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AG PRODUCTS DEPARTMENT
2901 BUTTERFIELD RD., OAK BROOK, IL 60521
EDITORIAL

Aquatics has been in publication since March, 1979. Aquatics is designed to be a reliable source of information for everyone interested in aquatic plant control and related pursuits, producer and consumer. Aquatics is a product of the Society. Together we have grown over the years due to the spirit of cooperation among the membership. Aquatics has brought the Society state, national and international recognition. We, the Society, its membership and aquatic plant management in Florida are the leaders throughout the world.

As editor the past two years, I have strived to keep the magazine as informative and interesting as possible. Aquatics is a success today because of the interest, pride and contributions from the membership. I thank everyone who has contributed. It has been both a privilege and honor to serve as editor.

As David Tarver takes over the helm as editor, I urge you to continue with the same spirit of cooperation that has brought us to where we are today. We have a good thing going, let's make it even better.

PAUL C. MYERS

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The Aqua-Vine Section of “Aquatics” has been added to provide information on current events and recent publications from industry and government to increase the dissemination of aquatic plant control techniques and regulatory changes. Complete copies of reports mentioned in this section can be obtained on request to the respective authors or the Editor of “Aquatics.”

AQUATICS: Published quarterly as the official publication of the Florida Aquatic Plant Management Society. This publication is intended to keep all interests informed on matters as they relate to aquatic plant management, particularly in Florida.

CORRESPONDENCE: Address all correspondence regarding editorial matter to Paul C. Myers, Editor, “AQUATICS” Magazine, 310 E. Thelma St., Lake Alfred, FL 33850.
Queen of the Water Lilies

by John A. Rodgers
Bioligist, Department of Natural Resources

The South American water lilies, Victoria amazonica (Popp) Sowerby (syn. V. regia) and Victoria cruziana D’Orb. (Syn. V. trickeri) are extraordinary aquatic plants. What other plant has a leaf that can support the weight of a small child, a flower which blooms white one night and purple the next, the prestige of having the top portion of London's Crystal Palace structured after its venation and the esteem of being named after Britain’s Queen Victoria?

Victoria belongs to the family Nymphaeaceae and consists of only the above two species. Victoria amazonica, commonly called the royal water lily, is native to Guiana, Bolivia and the Amazon River basin in Brazil. Victoria cruziana is frequently named the Santa Cruz water lily or “Mays del Aqua” and is native to Uruguay, Paraguay, and northern Argentina.

Although Victoria does not occur in any public water bodies in Florida, both species are well known to aquatic botanists. Their large floating leaves can expand up to 2 m. in diameter and the morphological structure of the leaf is unique to any other aquatic plant. Among the leaf, leaflets, or pitchers, are located along the periphery and the median part of the leaf. Leaflets are white the first day, but the mature flowering plant, he observed an average of 20 per cent, extending 20 cm. in height. The vertical leaf does not form an exact right angle with the leaf surface but curves so that the concave side receives wind or wave action. The structure provides increased resistance to leaf tear and prevents immersion by small waves. While this is an advantage over flat, floating leaves without rims, one may initially think that this would aid in the accumulation of water. To alleviate this problem, two wedge-shaped water outlets, or pitchers, are located along the rim opposite one another. The pitchers act as overflow devices, draining any water received from rain or large waves.

The upper and lower leaf surfaces in V. cruziana are uniform green, whereas in V. amazonica the upturned edges and under surface is purple-red. At maturity, the leaf blade of V. amazonica is larger, but its leaf rim is not as high. Because of its native range, V. cruziana is reported to be more cold tolerant than V. amazonica.

The flower of Victoria measures up to 40 cm., in diameter and consists of 4 large, spiny sepals and numerous, spirally arranged petals. Initial opening of the bud occurs at the onset of night, closing in the early morning before daylight. The flowers of V. cruziana and V. amazonica are white the first day, but the former species turns a deep pink the following day while the latter species turns a deep rose color the second day of anthesis. Flowering is not seasonal, but dependent entirely on water levels.

The opening of the enormous flower gives off a considerable amount of heat along with a strong scent. Studies have shown that during the opening of the bud the temperature of the air closely surrounding the bud increases 10°C from the heat evolved. Pollination occurs principally by a beetle (Cyclocephala hardyi), apparently attracted to the pineapple-butterscotch scent and heat exhaled by the opening of the flower. After pollination, the peduncle curves downwards and pulls the flower under the water. The fruit then ripens in about six weeks. Gelatinous seeds soon float to the water surface, where they remain adrift for a day. The gelatinous cover then washes off and the seeds sink to the bottom. An inferior ovary, numerous carpels and as many as 320 stamens comprise the floral parts of the flower.

Reproduction also takes place vegetatively from rhizomes. The thick rhizomes remain dormant during the dry season, but rapidly produce new leaf-shoots when conditions improve. Adventitious root clusters, between 15-20 in mature plants, are well developed along the numerous vascular bundles of the rhizomes.

Joseph Paxton’s experiments in the mid-1880’s also revealed the rapid vegetative growth of these two giant water lilies. After becoming the first person to successfully cultivate a seedling to a mature flowering plant, he observed an individual plant develop over 150 leaves and 126 flowers in just one year. Casey’s (1850) research demonstrated the vigorous growth rate of Victoria with data showing leaf width increases up to 36.7 cm/day.

Exuberant growth rates are not unusual for aquatic plants and one should not automatically label such species as noxious weeds. Other data such as growth requirements and growth habits must be considered. Unlike other water lilies, elongation of the petioles and peduncles does not occur in Victoria. As a result, this aquatic plant is restricted to...
Water weeds that clog Florida's waterways are sunk when treated with ORTHO DIQUAT Herbicide-H/A. DIQUAT is a broad spectrum herbicide that kills both floating and submerged weeds—even the tough ones like hydrilla, water lettuce and water hyacinth. And DIQUAT works fast—in just a few days after application you can see dramatic results.

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ORTHO DIQUAT. It sends water weeds straight to the bottom.
The introduction and spread of various weeds is one of the most interesting topics of conversation at almost any gathering of weed scientists. Plants, which have ultimately become weeds, have been introduced by scientists, among others, hoping to expand forage or crop production; and who hasn’t heard the story of the lady who tossed waterhyacinth into the St. Johns River! Plant and animal pests have many means of accidental or purposeful introduction into our country.

The most serious aquatic weed problems in the United States are of foreign origin. There is no argument about waterhyacinth and hydrilla, and many taxonomists also believe Eurasian milfoil was introduced into the U.S. around the turn of the century. Waters from extreme southern Florida to central Canada are susceptible to growing at least of one of these three species; waterhyacinth in the south, Eurasian milfoil in the north, and hydrilla to date found growing in the central and southern U.S.

Hydrilla was first discovered in Florida in the late 1950’s. An article in the Hyacinth Control Journal (May, 1969 p.48) indicates that hydrilla was introduced by the aquarium trade. Certainly, no one could have predicted how serious a problem it could become in our natural waters. Even scientists were baffled by its sudden appearance in Florida, where it was called Florida Elodea, thought to be a new species of Elodea, before it was finally properly identified in about 1964 or 1965.

It was no surprise that hydrilla had spread to several southern states by 1980, however, we were quite shocked to find it one summer day in our nation’s capital.

In August 1980, Dr. M. A. Beshir, from the Sudan, K. Langeland, D. Thayer, and myself drove all night to Washington for a meeting with EPA officials, to visit a reported hydrilla find in Maryland, collect hydrilla from North Carolina, and to attend the South Carolina APMS meetings. While walking past Park Lake in Constitution Gardens, it was suggested that Langeland check out the vegetation in the concrete bottom of the 4-5 acre pond. Upon seeing hydrilla in the lake, his historic first words should be left to the reader’s imagination. It should also be noted that wading in Park Lake at 7 a.m. is strictly prohibited, as so clearly pointed out by the Park Police.

Further investigation revealed that lilies and several other aquatic plants had been purposely planted in wooden boxes in the lake as part of a total ecosystem concept which was designed to reduce phytoplankton blooms in the pond. The Capital National Park Service had purchased what they and the plant supplier called Anacharis or Egeria, one of many advertised oxygen plants. Somehow, hydrilla ended up in the system!

A survey of an ornamental pond in front of the U.S. Department of Interior offices turned up water lettuce, waterhyacinth, and even a few sprigs of hydrilla. After several phone calls seeking further information, and after again being told by the Park Police that wading in Park Lake is illegal (fortunately, a different policeman), we traveled north to Lilypons Water Gardens, a few miles northwest of Frederick, Maryland. Lilypons is a major supplier of aquatic plants in the northeast and also has a facility for growing and selling plants near Brookshire, Texas. The hundred or so acres of ponds at Lilypons are planted with many species of beautiful aquatic plants. Also growing in many of the ponds was a plant that had tubers and appeared very much like hydrilla.

In a bulletin published in 1976, Hydrilla — A Rapidly Spreading Aquatic Weed Problem, I indicated that hydrilla was probably growing in many areas of the U.S. and was being improperly identified as Egeria or Elodea, from which it is difficult to positively identify due to the widely varying morphology which hydrilla is noted for producing. To complicate matters, recent research done by scientists in the Netherlands finds that hydrilla from Washington, D.C., has a different chromosome number than hydrilla from Florida (Pieterse, Personal Communication). Also, plants from Washington, D.C., grown in Dr. Thai Van’s labs at Ft. Lauderdale, have produced male flowers (Van, personal communication). Prior to this discovery, it was believed that we only had the female plant in the U.S. Nevertheless, hydrilla is being found around the country and is still most probably in several areas where it is being misidentified.

The current status (as gossip has it) of hydrilla is listed in the accompanying table and the most recent 1982 “finds” are explained below.
Table 1. Current status of hydrilla spread in the United States as best can be ascertained

<table>
<thead>
<tr>
<th>State</th>
<th>Date</th>
<th>Watershed</th>
<th>Contact</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Florida</td>
<td>1959-60</td>
<td>nearly all</td>
<td>several</td>
<td>New discoveries elicit little excitement anymore in Florida</td>
</tr>
<tr>
<td>Iowa</td>
<td>1971-72</td>
<td>ornamental pond</td>
<td>R. Blackburn</td>
<td>Bob identified the plant in a small pond and reported it in the Hyacinth Control Society Newsletter. It has now been eradicated from the pond and hydrilla is currently not known to occur in Iowa.</td>
</tr>
<tr>
<td>Louisiana</td>
<td>1973</td>
<td>several</td>
<td>James Manning</td>
<td>First found in Spanish Lake near New Iberia, found the next year in North Louisiana in Lake Sibley. Several lakes throughout the state currently infested, most serious is increasing infestation in 181,000 acre Toledo Bend Reservoir, where Texas and Louisiana are arguing about which state plants came from.</td>
</tr>
<tr>
<td>Texas</td>
<td>1976</td>
<td>several</td>
<td>Lou Guerra</td>
<td>First found in reflection pool at the Houston Zoo, properly identified in 1978. Hydrilla now in San Marcos River, Rayburn, Conroe, and Livingston Reservoirs. Widespread along coast from Brownsville to Louisiana border.</td>
</tr>
<tr>
<td>South Carolina</td>
<td>1979 and 1982</td>
<td>Lake Marion</td>
<td>Howard Roach</td>
<td>The spread and competition of hydrilla against Egeria will prove interesting in this extremely important fisheries recreational system of 110,000 acres with mean depth of 12 feet.</td>
</tr>
<tr>
<td>California</td>
<td>1978</td>
<td>Lake Ellis</td>
<td>Richard Yeo</td>
<td>Well over a million dollars were spent to clean the bottom and fumigate the soil to eradicate hydrilla from Lake Ellis — final results not in yet.</td>
</tr>
<tr>
<td>North Carolina</td>
<td>1980</td>
<td>Wake County</td>
<td>Neil Rhodes</td>
<td>Hydrilla was first found in lakes in the Ullastead State Park and since in several ponds and lakes around Raleigh.</td>
</tr>
<tr>
<td>Alabama</td>
<td>1980</td>
<td>Cowleyville Reservoir (Tombue River)</td>
<td>David Schiller &amp; Roy Bayne</td>
<td>The spread of hydrilla in these locations could be very extensive.</td>
</tr>
<tr>
<td>District of Columbia</td>
<td>1980</td>
<td>several ornamental ponds</td>
<td>Ken &amp; Langeland</td>
<td>Originally believed to be Elodea, finally identified to be in about one-third of Delaware's 25 to 30 freshwater impoundments (lakes).</td>
</tr>
<tr>
<td>Delaware</td>
<td>1981</td>
<td>several reservoirs</td>
<td>Roy Miller</td>
<td>See Text</td>
</tr>
<tr>
<td>Maryland</td>
<td>1982</td>
<td>Potomac River</td>
<td>K. Steward</td>
<td>See Text</td>
</tr>
</tbody>
</table>

Alabama. After several years of a strong prevention and public education campaign, and among arguments as to whether or not it would grow in the TVA system, Leon Bates and Terry Goldsby confirmed that hydrilla is firmly entrenched in a 16-mile stretch of Gantersville Reservoir in the Tennessee River System.

Maryland. Dr. K. Steward found naturalized populations of hydrilla growing in the Potomac River near Mount Vernon and also in an abandoned canal near Washington.

South Carolina. Although Howard Roach found a hydrilla plant in Lake Marion three years ago, it evaded discovery until this year when several hundred acres were found near Packs Landing. With Lake Marion being several hundred thousand acres in size and having extensive Egeria growth, hydrilla was difficult to find.

In the past 25 years, hydrilla has phenomenally spread to 11 states and the District of Columbia. Further, unconfirmed sightings have been made in three other states. All of the states from Delaware south along the East and Gulf Coasts, with the exception of Virginia and Mississippi, have confirmed hydrilla populations. In addition to the year-round hydrilla problem in Florida, the northern range will also face problems in the summer months when hydrilla growth and heavy demands for recreational use of the waters coincide.
Male Hydrilla Recently Found in the United States

by
Vernon V. Vandiver, Jr.¹
Thai K. Van², and
Kerry K. Steward²

Florida, unfortunately, has had a long history of being where many aquatic weed infestations first occur in the United States. This may again be the case with a recent discovery at the IFAS Agricultural Research and Education Center, Fort Lauderdale.

In September 1982, Dr. Thai K. Van identified male (staminate) flowers of Hydrilla [Hydrilla verticillata (L. fil.) Royle] on plants growing at the USDA Aquatic Plant Management Laboratory which is located at the AREC, Fort Lauderdale.

The discovery was the result of Richard Conant, Biological Technician with the USDA in Fort Lauderdale, observing some “debris” floating on the water surface of a concrete tank in which Hydrilla was growing. He brought the plant material to the attention of Dr. Van who determined that it was the staminate flowers of Hydrilla. The staminate flowers of this plant form in the axils of the submersed leaves and upon maturity are released and rise to the water surface.

The plant specimens were later sent to the University of Florida Herbarium for confirmation. A voucher specimen of the plant has been filed in the Herbarium and has been assigned the University of Florida accession number FLAS 147390.

The Hydrilla plants which produced the staminate flowers were not collected originally in Florida, but had actually come from Washington, D.C. The plants were collected from the Kenilworth Aquatic Gardens in Anacostia Park, Washington, D.C., approximately 1 year ago at the request of Dr. Kerry Steward. They had been cultured in the outdoor aquarium on the station in Fort Lauderdale since that time for the purpose of obtaining flowers for positive identification. Care is being taken to continue to isolate and contain the plants after the staminate flowers were identified.

Hydrilla is known to display a great amount of variability in its morphology, or form and structure. Everyone familiar with it can likely recall having seen some variation in the vegetative portion of the plant, such as leaf size and shape. Another way in which Hydrilla is variable is in its sexual characters.

The staminate flowers of Hydrilla contain pollen grains which are wind dispersed. Pollen grains from male flowers are fertilized by the female flowers and seed is produced.

Regardless of whether the Hydrilla in question is dioecious or actually monoecious, we know of no previous reports of any Hydrilla flowers with male reproductive structures having been collected from anywhere in the United States. The discovery of male hydrilla in this country is significant as it means that we now have the potential for seed production in the United States.

¹Associate Professor, Agronomy and Extension Aquatic Weeds Specialist, AREC Fort Lauderdale, IFAS, University of Florida.
²Plant Physiologist and Research Leader, USDA Aquatic Plant Management Laboratory, Fort Lauderdale.
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Sonar® aqueous suspension can be applied to the water surface or under the water surface or placed along the bottom of the water just above the hydrosol. Any conventional application equipment can be used.

Sonar 5% pellet can be applied to the water surface from the shore or from a boat. Refer to the Sonar label for complete application instructions.

Always follow label directions. Sonar is available in limited quantities under EPA Experimental Use Permit No. 1471-EUP-67.

For further information write or phone:
David P. Tarver, Aquatic Specialist, 2416 McWest Street, Tallahassee, FL 32303 (904) 386-8533
Sixth Annual FAPMS Meeting Success Beyond Expectations

The annual meetings have become a highlight for many involved in aquatics. This year's meeting, held October 27-29 in Orlando, was no exception. Three hundred registered attendees came to participate, learn and enjoy. The attendance at the formal sessions and business meetings was impressive. Everyone involved in putting together the 1982 FAPMS Sixth Annual Meeting should take pride in a job well done.

Johnny Mason was named Applicator of the Year.

The 1983 FAPMS Officers are:
President Carlton Layne
President-Elect Paul Myers
Secretary Mike Mahler
Treasurer Jim McGehee
Editor of Aquatics David Tarver
Directors Larry Maddox, Lee Hale, Eddie Knight, Bobby Corbin, Ray Spirnock, Herb Cummings, Andy Price, Nick Sassic, Debbie Valin

Harold Brown Receives FAPMS Presidents Award

Mr. Harold Brown was presented the FAPMS Presidents Award at the 6th Annual FAPMS Meeting.

Harold was recognized and honored for his many contributions to the aquatic plant management profession through his active involvement in, to name a few, the Florida Aquatic Plant Management Society, National Agricultural Aviation Association, Florida Agricultural Aviation Association, Pesticide Technical Council and the Aquatic Plant Advisory Council.

People on the Move

Paul Myers has recently resigned as Assistant Director of Polk County's aquatic weed control programs. Paul now has his own business, Applied Aquatic Management, Inc., offering aquatic management services.

Mike Mahler has left his position with the Department of Natural Resources to take over Polk County's aquatic weed control programs.

Harry L. McGill Remembered

Harry L. McGill was a close and good friend of many of the members of the Florida Aquatic Management Society. We share in his memory.


Harry earned his masters degree in Marine Science, graduating from the University of South Florida in 1972. He accepted the directorship of General Development Corporation's aquatic weed control operations. Part of Harry's additional responsibility at GDC was the oversight of GDC's large Wildlife Preserve near Arcadia. In fact, he lived on the preserve with his wife, Mary and their two girls, Kelly and Sally. Working and playing on the preserve was dear to Harry's heart.

Five years with GDC ended in 1977 and, through H. L. McGill Biological Consultants, Harry provided harvesting, spraying and fisheries services to various agencies in Florida and Texas until his death.

Harry served as a member of the Board of Directors of the Aquatic Plant Management Society from 1975 to 1978. He was certified by Florida in aerial application, aquatic plant control, industrial weed control, turf, forest and ornamental pest control. He was a member of the Florida Aquatic Plant Management Society, The American Fisheries Society and The Florida Commercial Applicators Association.

Should anyone choose to commemorate Harry through a contribution, the Harry L. McGill Memorial Fund is being administered by the Barnett Bank, Punta Gorda, FL 33950. The Florida Aquatic Plant Management Society has sent $100 in his memory. The fund is for the benefit of his daughters, Kelly and Sally.
If I had to be classified as either a "nozzle-head" or an "eco-freak," I would definitely be the latter. Though I have been in aquatics since 1971, I have intentionally avoided herbicides. Last year I left my research position for a job as regional biologist for northwest Florida with visions of long days on unspoiled rivers and an end to the meticulous repetition of research. Within weeks of that job change, I received a memo from my division director that made me feel a bit queasy. The memo stated that I was to prepare a work plan for treating an outbreak of Eurasian watermilfoil in Round Bay, part of the Apalachicola Bay System—and quickly. As you probably know, Apalachicola Bay is one of the most pristine and productive estuaries in the nation. It supports a seafood industry that is the mainstay of Franklin County's economy and has been designated as a National Estuarine Sanctuary.

In Round Bay, Eurasian watermilfoil had demonstrated its propensity for explosive range expansion. In the summer of 1980, Dr. Robert J. Livingston discovered a trace amount of milfoil. By August of 1981, DNR personnel estimated that there were 500 acres of milfoil in Round Bay. It was particularly disturbing that this rapid expansion occurred during a drought when the salinity in the area was at its highest level.

According to information on salinity and water depth, the area in the Apalachicola Bay System conducive to the establishment of Eurasian watermilfoil is approximately 10,000 acres. I was impressed by the extent of the problem and importance of the environmental and economic stakes. My first step in developing a work plan was to read everything I could find on Eurasian watermilfoil and its content. I also contacted people all over the nation. My conclusions from this information search were that this exotic milfoil could dramatically alter the bay, and the only (slim) chance we had at eradicating an isolated infestation was with herbicides. The literature stated that milfoil was highly susceptible to 2,4-D, and 2,4-D was one of the oldest, safest, and most thoroughly studied organic herbicides. My head slowly began changing into the shape of a nozzle.

I wrote a draft of the work plan and met with Woody Miley, Apalachicola Bay Sanctuary Manager and old friend, and Dr. "Skip" Livingston, the man perhaps most responsible for the bay remaining in such good condition. Amazingly, we three had independently come to the same conclusion—treat in the spring of 1982 with a dimethylamine salt of 2,4-D. The pelletized butoxyethanol ester, though perhaps more effective on milfoil, was 100 times more toxic to oyster larvae.

On January 18, 1982, I submitted a precise, footnoted work plan to the Apalachicola Bay Sanctuary Committee which consisted of Dr. Elton Gissendanner (DNK), Pam McVety (DER), Brad Hartman (GFC), Skip Livingston (FSU), and Cecil Varnes and Bobby Howell, officials of Franklin County. The proposed work plan passed unanimously. So far, so good.

The next step was to obtain a 24(c) label for use of DMA 2,4-D at rates effective on milfoil. I had many skeptics and little time. We had to treat in April, prior to the seasonal abundance of shrimp larvae in Round Bay but after milfoil was in a rapid growth mode and most vulnerable to 2,4-D. Thanks to the cooperation of the Department of Agriculture and Consumer Services and the University of Florida, I had the 24(c) one month after submitting an application. Things were definitely rolling my way.

It is rare when it is easy to pinpoint a single event that torpedoed months of hard work and difficult decisions. This time it was a cinch. On March 11, 1982, the "Apalachicola Bay" printed an article about the project stating "chemicals used in 2,4-D are the same found in Agent Orange," a classic half-truth. The wind suddenly changed in Franklin County. The focus of fear was shifted from Eurasian watermilfoil to 2,4-D, and I was on the defensive.

On March 16, 1982, Woody and I presented the work plan to the Franklin...
Queen of the Water Lilies continued from page 4

County Commission. We emphasized the potential harmful effects to the seafood industry of dense strands of milfoil. The commissioners and audience were concerned about 2,4-D. The decision was made to postpone the decision. A public referendum would be held on March 25. I began thinking we might weather the inevitable and justifiable public scrutiny. I was wrong.

On March 18, 1982, the “Apalachicola Times” printed a story entitled, “Fishermen, DNR Clash Over Milfoil Project.” The Department of Natural Resources had recently closed much of the bay to oyster harvesting due to high fecal coliform counts. Issues were being confused, not necessarily in print, but in the minds of the people.

Continuing field investigations documented the existence of milfoil in an area other than Round Bay. Our position that milfoil was isolated had been destroyed.

The public meeting was held on March 25, 1982. I was impressed by the turnout and the strong protective spirit for the Apalachicola Bay. Based on the lack of guarantees and public sentiment, the Board of County Commissioners voted unanimously against the project.

We will abide by the will of the people of Franklin County. It’s only fair; it’s their livelihood at stake. If the milfoil doesn’t continue to expand, their decision will have been the right one. As with most biological situations, anything can happen. To be honest, I have moments when I wish the bay will look like a well-fertilized pasture in a couple of years. But those thoughts quickly pass. I want the best for those hard-working fishermen and their beautiful bay. Also, I admit a sense of relief that I was let off the hook. Being in charge of the year’s largest herbicide operation in one of the state’s most sensitive areas was not exactly comforting.

In five months, I had reviewed the literature, written a work plan, presented the plan at four public meetings, obtained a 24(c), and gotten quite an education. One of the major lessons for me was that if I had approached the task of controlling the Eruasian watermilfoil in the Apalachicola Bay System as an environmentalist with a personal dislike of herbicides. As I studied, I reluctantly became convinced that, regardless of my personal feelings, a herbicide treatment of an isolated infestation of Eruasian watermilfoil was the right thing to do. That brings me to my second major lesson; it has become more difficult for me to classify people as ‘nozzle-heads’ or ‘eco-freaks’ even when I look in the mirror.

shallow water lagoons, lakes and river banks. Occurring naturally in water only 2-3 ft. deep, this massive water lily has evolved as a species of limited distribution. Victoria can flourish in very shallow water, but only if the water level does not fluctuate or rise too high.

Rainfall in the Amazon region (2.5 million sq. mi.) averages 20-25 m. per year with floods causing the main river to rise between 3-6 m. and occasionally up to 15 m. Few aquatic plants can endure such extreme conditions except for floating plants and some annuals. In its native environment, Victoria occupies the surrounding marshes and the temporary inundate lowlands during the rainy season. Since Victoria is an annual, it has an advantage over perennials in these type areas. During the dry period, which means anything between mud to shallow lagoons and marshes, seeds are produced. Distribution appears to be limited to South American but because of its leaf and flower size, Victoria is cultivated in numerous botanical water gardens throughout the United States and Europe.

In Paraguay, V. cruziana is called water corn because of its large, starch containing seeds. The seeds and rhizomes can be eaten raw, cooked or ground into flour. The underside leaf provides excellent habitat for invertebrates while the seeds are often fed upon by marsh birds and ducks.

Special thanks is extended to Peter Slocum, President of Slocum Water Gardens in Winter Haven, for his assistance in providing a specimen of Victoria for photographic purposes.

Florida Agricultural Research Institute

The Florida Agricultural Research Institute (F.A.R.I.) is assisting Florida farmers to properly use crop protection chemicals and correctly dispose of their containers, according to Russell K. Herrin, 1982-83 Chairman of the Board of Directors.

“Each Florida Cooperative Extension Service County Director and each Florida agricultural commodity and trade association executive has received a complimentary, octagonal stamp with the imprint, ‘Before Using Any Pesticide, STOP, and Read the Label.’ The stamp can be used in correspondence to farmers, organization’s members, and numerous other ways,” said Herrin.

Max Haigler, Chairman of F.A.R.I.’s Pesticide Safety Education Committee noted, “Use of the stamp with red ink will remind Florida farmers that proper and safe utilization of chemicals and disposal of containers is necessary. These production inputs must continue to remain available to farmers in sufficient quantities and at affordable prices.”

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In the late 1800’s some of the earliest work using surfactants indicated an increase in toxicity of arsenical insecticides with the addition of soap as a surfactant. By the 1950’s, the advantages of surfactants became apparent and led to their widespread use for increasing herbicidal activity. Today the technology of surfactants has gone from household detergents as wetting agents to complex synthetic formulations designed to accommodate a specific function such as wetting, spreading and sticking of herbicides to leaf surfaces as well as increasing the penetration of some herbicides into the leaf.

In the past year we have tested several surfactants commonly tank mixed with 2,4-D for waterhyacinth control to determine if the addition of surfactants could significantly increase the penetration of 2,4-D into the plants. The surfactants tested were Cide-Kick, Big Wet, X-77 and Herhex.

Radioactive 2,4-D was used to trace the movement of herbicide in the plant and spray solutions were mixed such that half the treatments had 2,4-D + surfactant in the spray and the remaining had only 2,4-D + water.

Single leaf applications were made per plant either with one of four 2,4-D-surfactant solutions or the 2,4-D-water solution. After a period of 2, 3, 4, and 6 hours the leaf that was treated and the leaf petiole were removed. Starting from the base of the leaf, every inch and a half of the petiole was sectioned and the amount of radioactive 2,4-D could then be determined. Assuming that any increase in translocation of the 2,4-D was related to an increase in penetration, we...
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could determine from the amount of radioactivity whether surfactants were effective at increasing herbicide penetration.

The results for the surfactant Big Wet and X-77 were similar to the results graphically illustrated for Cide-Kick (Figure 1). Initially the amount of radioactive 2,4-D in the petiole was significantly greater when a surfactant was added to the spray than when 2,4-D was applied alone. After 4 hours the levels of 2,4-D in the petiole were about the same for both 2,4-D + surfactant and 2,4-D + water treatments. The effect of Herbex on penetration was quite different than the other surfactants (Figure 2). Within the first few hours after treatment, there appeared to be no differences between the 2,4-D-Herbex and the 2,4-D-water treatment; however, after 3 hours it became obvious that the Herbex was significantly restricting either penetration and/or translocation of the 2,4-D into the petiole.

With the exception of Herbex, it appears as though the use of surfactants may increase the initial uptake of 2,4-D in waterhyacinths. This may be important in areas where wind chopped water, boat wake, or rains within 2 to 3 hours could wash herbicide sprays off shortly after application.

Figure 1. Effects of Cide-Kick on the penetration of 2,4-D through waterhyacinth leaves. Petiole segments were consecutively cut 1.5 inches in length from the treated leaf and labeled 1, 2, 3, & 4 respectively. The level of 2,4-D in the petiole was measured as DPM/mg plant tissue.
Figure 2. Effects of Herbex on the penetration of 2,4-D through waterhyacinth leaves. Petiole segments were consecutively cut 1.5 inches in length from the treated leaf and labeled 1, 2, 3, & 4 respectively. The level of 2,4-D in the petiole was measured as DPM/mg plant tissue.
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