



Center for Aquatic Weeds

AQUAPHYTE

International Plant Protection Center



AQUATIC WEED PROGRAM

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APPLE-SNAILS EATING CHARA

By Dr. Nestor J. Cazzaniga, Universidad Nacional del Sur, 8000 Bahia Blanca, Argentina.

Chara is a widespread water weed that forms submerged prairies of high productivity. Its prairies are sometimes called "aquatic deserts". There are very few invertebrates that accept chara as food (Gajevskaja, 1958). Thus, its biological control should be attempted by means of vertebrates (fishes, manatee, etc.).

Chara vulgaris and other Characeae are the main trouble in the drainage system of the Lower Colorado River Valley (Buenos Aires Province, Argentina) where 140,000 hectares are under irrigation. Four hundred kilometers of main drainage channels convey excess water to the Atlantic in an attempt to reduce the progressive salinization that affects this semiarid region (Thornthwaite's classification: DB2db, after Cazzaniga, 1981).

The biotic association of the channels is relatively poor, with low species diversity. Frequent use of mechanical controls makes these associations very unstable. Most organisms must re-colonize the channels year after year.

Because mechanical control is so expensive and disruptive, the Commission for Scientific Investigations of the Buenos Aires Province (C.I.C.) in 1978 began support of a program to study alternate control methods. Preliminary results have been published in an internal report (C.I.C., 1981).

Some program experiments with chemicals were successful, but no natural biological controls were found in the channels. Therefore it was necessary to find a control agent in the aquatic fauna of other zoogeographic areas. No infrastructure was available for the introduction of white amur, and low winter temperatures prevented the use of tilapia or marisa.

A promising Argentinian organism was identified: the apple-snail, *Pomacea canaliculata*. They are usually called "ampularia" (from the generic name *Ampullaria* that is of customary use in South America for these species).

In 1960, Oliveira e Silva used ampularia, together with tilapia, for the control of *Anacharis densa* in Rio de Janeiro. Some references to other pomaceas have been made by Blackburn *et al.* (1971) and by Rushing (1975), but no detailed papers have been published on their actual potential as control agents.

Argentinian ampularias were fed on chara and other macrophytes present in the channels. They showed not only a great voracity but also a desirable polyphagy (Andres, 1968).

While most invertebrates are generally reluctant to feed on chara, each adult ampularia consumed 8 to 24 g. of chara daily in the laboratory. Ampularia also showed a preference for chara over sago pondweed and water milfoil.

Ampularia breeds in captivity and can be conveniently handled: they survived the travel from

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COMPUTERIZED ADDRESS FILES TO BE AVAILABLE

The Aquatic Weed Program is developing files of addresses of researchers and research institutions from around the world. The files will be maintained on computer as part of the aquatic plant database. Users will use these files for making contacts with colleagues, requesting reprints and planning travel itineraries.

SEE PAGE SEVEN
FOR MORE INFORMATION.

WATERHYACINTH SOCIETY OF JAPAN

The Waterhyacinth Society of Japan (WSJ) was founded in July, 1982. The society has 120 members who are interested in waterhyacinth in Japan. President of the society is Dr. K. Ueki, professor of weed science at Kyoto University. Dr. Yoko Oki is editor of the society's newsletter which is written in Japanese. For information about the society and waterhyacinth problems in Japan, write to Dr. Oki at Institute for Agricultural and Biological Sciences, Okayama University, Kurashiki-710, JAPAN.

U.F. GRASS CARP RESEARCH

The collaboration between two of the world's leading fish biologists is yielding results applicable not only to the aquaculture of grass carp (*Ctenopharyngodon idella*), but also to the artificial culture of other fishes, including sport and food fish such as striped-bass. Aquaculture and bio-manipulation techniques they have devised are producing nearly 100% survivability among grass carp fry. Their techniques and apparatus have produced more fish fry in several small fish tanks than are produced in conventional 1-hectare aquaculture ponds, with attendant reduction in man-power and time spent. These methods could dramatically increase the yield of fish-farms which specialize in food or sport fish or fish used for control of aquatic weeds. In a world increasingly needful of protein for growing populations, and also increasingly harassed by aquatic weeds, the beneficial implications of their research is obvious.

Dr. Jerome V. Shireman and Dr. Karol Opuszynski have been working together at the Center for Aquatic Weeds in Gainesville (Florida) for the past six months. They expect to continue their work for the next six months. Dr. Opuszynski is visiting researcher from the Inland Fisheries Institute, Zabieniec, Poland. As a recognized expert on grass carp, he was invited to contribute to the work of the Center's fish culture unit under a grant from the United States Department of Agriculture. Dr. Shireman has coordinated the Center's grass carp research for the past nine years.

Grass carp researchers of the Center, including Shireman, D.E. Colle, R.W. Rottman and F.J. Aldridge, have been studying ways to culture

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AQUATIC PLANT INTERNATIONAL SHORT COURSE PLANNED

A five-week course, International Training Course on Aquatic Plant Ecology and Management, will be held at the University of Florida June 10 through July 13, 1984. This course is open to 15-18 participants from developing nations, and to date 23 people have expressed interest and have requested further information. The course will be very similar to one held in Gainesville during the summer of 1977.

The Training Course will be sponsored by the U.S. Agency for International Development, the International Plant Protection Center of Oregon State University and the University of Florida Center for Aquatic Weeds. There will be no registration fees for the course. Participants are expected to provide their own living and traveling expenses. Arrangements are being made for low-cost housing. Field trips in Gainesville will be provided at no charge to participants.

The tentative itinerary is as follows:

June 9-10—arrive in Gainesville, Florida

June 11-15—attend extension aquatic weeds training course (see announcement elsewhere in this issue)

June 18-22—research/demonstration projects, literature survey lectures

June 25-29—field trip

July 2-6—lectures, individual projects, term papers

July 9-13—final reports, lectures, demonstration project review

July 12-14—depart Gainesville

Transportation will be provided for training course participants to attend the National Aquatic Plant Management Society Meetings in Richmond, Virginia, July 15-18.

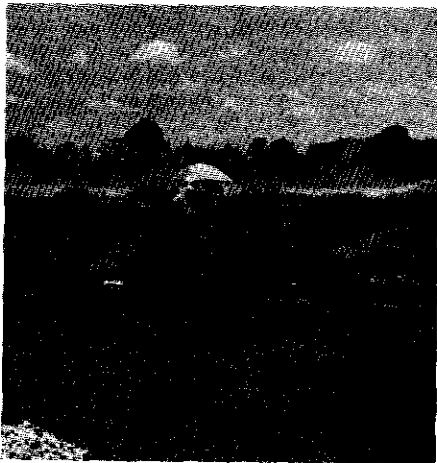
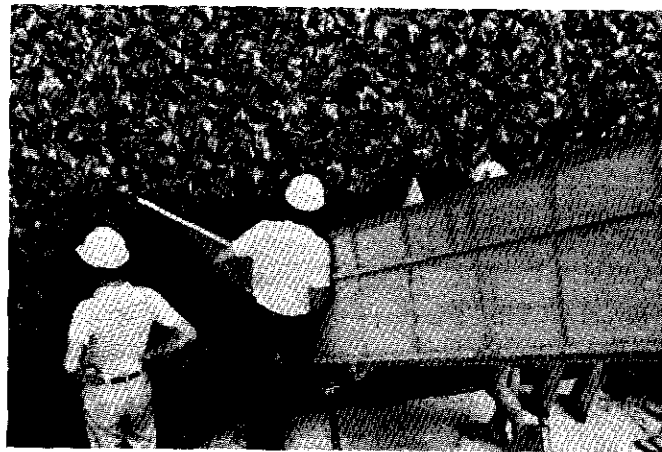
Daily schedules are now being finalized and a list of expenses is available. For further information, contact: Dr. W.T. Haller, Center for Aquatic Weeds, 7922 N.W. 71st Street, Gainesville, Florida 32606, USA.

IPPC SPONSORS TOUR

Several out-of-state and overseas scientists recently became acquainted personally with some of Florida's aquatic plant management projects. They took part in a tour arranged by Dr. William Haller of the University of Florida's Center for Aquatic Weeds and the International Plant Protection Center's Aquatic Weed Program. The tour took place following the Aquatic Plant Management Society's annual meeting near Orlando.

The group visited several sites, including the City of Lakeland's treatment plant which utilizes aquatic plants for nutrient removal, the Lake Okeechobee hydrilla and waterhyacinth control programs, and the Florida Power and Light Company's Martin County Cooling Reservoir torpedo grass research project. They also visited the Congen Properties grass carp project where the fish controls hydrilla in agricultural canals, and saw harvesting equipment controlling hydrilla and hygrophila in Lehigh Acres. The tour ended with visits to the Corkscrew Swamp Sanctuary and the Fairchild Tropical Botanical Gardens in Miami.

Members of the enthusiastic group shared their own expertise with managers of these projects and the personal relationships developed undoubtedly will continue to be of benefit to all concerned.



**AUSTRALIAN
weeds**

AUSTRALIAN WEEDS is a new publication and is the official journal of the Council of Australian Weed Science Societies. It is the only journal which deals with weeds of their part of the world.

Edited by Dr. J.T. Swarbrick, the journal presents original research, book reviews, article

abstracts, weed control equipment reviews, general articles, and conference reports. It also announces upcoming conferences, has a letters column and invites editorials from weed scientists.

Another feature of this journal is the fullpage color painting of a weed by artist Betty Conabere in each issue accompanied by texts from W.T. Parsons' Noxious Weeds of Victoria.

Overseas subscription cost of AUSTRALIAN WEEDS is \$25 (Aust.) for individuals and \$30 (Aust.) for libraries. For subscription information, contact Inkata Press Pty Ltd, 4 Longbourne Avenue, North Clayton, Victoria 3168, AUSTRALIA.

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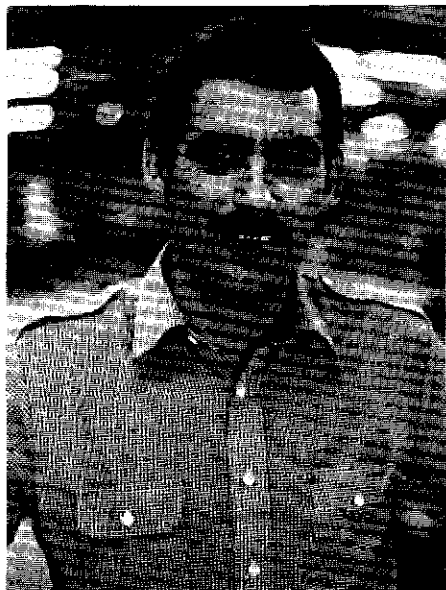
AQUAPHYTE is the newsletter of the Center for Aquatic Weeds and the IPPC Aquatic Weed Program of the University of Florida. The Center for Aquatic Weeds is in the Institute of Food and Agricultural Sciences (IFAS). The International Plant Protection Center (IPPC) is a unit of Oregon State University and is funded by the United States Agency for International Development. Program support is also provided by the Florida Department of Natural Resources.

EDITOR: Victor Ramey

AQUAPHYTE's circulation is 3,500. It is distributed to aquatic biologists and agencies world-wide. Comments, announcements, news items and other information relevant to aquatic plant research are solicited.

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U.F. CENTER FOR AQUATIC WEEDS HAS NEW DIRECTOR



Dr. Joseph C. Joyce
 Director
 Center for Aquatic Weeds
 Institute of Food and Agricultural Sciences
 University of Florida
 7922 N.W. 71st Street
 Gainesville, Florida 32606 USA

The Center for Aquatic Weeds welcomes its new Director, Dr. Joe Joyce. Simultaneous with Dr. Joyce's appointment, the Center was reorganized and now reports directly to the U.F. Vice-President for Agricultural Affairs, Dr. K.R. Tefertiller. This reorganization will enable Dr. Joyce, as Director, to coordinate effectively the activities of researchers of various disciplines who are associated with the Center. He hopes to expand the Center's level of basic aquatic plant research as well as research on aquatic plant management techniques which are compatible with the aquatic environment. Through coordination with state and federal agencies involved with aquatic plant research and control, Dr. Joyce expects the Center to become a nationally and internationally recognized aquatic plant research facility.

Before he came to the University of Florida, Dr. Joyce was Chief of the Natural Resources Management Section of the Jacksonville (Florida) District of the U.S. Army Corps of Engineers. In this capacity, he was responsible for federal aquatic plant control programs in Florida, and on a national basis assisted other federal and state agencies in all aspects of aquatic plant control programs. He had been with the Army Corps for twelve years.

Dr. Joyce says he is most honored to have been selected for this position and particularly appreciates the assistance and support given during his transition by the Center's previous directors, Drs. Arnett Mace, Jr. and William T. Haller.

FLORIDA AQUATIC PLANT MANAGEMENT SOCIETY MEETS FOR SEVENTH TIME

There are tens of thousands of miles of rivers and canals in Florida and more than 7,700 lakes. Because of Florida's sub-tropical climate and high nutrient input from residents, tourists and industries, many of these waters are subject to massive aquatic plant overgrowths. In Florida, several state and federal departments and many country and other local agencies maintain aquatic plant management branches staffed by hundreds of managers, applicators and other field personnel and scientists.

Coordinating the efforts of these aquatic plant management specialists requires means of communication and feed-back. In Florida, a major means of communication is the Florida Aquatic Plant Management Society. FAPMS sponsors annual meetings and publishes *AQUATICS* magazine and the society newsletter for its more than 600 members. In Plant City recently (October 12-14), nearly 300 FAPMS members convened for their seventh annual meeting.

During three days, members heard papers given on a variety of subjects, including reports about recent advances in chemical, biological and mechanical control methods, and reports from government agencies about their programs.

In keeping with the program theme (Public Awareness, Communication and Education), Mr. Ronald Arnold delivered the keynote address, "Government by the Media." As a practicing journalist, Mr. Arnold introduced his audience to the professional goals of journalists and described how their goals can affect the tone and accuracy of newspaper and other mass-audience reports. Mr. Arnold said aquatic plant management personnel (and others questioned

by reporters) must take into account the goals of journalists and also must be able to answer questions clearly, concisely and honestly. The panel discussion which followed featured the views of a journalist for the Orlando Sentinel and several agribusiness professionals; an interesting "give-and-take".

Later, a chemical and mechanical control equipment demonstration enabled members to compare their own control methods and machinery with those of others in the Florida aquatic plant management industry.

EXTENSION SHORT COURSE ON AQUATIC WEEDS

Dr. Vernon Vandiver (University of Florida) and Mr. William Maier (Florida Department of Natural Resources and the Center for Aquatic Weeds) have announced the organization of a four-day extension aquatic weed short course to be held in Gainesville June 11 (noon) through June 15 (noon), 1984. This course is similar to the one held in 1982 and is primarily designed for extension agents, water management personnel, city, county and other agencies and people responsible for aquatic weed control programs. The course will cover state-of-the-art chemical, biological and mechanical means of plant management, biology-ecology of aquatic systems, plant identification and other subjects pertinent to aquatic plant management in Florida. For further information, contact Dr. Vernon Vandiver, Agricultural Research Center, 3205 S.W. College Avenue, Ft. Lauderdale, Florida, 33314.

BOOKS AND REPORTS

AZOLLA AS A GREEN MANURE: USE AND MANAGEMENT IN CROP PRODUCTION. T.A. Lumpkin and D.L. Plucknett. 1982. Westview Tropical Agriculture Series, No. 5, Westview Press, Boulder, Colorado. 230 pages.

This is a detailed and comprehensive review of *Azolla* and its utilization as a biofertilizer in flooded rice cultivation. "In this first book on *Azolla* to be published in the Western World, the authors draw on Chinese, Vietnamese and Western literature to provide a scientific and management framework for the use of *Azolla* in agriculture, especially in the developing world."

This aquatic fern, which harbors nitrogen-fixing blue-green algae (*Anabaena*), has been cultivated and used as green manure since at least the 11th century. Included in this work are chapters on the history of its use, its taxonomy and ecology, its physiology, its nursery culture and field cultivation, and its pests and pest control. A chapter on the use of *Azolla* in farming systems includes translations of Chinese and Vietnamese cultivation guides as well as information on *Azolla*'s effects on soils and crop yields. A chapter on other uses for *Azolla* includes reviews on its use as feeds for livestock, swine, poultry and fish. Finally, the book includes an extensive bibliography, including several hundred Chinese publications on *Azolla*.

WATER POLLUTION AND MANAGEMENT REVIEWS. Two volumes. C.K. Varshney, editor. 1981, 154 pages. 1982. South Asian Publishers Pvt. Ltd., 36 Netaji Subhash Marg, Daryaganj, New Delhi 110002, INDIA. 172 pages.

According to the press release, these reviews are "intended to overcome the communication gap by providing exhaustive reviews on specialized topics" related to water management. Each volume contains nine contributed reviews as well as author and subject indexes.

WATERPLANTS OF NEW SOUTH WALES. G.R. Sainty and S.W.L. Jacobs. 1981. Water Resources Commission, New South Wales, Australia. 550 pages.

This is a lavishly produced hard-bound book which includes three identification keys to the water plants including algae, bryophytes, pteridophytes, angiosperms, monocotyledons and dicotyledons. Many of the color photographs are full page size. Description, growth biology, habitat, economic significance and distribution of each species is given. Following the identification section are photographic sections on waterplants in rice fields, seeds of waterplants and freshwater algae. Following these is a section on the pests common carp, goldfish, crayfish and water rat. Next is a section by K.L.S. Harley in which he reviews Australian biological control work on water hyacinth, alligatorweed and salvinia and a section on nutrient enrichment eutrophication by K.H. Bowmer. A final section on management techniques used in New South Wales emphasizes control methods used in irrigation systems. A glossary and index completes the book.

FIELD PROBLEMS OF TROPICAL RICE. Revised Edition. International Rice Research Institute. 1983. IRRI, P.O. Box 933, Manila, PHILIPPINES. 172 pp.

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SALVINIA BIOGAS IN INDIAN KITCHENS

African payal, Kariba weed, kayambang, chawk hunu, nae daeng, beo tai chuok, lukut cay, mata lele...salvinia. Whatever its local name, the free-floating fern *Salvinia* has become a menace in Africa, Asia, Australia, Central America and India. It can sometimes choke a lake about as fast as you can say its name. Sometimes, though, researchers devise a "use for the useless". In the case of salvinia, for example, it is now known that biogas for domestic consumption can be generated using standard biogas generation units fed with salvinia. In India,

researchers have been producing biogas from salvinia for the past two years.

As a result of this research, biogas production from salvinia is already finding its place in some Indian homes, according to S.A. Abbasi and P.C. Nipanay of the Centre for Water Resources Development and Management. Using available digester technology, it has been found that salvinia produces biogas either by itself or as a supplement with dung. They also report that obnoxious odors sometimes produced by biogas generation are not produced using salvinia.

According to CWRDM researchers, farmers and housewives who have used the salvinia biogas units are pleased with the results.

The Centre is also developing methods for the harvesting, storing and feeding of salvinia into generators which can be adopted easily by farmers and others in need of biogas.

For more information on salvinia biogas production in India, contact Dr. Abbasi at: Water Quality and Environment Division, Centre for Water Resources Development and Management, Kozhikode-673 571, Kerala, INDIA.



Mr. Nipanay (center) feeding salvinia to the digester as Dr. Abbasi (left) looks on. Mr. Rairukuty (right), on whose farm the digester unit is located, is obviously delighted with the project.



A housewife using salvinia-derived biogas for cooking.

HALLER RETURNS HOME

IPPC Aquatic Weed Program leader William Haller recently returned from a trip to The Netherlands, Sri Lanka and Thailand. Haller reports that the International Symposium on Aquatic Macrophytes, 18-23 September, organized by the Faculty of Science, Department of Aquatic Ecology, Katholieke University, Nijmegen, was well organized and attended, a truly educational experience. More than eighty scientists representing nearly twenty countries exchanged information and research results in informal discussions as well as during scientific presentations.

In Sri Lanka, Haller visited with the staff of the USAID mission and reviewed research with Sri Lankan scientists in several ministries and educational institutions. Similar exchanges and discussions were held in Thailand.

MIMOSA PROCEEDINGS AVAILABLE

The possibility of holding another *Mimosa pigra* conference in the next two to three years was discussed with Dr. Banpot Napompeth of Thailand. Haller, Napompeth and Ian Miller of Darwin, Australia were selected at the close of the last *Mimosa* conference to be the organizing committee for a future *Mimosa* meeting. If research advances continue at the present pace, it is likely that another symposium will be held in 1986 or '87, most likely in Australia. Meantime,

the Proceedings of the First International Symposium on *Mimosa pigra* Management (22-26 February 1982) have been published and free single copies are available for those in developing countries. For copies, contact: I.P.P.C., Oregon State University, Corvallis, Oregon 97331, USA.

SNAILS

Continued from page 1

Rio de la Plata to the Colorado River (800 km) in wooden boxes, without water, on a truck.

Trials made in confined areas of channels gave the following information:

- *Ampularia* effectively controlled chara in small scale trials.
- They actively bred after transport to the new environment, notwithstanding the high salinity (about 12 g/l).
- They tolerated the winter temperatures, the minimum of the coldest month (August) being 1.1 degrees C. and -5.7 degrees C. (average and absolute respectively).

Now, four years after the first experiment, a successful population of *ampularia* is maintained in a portion of a drainage channel. Future research will concentrate on their resistance to herbicides, their action on rice and other aquatic crops, their life histories and other important aspects of their biology.

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