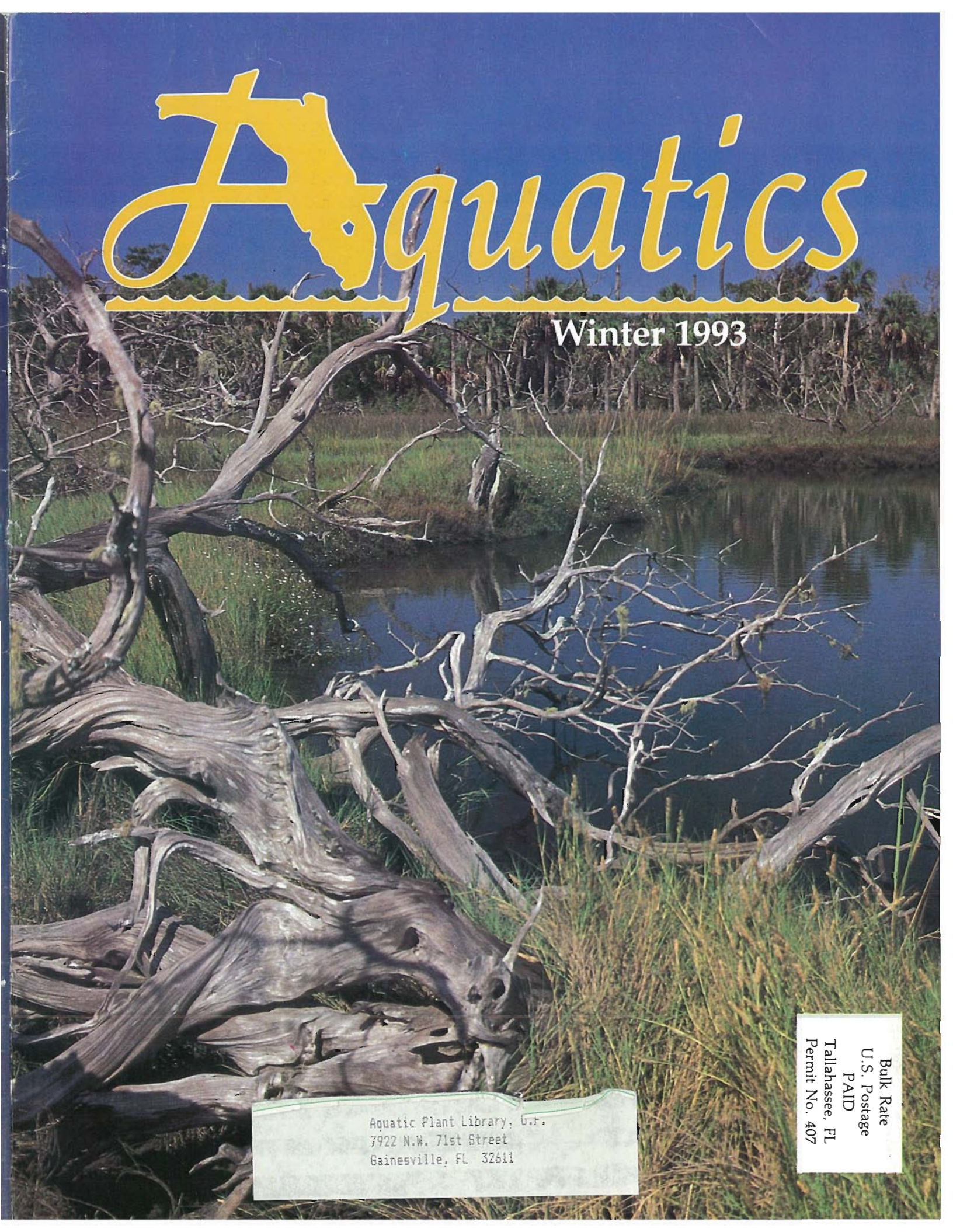

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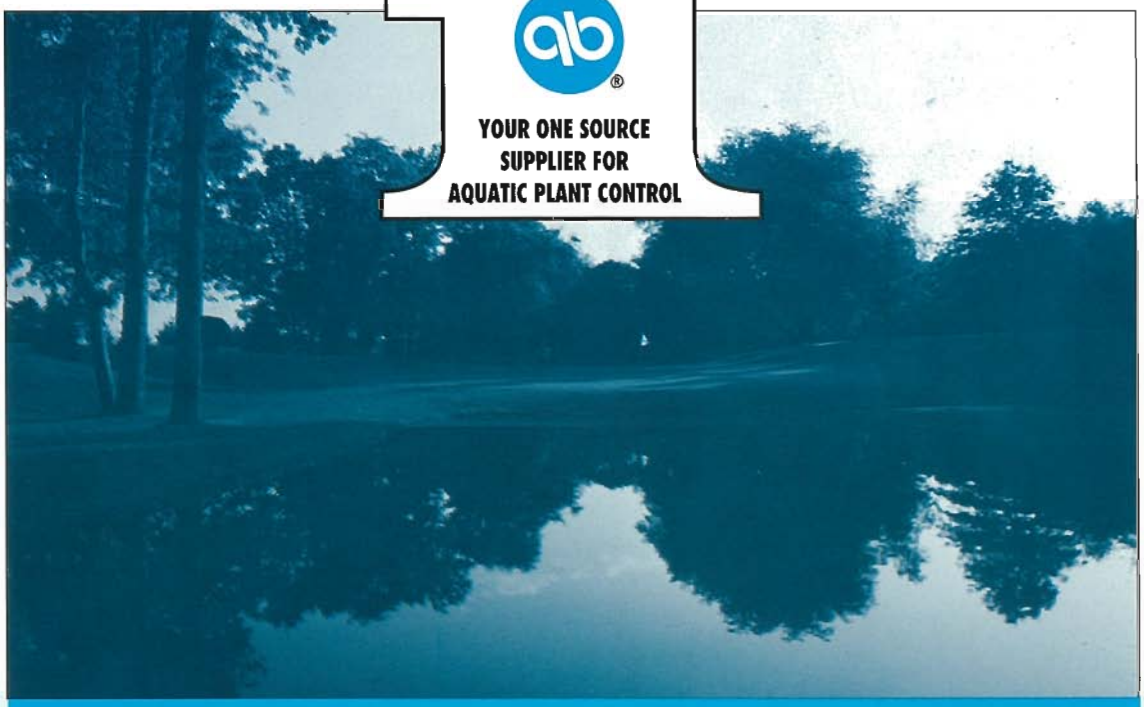

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Letter to the Editor

Vision: Being able to see, or the manifestation to the senses of something immaterial.

Another FAPMS meeting has come and gone. We've seen the changing of the guard and the election of a new president. We saw another exciting golf tournament? We were able to see the folks we only see once a year and renew old friendships. We also saw the bottom of one to many beer cans! However, it's what I didn't see that bothers me most. The applicator papers were few and far between, and I think I know why. Fear of making a fool or yourself. Believe me folks, I know it's hard to get up in front of 400 plus people and give a paper. Then again, let me reassure you that these same 400 people are in your corner. They don't care if you stutter, or if your voice quivers, and they have gotten used to the sound your knees make when they knock together. This society is what the applicator makes it. Everyone from the president on down has told us FAPMS is for the applicators. So it's time we, the everyday applicator, took the ball and ran with it. Didn't we see too many data slides this year? From the Bob Uecker seat that I had, it was hard to make heads or tails of them. Too many lines, going too many directions, some even resembled a New York city road map! I want to see experiments- whether they worked or not. If you find something that works tell us, if it doesn't, tell us. It's really that easy. I have heard an airboat load of excuses from "I can't speak and nobody wants to hear what I have to say" to "there's nothing new under the sun." Well, I don't believe any of that and I want to hear what you've done this year. How many acres of hydrilla did you treat? Better yet, tell me how many acres you controlled. Be proud of what you do, teach us something about your area, and get up there and tell us about it. If we want this mystical thing we call FAPMS to keep living and breathing, we, the applicators have to stay involved. If we choose not to, just look at all the data slides we have to look forward to! Help bring FAPMS back to life, the way it was intended, FOR the applicators, BY the applicators. Lets not lose our vision for FAPMS and what it was meant to be.

Darryl (Grem) Blackall
St. Johns River Water
Management District
Winner of 1991 Best Applicator
Paper Award

About the Cover

When the cold fronts move through the Southeast, redfish and speckled trout move into deep holes like this one photographed by Jim Kelly on the Waccasassa River. He won't tell me exactly where.

Aquatics
Winter 1993/Vol. 15, No. 4

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Giant Cutgrass - an Unfriendly Native.

by
Alison M. Fox.
IFAS/Center for Aquatic Plants/Department of Agronomy
University of Florida

Giant cutgrass (*Zizaniopsis miliacea*) is a tall emergent grass native to the southeastern United States. Although also known as water millet, you need only a few brushes with this plant to discover how much more appropriate the name *cut*grass is. The leaves, which may be 4 to 5 feet in length, have extremely rough margins which will inflict painful wounds at the least provocation. It doesn't take much time in its company to realize why so little has been published about the biology of this hostile plant.

IDENTIFICATION

A third synonym for this species is southern wild rice. This name can lead to some confusion since there is a species of wild rice, *Zizania aquatica*, which (in order to distinguish it from the northern species *Zizania palustris*) is also called southern wild rice. The confusion does not end there, however, because giant cutgrass and *Zizania aquatica* look very similar and may occur in the same habitats, such as along river banks. In the vegetative state these species can only be distinguished upon close examination. The base of a shoot of giant cutgrass tends to be flatter and harder than that of *Zizania aquatica* which is round and more spongy. Only giant cutgrass has rhizomes but both species will produce numerous shoots from the base of a single plant. Because of these rhizomes, giant cutgrass is a perennial grass whereas *Zizania aquatica* has been typically regarded as an annual species. However, it appears that in some sites in Florida *Zizania aquatica* plants can survive for more than one growing season (Jan Miller, pers. comm.).

Figure 1. Panicle of Zizania aquatica *with female flowers above and male flowers below*

Fortunately, the flowers of these two species are quite distinctive. The individual male and female flowers of *Zizania aquatica* are separated on the panicle (flower-head) with the female flowers (which develop into the seeds) on the top branches (Figure 1). In giant cutgrass the male and female flowers are mixed throughout the panicle so that there is no distinction between the top and bottom branches (Figure 2). The 2 mm long seeds of

Figure 2. Panicle of giant cutgrass with male and female flowers mixed on the panicle.

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giant cutgrass mature and are shed in a progression from the top to the base of the panicle. Thus, although a partly shed giant cutgrass panicle may appear to have the top to bottom differences associated with *Zizania aquatica*, the fact that seeds will be found at the bottom of the panicle distinguishes the plant as giant cutgrass. To be confident of correctly identifying these two species it is necessary to examine flowering plants.

DISTRIBUTION

Giant cutgrass may form fringes along the shores of lakes, reservoirs, rivers and canals, or it can occur in large, dense stands in freshwater marshes. This species is principally found in Arkansas and the coastal states from Maryland to Texas, with large populations in the abandoned rice fields of the Carolinas and the coastal marshes of Georgia and Louisiana. Giant cutgrass has been identified in at least 50 waterbodies in Florida, throughout the panhandle and extending south to the Fakahatchee Strand Preserve, and canals south of Lake Okeechobee. It can grow in moist sediments which are periodically flooded, and stands will extend lakeward into water up to 4 feet deep. Stands are also found in tidal marshes, but because giant cutgrass is not very salinity-tolerant it will be replaced by other species as the influence of salt-water increases nearer the sea.

Giant cutgrass stands that invade shallow areas along rivers can reduce water flow sufficiently to result in the deposition of suspended sediments. Combined with the organic matter deposited by the plants themselves, this may reduce reservoir storage capacity and narrow river channels. This has been a primary concern in Lake Seminole, a 37,500 acre reservoir on the Florida- Georgia-Alabama border. Giant cutgrass appeared within 3 years of the reservoir's impoundment in 1957 and expanded rapidly to cover over 8,000 acres by the mid 1980s. Conversely, there are many other sites within Florida where this species has been established for many years without much expansion.

BIOLOGY AND GROWTH

Most flower production in giant cutgrass occurs in April and May, and over 3,000 seeds may be produced on a panicle. On the rare occasions that seedlings have been observed in the field they have been found only on exposed mud-flats. It is not likely that this method of reproduction is important in relation to stand expansion but it may be a significant long distance dispersal mechanism.

Giant cutgrass plants can vegetatively spread by the pro-

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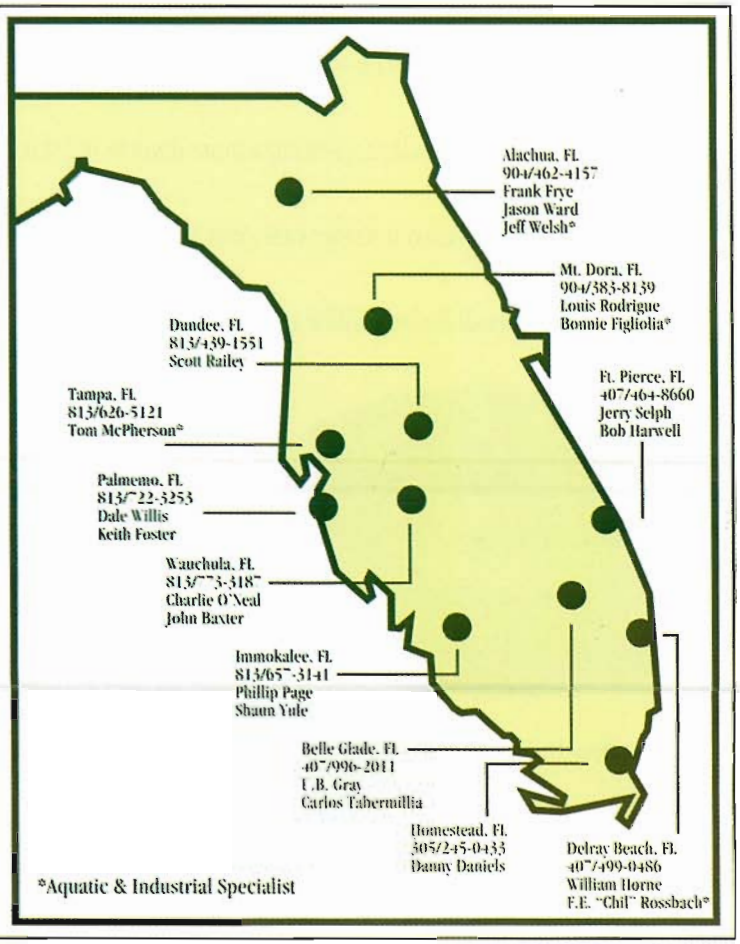

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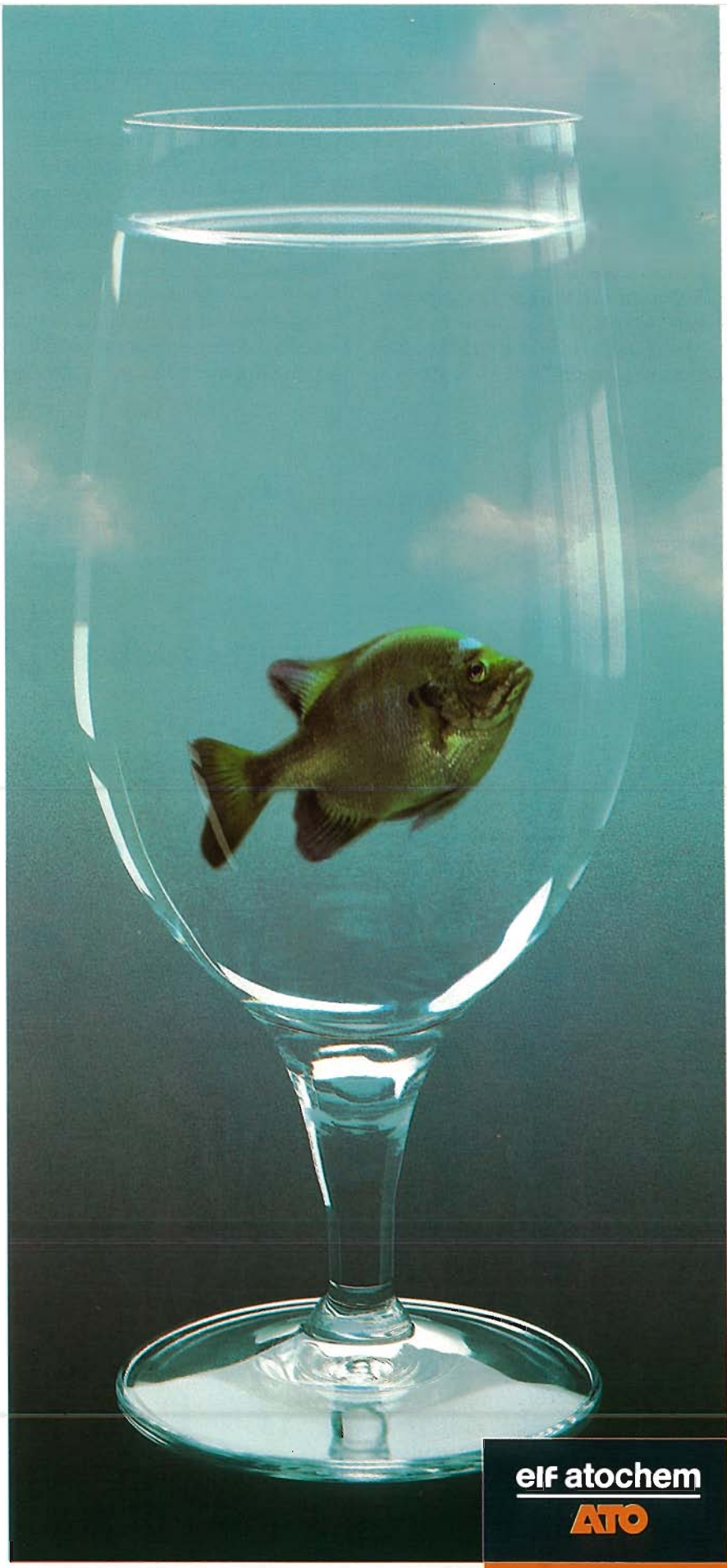

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duction of shoots from rhizomes. These rhizomes do not grow as fast as some other species (e.g., cattails) but they are important in allowing giant cutgrass to recover from events that damage the above-ground parts of the plant (e.g., frost, fire, disease, cutting). In deeper water (3 to 4 feet) gradual stand expansion may be dependant upon rhizome growth.

The mechanism that is responsible for the rapid rates of stand expansion seen in places such as Lake Seminole (6 to 10 feet per year) is quite unusual. As the flowers on giant cutgrass plants at the edge of a stand mature, they will gradually lean towards the open water. By the time that all the seeds have been shed the flowering stem will be lying horizontal at the water surface (stages A to C in Figure 3). These flowering stems each have between three and five nodes (joint-like thickenings from which leaves arise) and the two or three of these nearest to the flower will produce new shoots and adventitious roots (stage C in Figure 3).

Most of these shoots will only produce leaves but the node nearest to the original flower will extend to form a new (secondary) flowering stem with several nodes and a fertile flower (stage D in Figure 3). After its seeds are produced and shed, this secondary flower will lean over to become horizontal and the process of shoot and further flower formation may continue (stage E in Figure 3). Up to six flowers may be produced per year in this manner from a single plant base, extending the flowering stems out into the water by as much as 10 feet.

Such multiple flower production is only possible if the horizontal flowering stems are sufficiently well anchored by the adventitious roots, or are so sheltered, that neither waves nor floating debris break the stem. Adventitious roots will be more likely to reach the substrate and provide satisfactory anchorage prior to stem breakage if the water is shallow. Thus, stand expansion will be most rapid in areas with shallow water and which are sheltered from waves and floating material.

Horizontal stems on plants in more exposed and deeper water may be broken before a secondary flower can be produced. In such areas stand expansion will result from rhizome growth. Parts of flowering stems which are broken off will float, and may collect into floating islands or may drift into a shallow area where they can become rooted and establish new plants. Thus, in addition to rapid stand expansion, this mechanism of shoot production on the flowering stems can result in plant

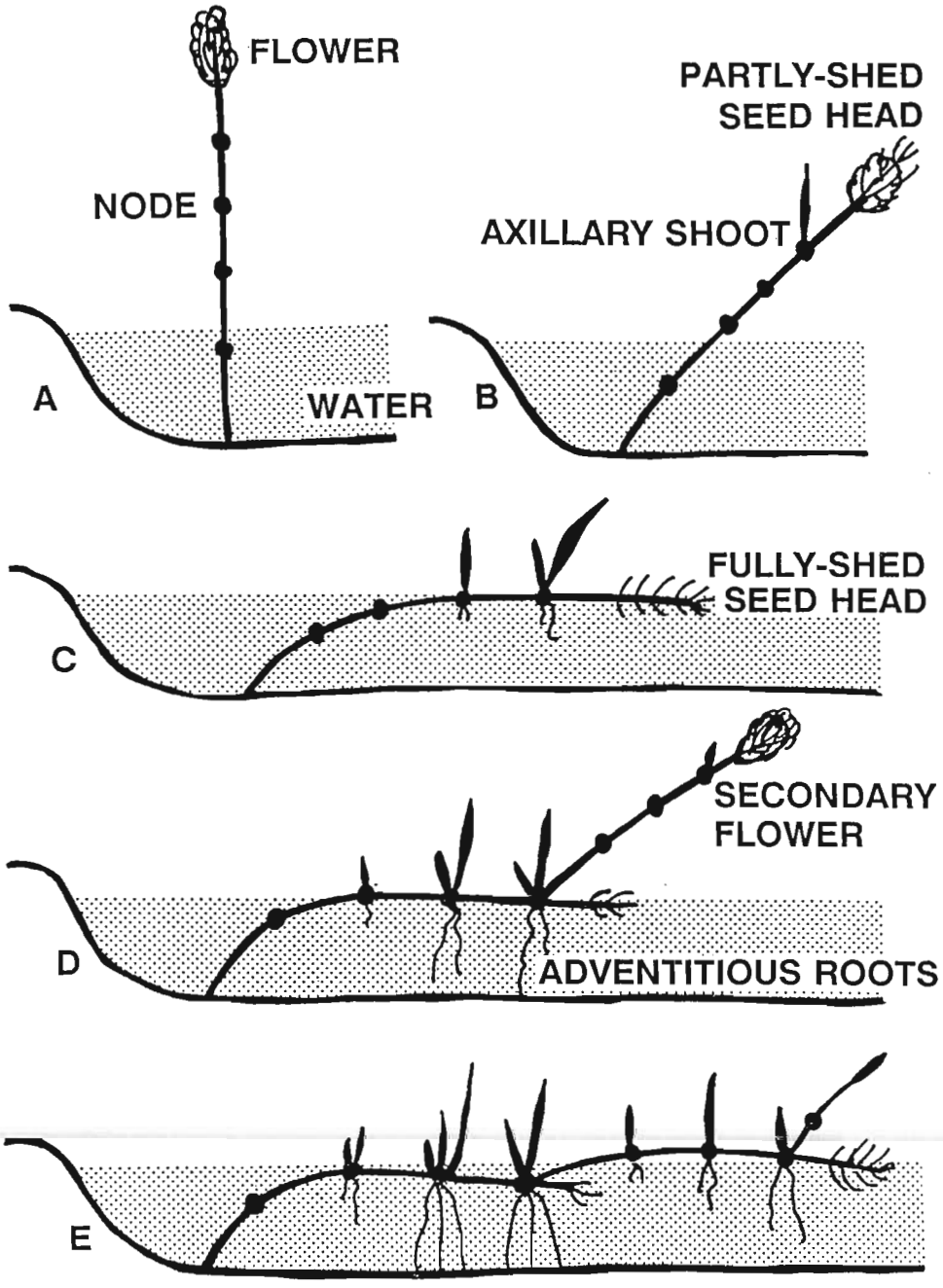

Figure 2: Development of flowering stem at the periphery of a giant cutgrass stand. A= start of flowering season in April/May, 0 weeks; B = 2 weeks; C = 4 weeks; D = 6 weeks; E = 8 weeks.

dispersal to new sites within a waterbody. This production of shoots, roots, and secondary flowers from the flowering stems nodes is a further characteristic which distinguishes this species from *Zizania aquatica*.

MANAGEMENT

It is possible to grow new giant cutgrass plants from sections of flowering stems which include nodes. This method of propagation is much quicker and simpler than trying to germinate seeds, and has been used in revegetation projects in Louisiana. Along exposed shorelines, dense fringes of this robust, rhizomatous species are being established to reduce erosion.

In some sites giant cutgrass has to be removed, typically because it is reducing or diverting water flow or preventing access to the water. In the 1940's and 1950's giant cutgrass management was conducted to improve malaria control, and in attempts to replace this species with others which provided more productive duck habitat.

Being a perennial species, management methods must remove or kill the rhizome to be effective in the long-term. Dredging is commonly used in channels where accumulated sediments are to be removed along with the plants. Regrowth is rapid from plants that are cut, burnt, or treated with contact herbicides, unless this occurs late in the growing season and is followed by flooding. Glyphosate has been found to provide effective control in Lake Seminole.

THINGS WE DON'T KNOW

Not much information has been published about the ecology of giant cutgrass. It frequently forms stands which have low plant species diversity but its competitiveness has not been investigated. It appears to be able to grow in a range of sediment types, ranging from sandy to silt or mud substrates but its nutrient requirements have not been established. Although usually found in open areas giant cutgrass can also tolerate the shade of cypress trees, as found in the Corkscrew Swamp Sanctuary, but how shading may influence its rate of growth or competitiveness is not known.

There are plenty of things that remain to be learned about this species, which is always an exciting prospect for a plant ecologist. However, it will take determination and a thick skin to better understand this interesting but unfriendly native.

Acknowledgements

The assistance of Bill Haller, Margaret Glenn and Jan Miller has been much appreciated throughout my giant cutgrass projects, as has the funding from the US Department of Agriculture and Center for Aquatic Plants under cooperative agreement No. ARS 58-43YK-9-0001.

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Figure 1. The common name, water clover, describes the distinct four leaflets of Marsilea *spp., which resemble four-leaf clovers, and make the genus easy to identify.*

"Aquatic Four Leaf Clovers" - *Marsilea spp.*

by
John A. Rodgers
Department of Environmental Protection
Bureau of Aquatic Plant Management
Tampa, Florida

INTRODUCTION

The genus *Marsilea* is named in honor of Italian botanist Giovanni Marsigi. The common name, water clover, describes the distinct four leaf arrangement that resembles the ordinary four-leaf clover (Figure 1).

DISTRIBUTION

Approximately 65 *Marsilea* species are found throughout the world, with the majority occurring in Australia and South Africa. The following seven *Marsilea* spp. are found in the United States, five of which are native:

M. mexicana A. Braum (Mexicana water clover),

M. tenuiflora Engelm. ex Kunge (narrow leafed water clover),

M. macropodia Engelm. ex A. Braum (bigfoot water clover),

M. uncinata A. Braum (hooked water clover),

M. quadrifolia L. (European water clover),

M. mucronata A. Braum or M. vestita Hooke & Grev. (hairy pepperwort),

M. fournieri C. Chr.

M. mexicana and *M. quadrifolia* are non-native to the United States.

M. mucronata and *M. uncinata* have been found in Florida. *M. mucronata* was first discovered in 1891 in a north-central Florida pond, apparently introduced from western

North America. This early discovery is rarely cited in publications and this species is believed to have disappeared from the pond soon afterwards. In *Ferns of Florida* (Lakela and Long 1976), this same introduction is cited but it is suggested that *Marsilea* was distributed from Lake to Dade Counties. It was further mentioned in *Ferns of Florida* that no recent collections have been found.

The most abundant non-native species of water clover found in the United States is *M. quadrifolia.* This European aquatic fern was first introduced into Bantam Lake, Connecticut in 1982. It has since established in Maryland, Pennsylvania, Ohio, Michigan, Kentucky, Indiana, Illinois, Missouri, Kansas and Iowa and is considered naturalized in Canada.

ECOLOGY AND BIOLOGY

Depending on the species, water clover grows rooted in shallow water, temporarily flooded depressions, moist soils and dry shorelines. The deep water forms usually have larger leaflets than the terrestrial species. A species can easily adapt to seasonal water level changes, which can result in leaflets of different size and shape. Species growing in shallow water or wet mud have erect petioles, 5-35 cm tall, with emergent leaflets. In deeper water, the leaflets float on the water surface with petioles recorded up to a meter long. While many species can be identified by the shape and size of the leaflet, classification is mainly based on sporocarps.

The primary mode of reproduction is vegetatively by rhizomes. A network of slender creeping, branched rhizomes can produce numerous erect petioles.

Sexual reproduction of water clover is by spores. There are two types of spores; a large female spore (megaspore) and a tiny male spore (microspore). Both of these spores are contained in stalked capsules called sporocarps which burst when the female spores are ripe and swollen. This containment differs from *Azolla* spp. and *Salvinia* spp., which have separate sporocarps for the male and female spores. After fertilization, the female spore is dispersed by wind. The sporocarp, itself, is unlikely to be dispersed by wind because of its size and weight.

The leaves of water clover, along with the stalks containing sporocarps, are consumed by several species of waterfowl. The sporocarps pass through the intestinal tracts of migratory water birds and thus provide an efficient means of distribution. Sporocarps are reported to be viable for up to 100 years. Water clover can provide shade and protective cover for small fishes and the leaflets are consumed by waterfowl. Several species, especially *M. hirsuta* (*M. exrata*), are used in aquaria and decorative water gardens.

WATER CLOVER IN FLORIDA

Figure 2 was photographed in

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Figure 2. This species of water clover, M. uncinata, *which was photographed at a 1/3 acre pond in Land-O-Lakes, Florida, formed an extremely dense network of intertwining rhizomes and stems along the shoreline to water depths of one meter and adapted to dry soil conditions (next to wax myrtle trees in backyard).*

February, 1992 at a 1/3 acre pond in Land-O-Lakes, Florida (Pasco County). An Asian neighbor of the pond owner asked if she could plant a small amount of water clover (*M. uncinata*) along the edge of the pond so she would have available a fresh vegetable to add to salads. This species and *M. quadrifolia* are frequently cultivated and used in Asia as a compliment to salads. After six months, the entire periphery of the pond was covered with water clover. The network of roots, rhizomes and stems were extremely dense. The water level had fluctuated soon after the planting, which probably aided its rapid establishment. The plant was growing rooted in water over one meter deep, along the shoreline in wet sand, and six meters up the shore in very dry soil. In deeper water, the plant was not as dense as along the shoreline but had a growth density similar to pennywort. Access to open water and shoreline fishing was greatly restricted.

A revisit to the pond a year later showed that water clover was still abundant in the majority of the pond. The plant did not spread any deeper into the pond and some of the shoreline was now cleared of the plant. The owner may have chemically treated or hand removed some of the plants. Another small pond across the road, approximately 20 meters away, now had a small populations of this water clover.

The spores of water clover supposedly mature between June and December, but sporocarps were present on these plants during February. The plant had solitary sporocarps, which were prominently hooked, glabrous leaflets, and peduncles 12-15 mm long. In *Aquatic and Wetland Plants of Southwestern United States* (Correll and Correll 1972), *M. uncinata* is stated to be 6 to 20 cm tall. Aquatic plants of the same genotype frequently display a wide range of plasticity and petioles and leaf forms can vary according to soil type and water depth. I believe this is the case with this species. This species is also found in Texas and Louisiana.

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Other waterbodies where water clover has recently been found in Florida are the Santa Fe River (columbia County, 19911) and Alligator Lake (Pinellas County, 1992). The site of Alligator Lake was interesting because it was growing next to a large cultivated crop of water spinach (*Ipomea aquatica*), another Oriental vegetable. Only a small amount of water clover, approximately 50 stems, was present.

M. uncinata was also found around a boat ramp of the Santa Fe River (personal communication - Joe Hinkle, FDEP Biologist). The plant was hand removed and has not been reported since.

M. macropodia and *M. quadrifolia* have been mentioned in several publications as weeds in rice paddies in India and Southeast Asia. In reviewing the literature for this article, water clover was only occasionally reported as a problem. The control of water clover, if needed, can be accomplished by foliar applications of 2,4-D.

Aquatic plant control personnel who believe they have seen water clover in the field should report such findings to their FDEP Regional Biologist.

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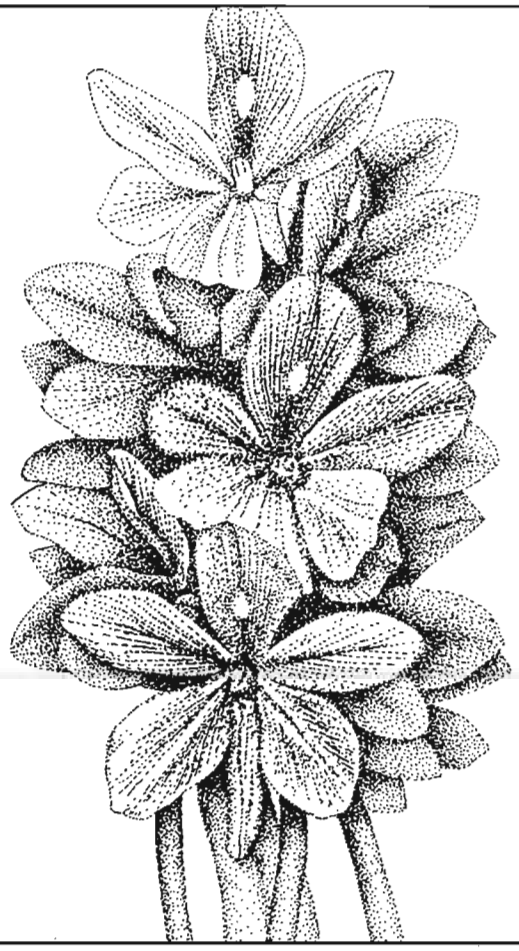

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Water-lilies of Florida

by
David L. Sutton, Professor
Fort Lauderdale Research and Education Center
University of Florida - IFAS
3205 College Avenue
Fort Lauderdale, FL. 33314

Flower of the Yellow water-lily growing on Lake Okeechobee.

Introduction

The Nymphaeaceae or water-lily family contains the genera *Nymphaea*, commonly called water-lilies, and *Nuphar*, commonly called spatter-docks or yellow cow-lilies. Members of this family occur from tropical to northern cold temperate regions of the world. Many water-lilies produce large, showy flowers that make them attractive and sought after plants as compared to the spatter-docks.

Water-lilies grow best in full sunlight in static water protected from wind and wave action, whereas the spatter-docks will tolerate wind and water flow. The floating leaves of water-lilies, although attached to the rhizome by long, trailing, flexible petioles, are damaged by the pounding action of wind and waves. Leaves of spatter-dock are held above the surface of the water on stiff, erect petioles, and thus are not influenced as much by wind and waves.

Water-lilies, because of their large, showy and sometimes fragrant flowers, are favorite aquatic plants for use in ornamental pools and ponds. Modern-day interest in water-lilies is said to have begun in 1786 with the introduction to England of fragrant white water-lilies from North America for use as ornamental aquatic plants.

There are about 35 species of water-lilies worldwide. Many water-lily hybrids have been

produced for ornamental purposes. A few hybrids have naturalized from cultivation but none are known to cause problems. Water-lilies in Florida include both native, e.g., fragrant white water-lily, and introduced species, e.g., cape blue water-lily; naturalized hybrids, e.g., Dauben water-lily; and one natural hybrid, sulphur water-lily (Table 1).

Genus Characteristics

Fossil records indicate that present day water-lilies appear much like their ancestors which lived over 160 million years ago. Anatomical characteristics of water-lilies have changed little with time, but their geographical distribution has changed in response to climatic changes.

Before the Ice Age, fossil records indicate water-lilies were found in the Arctic. Some species with fossil records in Europe are now found

Table 1. Water-lilies of Florida.

Common name	Species name
A. Native	
Fragrant White Water-lily	*Nymphaea odorata* Ait.
	var. *gigantea* Tricker
	var. *godfrey*i Ward
Yellow Water-lily	*Nymphaea mexicana* Zucc.
Sulphur Water-lily	*Nymphaea* X *thiona* Ward
Everglades Water-lily	*Nymphaea elegans* Hook.
B. Naturalized	
Cape Blue Water-lily	*Nymphaea capensis* Thunb.
Dauben Water-lily	*Nymphaea* X *daubeniana* O. Thomas
Sleeping-beauty Water-lily	*Nymphaea blanda* G. F. W. Meyer
	var. *fenzliana* (Lehm.) Casp.
None	*Nymphaea jamesoniana* Planch.
None	*Nymphaea ampla* (Salisb.) DC.

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only in warmer climates which suggests that Europe may have been at one time much warmer than it is today.

A water-lily plant is composed of a large rhizome to which are attached roots and long, flexible petioles extending to the surface. Floating leaves are attached to the petioles. The floating leaves lay flat on the surface of the water with leaf blades that are ovate to orbicular and deeply cleft basally. At times, in a dense growth of water-lily plants, new leaves may push older leaves up so that they appear to be emersed. True emersed leaves are rare, and submersed leaves when present are thin and delicate.

Flowers are the most prominent feature of water-lilies with some plants featuring numerous petals per flower. All flowers have four, usually green, sepals at the base of the flower. Flowers float or extend above the surface of the water. Flowers generally are open during the day but close at night. Some tropical water-lily plants open their flowers only at night. The flowers live for a few days. Many species bloom profusely when adequately fertilized.

Species Present in Florida

A. Fragrant White Water-lily (*Nymphaea odorata*)

Fragrant white water-lily plants are the most abundant of all the water-lilies in North America and they occur from Canada to Nicaragua. Two varieties occur in Florida. Variety *gigantea* Tricker has large flowers and medium to large leaves and occurs through out much of Florida. Variety *godfreyi* Ward has small flowers and small to medium leaves and occurs primarily in West Florida. Several other varieties of fragrant white water-lily occur in other areas of North America.

B. Yellow Water-lily (*Nymphaea mexicana*)

Yellow water-lilies occur in Florida, along the southeast coast of the US into Texas and Arizona, and in Mexico. Yellow water-lilies were abundant in many shallow water areas in Florida before the introduction of waterhyacinth (*Eichhornia crassipes* (Mart.) Solms.). Yellow water-lilies have been crowded out by the aggressive floating waterhyacinth plants. Now that maintenance control of waterhyacinth plants has been achieved in many lakes such as in Lake Okeechobee and the Kissimmee Chain, yellow water-lilies are much more common than they were a few years ago.

Flowers of yellow water-lilies extend above

Flowers of the Sulphur water-lily (upper) and the Fragrant white water-lily (lower) and growing near each other south of the Monkey Box on Lake Okeechobee.

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the surface of the water on a stout peduncle. The yellow petals open around noon and close about 4 PM in the afternoon. Upper surfaces of leaves tend to be bright green in the summer and greenish-purple in the winter.

C. Sulphur Water-lily (*Nymphaea X thiona*)

This plant is a natural hybrid of the yellow water-lily and variety gigantea of the fragrant white water-lily, and may be found where both parents grow close to each other. Its flowers are quite large like the fragrant white water-lily with light yellow petals on inflorescences that extend above the surface of the water like the yellow water-lily. The sulphur water-lily appears to be sterile since viable seeds have never been collected.

The sulphur water-lily was first described in 1957 from plants collected in the St. Johns River. A horticultural hybrid was developed a number of years ago but this hybrid is probably the result of the cross between the yellow water-lily and the fragrant white water-lily variety *odorata*.

Lloyd Mitchum, 11 to 12 years ago, observed the sulphur water-lily in areas between Indian Prairie Canal and Dykes Ditch on Lake Okeechobee. Within the last few years however, this plant has been found in several areas south of the Monkey Box on Lake Okeechobee. The apparent expansion of the sulphur water-lily again suggests that maintenance control of water hyacinth is allowing re-establishment and growth of native aquatic plants.

D. Everglades Water-lily (*Nymphaea elegans*)

The Everglades water-lily is found in shallow water areas primarily in the south to southwestern portions of Florida. It flowers from August to November. The flower consists of small pale blue to almost white petals. The petals always have a bluish tinge that deepens on drying.

E. Cape Blue Water-lily (*Nymphaea capensis*)

Cape blue water-lilies are native to South Africa. As its name indicates, the flowers contain blue to lavender petals that are whitish at the base. This plant has many horticultural variations, and the plants in Florida may be variety *zanzibariensis* (Casp.) Conard.

F. Dauben Water-lily (*Nymphaea X daubeniana*)

The Dauben water-lily is a horticultural hybrid that has naturalized in a few areas of Florida. Its leaf blades are usually green on both surfaces. The upper leaf surface contains a mound of fibrous tissue at a point above the juncture of the blade and petiole from which epiphyllous plantlets form. These plantlets may be used to propagate new plants. Petals of Dauben water-lilies are light blue

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and may be confused with other blue water-lilies.

G. Sleeping-beauty Water-lily (*Nymphaea blanda*) and *N. jamesoniana*

These two species are rare in Florida. Although they belong to a large South American group of night blooming water-lilies, they probably are native to Florida. They occur primarily in the west central areas of Florida. Because they bloom at night, they are easily overlooked. These water-lilies produce white flowers from September to November.

H. Nymphaea ampla

This water-lily, native to tropical America, has naturalized in areas of Lee County. The plant has flowers with white petals that extend above the surface of the water.

Management of Water-lilies

Water-lily plants are not generally considered to be problem aquatic plants. However, at times they may present problems in localized areas of a body of water or in small ponds. Foliar applications of glyphosate products registered for use in aquatic sites at label rates will provide adequate control of problems resulting from excessive growth of water-lily plants. With careful applications, a desirable level of plants can be maintained.

Acknowledgments

Contribution of the University of Florida's Fort Lauderdale and Education Center. Published as Journal Series Number N-00792 of the Florida Agric. Exp. Sta.

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Flower of the Cape Blue water-lily growing in a drainage ditch along Highway 29 south of La Belle.

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Understanding Pesticide Regulation- New Pesticide Registration

O. Norman Nesheim
Pesticide Information Coordinator
IFAS, University of Florida

Pesticide registration is a pre-market review and licensing program for all pesticides marketed in U.S., whether of domestic or foreign production. The U.S. Environmental Protection Agency (EPA) annually reviews approximately 15,000 registration submissions of various kinds. Most of these submissions are for new formulations containing active ingredients which are already registered, new uses of existing products or various other label amendments to existing products. Only about 15 new chemicals (new active ingredients) are registered each year.

Risk Assessment

Under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), all pesticides distributed or sold to any person in the United States must be registered with the U.S. EPA. The EPA is responsible for registering new pesticides to ensure that, when used according to label directions, they will not present unreasonable risks to human health or the environment. FIFRA requires the EPA to take into account economic, social, and environmental costs and benefits in making decisions. The EPA bases registration decisions for new pesticides on its evaluation of test data provided by registration applicants. Applicants for pesticide registration obtain these data from tests that are specified by EPA. The tests must be performed according to specified protocols. Required studies include testing to show whether a pesticide has the potential to cause adverse effects in humans, fish, wildlife, and endangered species. Potential human risks include acute (short-term) reactions such as toxic poisoning and skin and eye irritation, as well as possible chronic (long-term) effects such as cancer, birth defects, or reproductive system disorders. Data on environmental fate are also required so that EPA can determine, for example, if a pesticide poses a threat to ground- or surface water, agricultural workers, endangered species, etc.

Product Classification

EPA may classify a pesticide product for restricted use if its characteristics warrant special handling. Restricted use pesticides may be used only by or under the supervision of certified applicators trained to handle these chemicals. Restricted use classification must be shown on labels. During registration review the EPA may also require changes in proposed labeling and use patterns.

Tolerances

If a pesticide is being considered for use on a food or feed crop, the applicant must petition EPA for a tolerance and submit appropriate data so EPA can define a safe and realistic tolerance level. Tolerances are maximum permissible residue levels for raw agricultural products and processed foods. They are established by EPA under the Federal Food, Drug, and Cosmetic Act (FFDCA). Tolerances for agricultural commodities are enforced by FDA; those for meat and poultry products by the USDA.

Registration Process

The registration process usually begins with an experimental use permit (EUP) issued by the EPA to permit pre-market field testing. Subsequently, the manufacturer submits an application for federal registration to EPA for review. This application must include appropriate health and safety data, and EPA may require further testing to clarify specific health or environmental questions that may arise during registration review.

A manufacturer may spend five to seven years researching and developing a new active ingredient before a registration package is even submitted to EPA for consideration. Once the registration package is submitted to EPA it may take up to three years or more for EPA to review the data contained in the package and to approve or deny the registration. Registration of a new formulation containing an active ingredient already registered or a new use for a currently registered active ingredient usually takes less time. Inventing, testing, evaluating, and moving a new active ingredient through the registration requirements may take a manufacturer

seven to 10 years and cost $40-60 million dollars before any sales occur.

Special Registrations

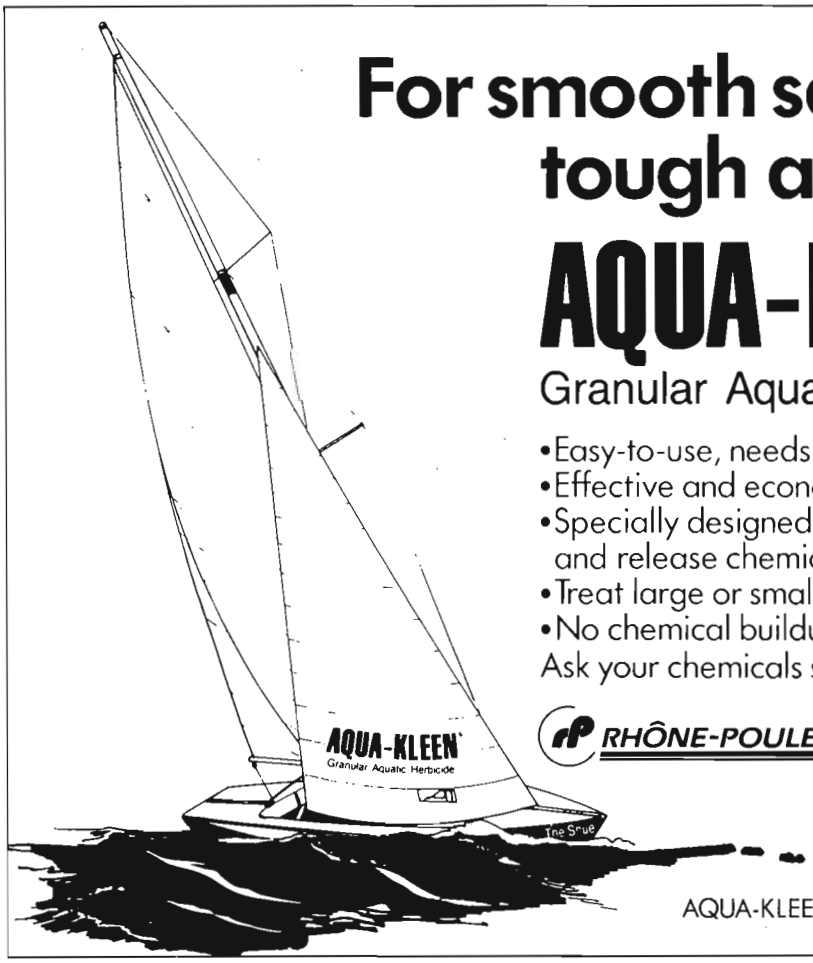
FIFRA permits EPA to issue a conditional registration for a pesticide, if EPA finds that the use of the product will not significantly increase the level of risk posed by similar products already on the market. The conditions imposed on the registration is satisfactory completion (usually within a specified time) of specific studies required for full registration. Under special circumstances EPA may also grant conditional registrations for products containing active ingredients not previously registered with EPA if the conditional use of the product will be in the public interest, and will not present an unreasonable risk.

EPA also evaluates several other types of special registration submissions mandated by FIFRA. Experimental use permits under Section 5 of FIFRA allow large-scale experimentation in order to develop data for new products or new uses of existing ones. Through Section 18 of FIFRA, EPA may temporarily authorize state or federal agencies to combat certain pest-related emergencies with pesticide uses not permitted by existing federal registrations. Section 24(c) authorizes states to register a pesticide for a "special local need." Such registrations, when issued, are effective immediately, but EPA has authority to disallow them within 90 days after being issued. Special local need registrations become federal registrations for use in specified states.

State Enforcement

FIFRA gives states primary enforcement responsibility for pesticide use violations, subject to EPA oversight. Pesticide applicator certification programs are also conducted by the states. In Florida, enforcement responsibilities are handled by the Department of Agriculture and Consumer Services (FDACS). FDACS is the designated State Lead Agency for the enforcement of state and federal pesticide regulations. Through a memorandum of agreement with FDACS, the Institute of Food and Agricultural Sciences at the University of Florida has training and testing responsibilities for the applicator certification program.

This article was reprinted from IFAS Fact Sheet PI-14, which is available from County Cooperative Extension Offices. It was originally adapted from PIP-IS-7-89, Understanding Pesticide Regulation, Regulation of New Pesticides by Robert Bellinger, Pesticide Information Specialist, Cooperative Extension Service, Clemson University.



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AQUAVINE

There Goes the Trust Fund

According to minutes of the South Florida Water Management District Governing Board Meeting of September 9, 1993, the Department of Environmental Protection reimbursed the District in the amount of $400,000 for melaleuca management. This money was paid out of the aquatic plant management trust fund. Legislation passed in 1992, which increased the amount of money transferred to the aquatic plant trust fund from the Gas Tax Collection Trust Fund, mandated the expenditure of $1,000,000 for melaleuca control. However, we were assured, both when the Bureau designated melaleuca as a aquatic plant and when this legislation was passed, that money would never be taken from the trust fund for melaleuca control unless additional money, generated for that purpose was put in. Additional money has not been added to the trust fund for melaleuca control and this money is desperately needed for hydrilla management projects.

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"Aquatics" Inventory

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These programs teach the basic knowledge necessary to pass the restricted use pesticide applicator certification test for aquatic pest control in Florida. Topics covered include a brief history of aquatic plant management, laws, herbicide technology, biological control, mechanical control, and environmental considerations. Adapted form the Aquatic Pest Control Applicator Certification Training Manual (IFAS Pub. SM-3).

IFAS Pesticide Fact Sheets

Three new fact sheets have been prepared by the IFAS Pesticide Information Office (PIO):

"Understanding Pesticide Regulation: New Pesticide Registration" (IFAS Fact Sheet PI-14) by O. Norman Nesheim

"Understanding Pesticide Registration: Regulation of Registered Pesticides" by O. Norman Nesheim (IFAS Fact Sheet PI-12)

"Toxicity of Pesticides" by O. Norman Nesheim (IFAS Fact Sheet PI-13)

The fact sheets are available free from Cooperative Extension Offices or by calling the Center for Aquatic Plants (904/392-9613).

2,4-D Toxicology Literature Review

FAPMS has received an additional 100 copies of "A Comprehensive, Integrated Review and Evaluation of the Scientific Evidence Relating to the Safety of the Herbicide 2,4-D." To obtain a copy of this 100-page review contact the Editor.

GRASS CARP SYMPOSIUM

Grass Carp Use in Large Ecosystems
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A Symposium is being planned to review current knowledge and data on the use of Grass Carp for aquatic weed control in large lake and reservoir ecosystems. Presentations on the stocking and subsequent environmental impact on large lakes from Texas, Alabama, Florida and South Carolina are being planned. Expert panels will discuss recapture techniques, interactions of submersed plants with fish production and other timely topics. The Symposium will be held Monday - Wednesday, March 7-9, 1994 at the J.W. Reitz Union, University of Florida, Gainesville, Florida. To place your name on a list for further information, send address to Ms. Bobbi Goodwin, Center for Aquatic Plants, 7922 N.W. 71st Street, Gainesville, FL 32606. If you have some information that you would like to present at the meeting, contact the Program Committee at the same address.

FWSS 1994 Annual Meeting

The Florida Weed Science Society will hold its 1994 Annual Meeting February 4, 1994. The meeting will be held at the Palm Beach County Cooperative Extension Service's Clayton Hutchinson Auditorium in West Palm Beach. The meeting will include sections on weed control in ornamentals and turf, vegetable crops, rights-of-way, and aquatics, and woody exotic plant control. CEU's for pesticide applicator recertification will be offered in corresponding categories. For additional information contact Jerry Hulbert at 407/682-3553.

EPPC Annual Meeting

The Exotic Pest Plant Council will hold their annual meeting on March 17 and 18, 1994 at the University of Central Florida in Orlando. The main topic of the meeting will be "The effects of disturbance on natural landscapes: Does it enhance susceptability to invasion by exotic plants?" For additional information contact Don Schmitz at 904/277-2600.

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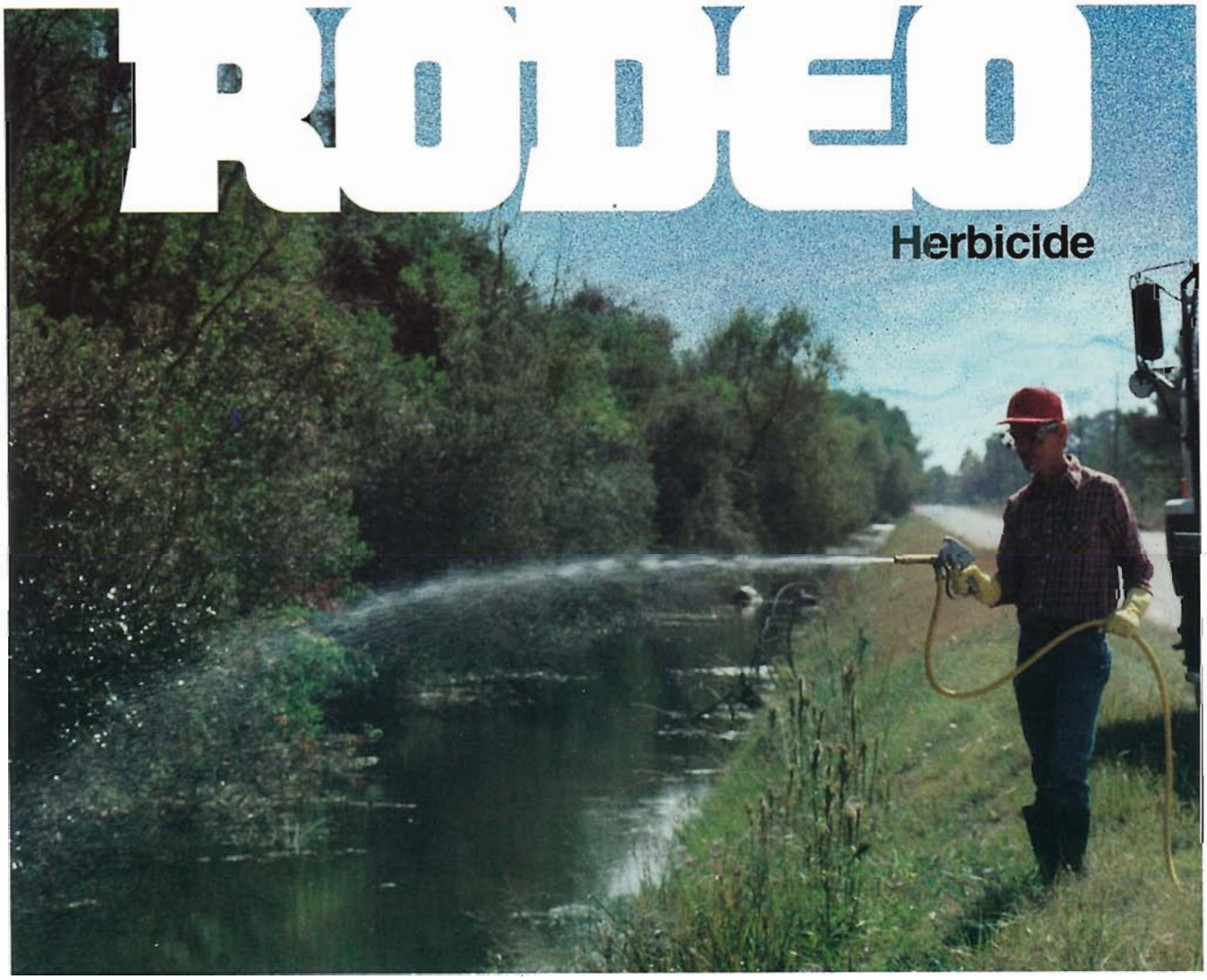

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