducing. Invasiveness is defined by category: **Category I** includes species that are invading and disrupting native plant communities in Florida (This definition does not rely on the economic severity or geographic range of the problem, but on the *documented ecological damage* caused.); **Category II** includes species that have shown a potential to disrupt native plant communities in Florida, but have not yet shown disruption of natural plant communities.

The FEPPC has a website at http://www.fleppc.org/ that contains their invasive plant list, an exotic plant control guide, an exotic plant field reporting survey form, an interactive forum, and links to relevant web sites.

The FEPPC also has a quarterly magazine, *Wildland Weeds*, to provide a forum for issues and concerns regarding exotic pest plant biology, distribution and control. The publication is distributed to members.

For membership information, contact Allan Dray, IFAS, FLREC, 3205 College Ave., Fort Lauderdale, FL 33314; (954) 475-0541. E-mail: fadray@netrunner.net

AT THE CENTER

What's in a Name?

It's not just a name change, although we've been investigating the biology, ecology and control of invasive plants for the past 20 years. It's not to inform our closest friends; they know already that our scientists and technicians have worked to develop management methods for several serious invading plant pests.

We've changed our name, expanding our public scope, in order to broaden our base of cooperators and involve even more researchers and educators in the burgeoning necessity of curtailing and managing wild plant invasions, both aquatic and terrestrial.

We are now the **Center for Aquatic and Invasive Plants.**

"When work first began here at the Center in the 70s, the primary research and management concerns were with invasive plants, namely water hyacinth, alligatorweed and, later, hydrilla," said **Randall Stocker, Director**. "Over the years, as at least two of these plants came under maintenance control, and as our knowledge, successes and facilities grew, and as aquatic, wetland and invasive plants began to take environmental center stage, our research, education and extension programs have followed suit. Nowadays, Center-associated researchers are involved not only with aquatic and wetland plants such as hydrilla, torpedograss and melaleuca, but also with Chinese tallow, Brazilian pepper and wetland night shade, all of which are invasive plants."

"As these and other invasive plants make their way to Florida, more than ever there needs to be a designated leader in the fight against them. Over the years, as we took on more and more of the serious plant management problems of Florida, only our name stayed the same. Now our name has also changed as we assume the role of lead research, education and extension facility for invasive as well as aquatic plants," says Stocker.

Welcome New Graduate Students

Dorothy Brazis comes from Akron University (Ohio) with a Bachelor of Science degree in Botany, after completing two-years of Peace Corps service in Cameroon. She will be studying the invasive, non-native skunk vine (*Paederia foetida*) with Dr. Randall Stocker. Skunk vine is a twining, climbing, perennial vine that spreads easily, occupies a wide range of ecological habitats, and out-competes native vegetation (both herbaceous and arboreal). Skunk vine has become naturalized in central Florida and is listed as a Category I species (most invasive) by the Florida Exotic Pest Plant Council (FEPPC). Dorothy will be studying the ecology of skunk vine, especially its competition strategy, as a step toward formulating future control methods. The tough, woody vine is currently being managed with herbicides. As both its common name and species name implies, skunk vine has a fetid odor, especially when crushed. It invades forest understories, rights-of-way, wetlands, pastures, homeowners' yards and other areas. Skunk vine is native to southeast Asia and may have been introduced to Florida by the government in the late 1800s as a food/fiber crop for cattle.

Jennifer Possley comes from Kalamazoo College (Michigan) with a Bachelor of Arts degree in Biology. She plans to work on the downy rose myrtle (*Rhodomyrtus tomentosa*), an invasive terrestrial shrub flourishing in natural areas of south Florida. A native of Asia and Australia, the plant is listed as a Category I species (most invasive) by the Florida Exotic Pest Plant Council (FEPPC). Jennifer will be studying the flower, fruit and seed-set phenology and fire ecology of downy rose myrtle under the direction of Dr. Randall Stocker. Prior to coming to the Center, Jennifer spent 5 months working in exotic plant control in the Big Cypress Preserve, a next-door neighbor to the Everglades National Park, as an Americorps volunteer.

Todd Neel comes from Trinity University (San Antonio, Texas) with a Bachelor of Science degree in Biology. He plans to study wetland nightshade (*Solanum tampicense*) under the direction of Dr. Alison Fox. Also listed as Category I by the FEPPC, wetland nightshade flourishes in regularly flooded wetland habitats such as along rivers and in cypress domes in southwest Florida. Wetland nightshade is a particularly nasty shrub to work with in that it has sharp prickles on the veins of both upper and lower leaf surfaces as well as on the sprawling stems. These leaf and stem prickles snag and interlock to form impenetrable thickets. Todd plans to study the feasibility of eradicating wetland nightshade by studying limits to seed germination, seed bank longevity and seasonal dynamics, and seedling tolerance to environmental stresses.

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FROM THE DATABASE

Here is a sampling of the research articles, books and reports which have been entered into the aquatic plant database since January 1998.

The database has more than 46,000 citations. To receive free bibliographies on specific plants and/or subjects, contact APIRS 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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