

THE AQUATIC PLANT MANAGEMENT SOCIETY, INC.

**21st ANNUAL MEETING
ABSTRACTS**



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Benefit/Cost Analysis of Silvex Cancellation

Edward O. Ganstad, Office of the Chief of Engineers,
U.S. Corps of Engineers, Washington, D.C.

The most prevalent problem plants that are best controlled with 2-(2,4,5-trichlorophenoxy) propionic acid (silvex) are mixed populations of submersed aquatic plants, alligatorweed and other emerged plants, and saltcedar and other phreatophytes and riparian vegetation. Whereas the present system of analysis by the EPA in the Rebutable Presumption Against Reregistration of silvex defines the conditions that charge the cost of agricultural production as benefits. The basic truth is that elimination of a herbicide, such as silvex, has costs beyond and above the costs to agriculture.

Wetland Plants for Effluent Disposal

C. W. Sheffield and Carol Lotspeich, Bio-Engineering Services, Orlando, Florida

This paper will review various projects that Bio-Engineering Services has designed using a freshwater swamp as means of effluent disposal for treated sewage. The uniqueness of this paper is that a natural swamp was used, after it was surveyed for vegetation types, whereas the aquatic plants are being used as an extension of this sewage treatment process to remove the nitrogen and phosphorus from this wastewater prior to it entering a nearby canal. Extensive water quality data has been obtained on this project.

Weed Management Strategies Using Grass Carp for Vegetation Control

Jerome V. Shireman, Center for Aquatic Weeds, University of Florida,
Gainesville, Florida

Data obtained from Lake Baldwin, Florida, indicate that 130 kg of grass carp per hectare of hydrilla is effective for hydrilla control. Three management strategies, based on this stocking rate, are proposed to manage hydrilla, and method of selection depends upon the management goal.

The *Myriophyllums* of Oklahoma

Richard Couch and Edward Nelson, Oral Roberts University, Tulsa Oklahoma

An extensive field and herbarium survey of Oklahoma's submersed vascular aquatic macrophytes, combined with an annotation study of the genus *Myriophyllum*, resulted in a more accurate assessment of the occurrence and distribution of the *Myriophyllums* in Oklahoma.

Utilization of Aquatic Plants for Nutrient Uptake in Artificial Marshes

Robert Blackburn, Kenneth Boyer, Joe Frost, Mark Newfeld and
Jerry Yestrebsky, Joyce Environmental Consultants, Inc.,
Casselberry, Florida

Aquatic plants have been established in artificial marshes to remove nutrients from storm water runoff. Concentration of nutrients removed varied with plant species, plant maturity, retention time, and temperature. Effect of marsh design on nutrient removal is being evaluated in a 2000-acre golf and residential community in Palm Beach County, Florida.

Control of Hydrilla with *Fusarium rosen Culmorum* in Large-Scale Pilot Tests

R. Charudattan, R. E. Cullen and F. M. Hofmeister,
Center for Aquatic Plants, University of Florida,
Gainesville, Florida

A fungus, *Fusarium roseum* (Culmorum) has been used successfully to control hydrilla in large-scale pilot tests. Plastic pools (7.29 m² area and 24 cm mean water depth) containing hydrilla alone or hydrilla and five other submersed macrophytes were treated with fungal spores at the rate of 1.29×10^{10} per m². There were no adverse changes in dissolved O₂, water pH, and quality and rate of regrowth of four non-target plants. Histopathology and reisolations of the fungus from diseased plants were used as evidences of infection and pathogenesis. Hydrilla could be either killed or contained by the fungus such that $\leq 5\%$ regrowth occurred. Additional large-scale evaluations are planned.

The Florida Game & Fresh Water Fish Commission's New Role in Aquatic Plant Management

Lowell L. Trent, Clayton Phillippy, and Debbie Valin, Florida Game and Fresh Water Fish Commission, Leesburg, Florida

Ponds and lakes stocked with grass carp under 16C-21 and lakes using the hybrid grass carp will be evaluated biannually. Preliminary investigations with the Florida hybrid grass carp indicate it will be a safe, useable and popular organism for submersed aquatic weed management by the public. Herbivorous fish must be permitted before being used for research and management purposes in Florida.

Large-Scale Mapping of Aquatic Weeds Using Aerial Color Infrared Photography

R. D. Martyn & W. W. Snell, Texas A & M University, College Station, Texas

Vegetation maps of three dominant submersed weeds were prepared for a 20,000-acre reservoir in east Texas, using color infrared aerial photography. Acreage figures were calculated for each species and infested areas were delineated onto 1:24,000 scale maps. Data was collected over a one-year time and increases in the weeds were clearly demonstrable. Hydrilla was the most prevalent species and showed the greatest increase (4,578 acres to 6,825 acres) with 49% new growth. Milfoil and coontail accounted for an additional 1,229 acres.

"Work Plans" for Aquatic Weed Control

Robert J. Gates, Southwest Florida Management District, Brooksville, Florida

Work plans for Aquatic Weed Control is a method by which integrated pest management of aquatic plants may be implemented. Biological, mechanical, and chemical methods may be used but more importantly, the public and other concerned groups are informed and involved in the process.

Public Participation in Pesticide Programs

A Panel Discussion — Tom Camp, Moderator, Aquatic Management Company, Inc., Glendale, Arizona

Members from the Mississippi Wildlife Federation, radio and broadcasting media, major newspaper media, fish farms, a federal agency, and if possible a housewife from the local area will discuss their concerns and needs for participation in pesticide programs.

Potential Management of Aquatic Weeds by Biodynamic Actions: Scope and Limitations

John Barltrop, Barbara Martin and Dean F. Martin, Chemical and Environmental Management Services Center, University of South Florida, Tampa, Florida

The observation that certain noxious aquatic plants (e.g. *Elodea canadensis*) have reportedly spontaneously disappeared from certain infestations has prompted an interest in the possibility that biodynamic action may have been responsible. It is well known that certain dyes and colored materials can react with oxygen in the presence of light and produce a special form of oxygen called singlet oxygen that leads to cell destruction. The scope, precedents and limitations of the reaction are considered.

A Preliminary Report on the Vascular Plants of the Winyah Bay Marshes and Estuary, Georgetown, South Carolina

W. Harold Ornes, University of South Carolina, Aiken, South Carolina

It has been proposed that Winyah Bay, near Georgetown, be dredged to facilitate increased shipping and thereby enhance industrial and municipal development. This study was designed to provide (1) baseline data on levels of heavy metals in aquatic plants of Winyah Bay, and (2) a floristic survey on the open water communities, disturbed areas, and marsh communities. Field observations concerning the populations of vascular species will be reported as (1) dominant, (2) frequent, (3) infrequent, or (4) rare.

Influence of Light Upon the Herbicidal Properties of Hydrogen Peroxide on Coontail

Stratford H. Kay, J. D. Ouzts, and P.C. Quimby, Jr., Center for Alluvial Plains Studies, Delta State University, Cleveland, Mississippi and Southern Weed Science Laboratory, USDA, SEA-AR, Stoneville, Mississippi

The herbicidal properties of hydrogen peroxide on coontail were evaluated at high and low light intensities. Coontail was found to be more sensitive to hydrogen peroxide when exposed to high light ($450 \text{ ue-m}^{-2}\text{-sec}^{-1}$) than when exposed to low light ($65 \text{ uE-m}^{-2}\text{-sec}^{-1}$). Damage to the plants was not only more extensive at high light, but also occurred more rapidly.

Current Investigations of a Naturally-Occurring Hydrilla Inhibitor

Dean F. Martin, Chemical and Environmental Management Services Center, University of South Florida, Tampa, Florida

This paper describes recent research at the CHEMS Center on naturally-occurring hydrilla inhibitors. The inhibitors have been isolated from sediments of White Trout Lake and Lake Starvation, Hillsborough County, Florida, by extraction with water, followed by separation with ultrafiltration. Subsequently, we have separated the active fraction by high-performance liquid chromatography, and at least one fraction has been subjected to mass spectrometry to help define the structural features present in the active agent.

Some Factors Affecting the Germination of Seeds of the Fragrant Water Lily (*Nymphaea odorata*)

Mary Jane Else and Donald N. Riemer, New Jersey Agricultural Experiment
Station, Rutgers University, New Brunswick, New Jersey

Nymphaea odorata is a weed of shallow waters and irrigation ditches, particularly those associated with cranberry farming in New Jersey. Seed germination of the fragrant water lily was studied in order to gain more insight into its biology. Light and stratification were found to promote germination; while drying, freezing, carbon dioxide and aeration inhibited it. Germination promotion by seed crowding was thought to be due to an ethylene effect.

Effects of Various Diets on the Growth of Hybrid Grass Carp Fingerlings

John R. Cassani, William E. Caton and Thomas H. Hansen, Jr.,
Lee County Hyacinth Control District, Fort Myers, Florida

The effects of various diets (plant, animal and artificial food) on the growth of hybrid grass carp fingerlings (*Ctenopharyngodon idella* [Val.] X *Aristichthys nobilis* [Rich.]) were examined in two separate studies. In general, hybrid grass carp fingerlings showed the greatest growth rate when fed a combination of *Lemna gibba*, *Wolffia columbiana* and artificial food (floating catfish pellets) during a 60-day period. The diets that produced the most efficient growth or those with the lowest conversion rates were mosquito larvae and fresh frozen brine shrimp. The effect of naturally decreasing water temperature on feeding behavior and growth is also discussed.

A Review of Harvesting Performance in Florida

C. Brate Bryant, Aquamarine Corporation, Waukesha, Wisconsin

A compilation of a dozen harvest contracts performed in Florida, primarily on hydrilla, reveals a harvest rate that is constant, predictable and repeatable. Costs of harvesting hydrilla vary primarily in proportion to transport distance from harvest site to shore conveyor site. Use of harvesting as a tool in integrated control programs prior to using herbivorous fish or herbicides is discussed.

Effects of a New Algicide, PH4062, on Growth of *Cladophora* sp. and *Rhizoclonium*

Lars W. J. Anderson and Nate Dechoretz, USDA-SEA Aquatic Weed
Control Research, University of California, Davis, California

An experimental algaecide, PH4062 [N-(4 cylohexylphenyl)N¹ N¹-diethylenediamine] was phytotoxic to two filamentous green algae in static-water bioassays. Growth of *Rhizoclonium* was reduced approximately 60% after a 7-day exposure to PH4062. Some combinations of PH4062 and CuSO₄ appeared to have additive phytotoxicity but none was synergistic. PH4062 was more effective than CuSO₄ in reducing growth of both algal species in limited-time exposures of 1, 2, or 4 hours.

Growth and Feed Conversion Efficiencies of Hybrid Carp (*Aristichthys nobilis* Rich x *Ctenopharyngodon idella* Val.)

David L. Sutton, University of Florida, Ft. Lauderdale, Florida

The hybrid carp is being studied for its potential as a biological control method for some aquatic plant problems. Information will be presented on the growth of hybrid carp in relation to aquatic plants consumed. Results are from studies conducted in plastic-lined pools under outdoor conditions.

Aquatic Weed Control with Seven Applications of Hydrothol 191 in the Salt River Project Tempe-Western Canal

Fred G. Corbus, Consultant, Phoenix, Arizona

The Salt River Project is the principal source of agricultural, municipal and industrial water in 250,000 acres in South Central Arizona. Seven applications of Hydrothol 191 Aquatic Herbicide, Mono (N,N dimethylalkalamine) salt of endothol, were made at two week intervals in the Tempe-Western Canal at .2 ppm during the summer of 1980. Control, suppression, a marked thinning of stand and possible elimination of one stand of sago pondweed (*Potamogeton pectinatus*), the only vascular weed present, resulted.

Distribution and Abundance of Subterranean Turions of *Hydrilla verticillata* (L.F.) Royle in Lake Okeechobee

Ted R. Batterson, O. L. Sutton, K. M. Portier, M. C. Bruner,
University of Florida and USDA-SEA

Hydrosol samples were taken with a core sampler and screen for subterranean turions (tubers) of *Hydrilla verticillata* in Lake Okeechobee, Florida. Samples were collected at 1 m intervals from a grid that was superimposed over a hydrilla mat growing in approximately 1 m of water in the northwest corner of the lake. They were collected in February and March of 1981 and the results were subjected to various statistical analyses to determine distributional patterns.

Effect of Vegetation Cover on Headwater Quality and Quantity

John R. Allan and Blair R. Shaw, Agriculture Research Center,
Lethbridge, Alberta, Canada

The East Slope of the Alberta Rocky Mountains is one of the most important water producing areas in North America. Research in 1962 established baseline water quality parameters for this watershed. Current studies have shown little change in water quality. Extensive vegetation manipulation in adjacent areas has greatly influenced runoff patterns and water quality of tributary streams. Siltation problems have developed in some watersheds.

Aquatic Herbicide Drift Abatement

Donald C. Widmann, Nalco Chemical Company, Leesburg, Florida

An easy to use, effective herbicide carrier has been developed for the aquatic weed control specialist. Nalquatic, a visco-elastic carrier, permits the applicator to deliver more herbicide to the submersed weed surface, while improving sinking, contact and confinement properties. Applied by boat or aircraft, Nalquatic causes the herbicide formulation to cling together and stick on the plant surface. Nalquatic is adaptable to all types of application by boats and aircraft and can be fed by inline injection or tank mix.

Function of roots in the Development of *Myriophyllum spicatum*

John R. Allan and Blair R. Shaw, Agriculture Research Center,
Lethbridge, Alberta, Canada

Eurasian watermilfoil exhibits a temperature-dependent summer and winter growth form. Shoot and root morphology changes at 15 C, under normal lighting. Blue light was found to stimulate root growth. Fresh, dry and ash weight, as well as chemical composition of roots were determined for the summer and winter growth forms grown under various light and temperature regimes. The effect of root growth and the redox potential of the hydrosol was examined.

An Economical Inverting System

Leonard Bartos, John Kelso and Joe Lang, Southwest Florida
Water Management District, Brooksville, Florida

The use of invert application systems is a common method for the control of submersed aquatic plants in Florida. A variety of invert pump systems have been marketed by commercial interests; however, the district staff devised a system which incorporated our particular requirements. An economical and efficient system was designed, field tested and is now used as our standard application system. The utilization of the system with various inverting oils and herbicides will be presented.

Effects of Sonar on Coontail, Water Quality, and Non-target Organisms

Richard Couch, Edward Nelson and John Korstad,
Oral Roberts University, Tulsa, Oklahoma

An experiment was conducted to test the efficacy of the herbicide Sonar for the control of coontail (*Ceratophyllum demersum* L.) in a large lake when only a portion of the lake was treated with the herbicide. Dilution, caused by migration of the herbicide out of the treated areas resulted in poor control of coontail. The herbicide had no measureable effects on water quality and non-target biotic components monitored during the course of this investigation.

Use of Aquatic Herbicides in the Southeastern USA by the Fish & Wildlife Service

D. P. Schultz, W. W. Johnson, J. M. Price IV,
U.S. Fish and Wildlife Service, Atlanta, Georgia

The use of aquatic herbicides by the Fish and Wildlife Service in the southeastern states is limited to national wildlife refuges and national fish hatcheries. The major weed of concern at most refuges is cattail, although water hyacinth, water lettuce, spatterdock and maidencane have received treatment. The use of herbicides at most hatcheries is oriented toward control of algae which interfere with harvesting and growth of fish in production ponds.

The Use of Polymers in Aquatic Weed Control

Don Dixon, Nalco Chemical Company, Citrus Heights, California

The use of polyacrylic polymers is seen as a vast improvement in pesticide delivery systems for the submerged aquatic environment.

Midsouth Weather and Biocontrol of Alligatorweed

G. V. Vogt, P. C. Quimby Jr., and S. H. Kay,
Biological Weed Control Research Control Research Unit,
SEA-AR, USDA, Stoneville, Mississippi

Irregular seasonal observations of about 150 stations in the midsouth during 1973-77 suggest that the occurrence and activity of *Agasicles hygrophila* and *Vogtia malloi* on alligatorweed correlate with weather. These observations were plotted against representative weather data for coastal, transition, and inland zones. Winter temperatures play a major role in over-wintering, spring build-up, and subsequent inland migration of the biocontrol agents in the lower Mississippi River Valley.

Applying Eggs of *Arzama densa* Wlk. to Water Hyacinth in Greenhouse Studies

R. G. Baer and P. C. Quimby Jr., Southern Weed Science Laboratory,
USDA, SEA-AR, Stoneville, Mississippi

Spray methods have been developed to apply eggs of a biological control agent to a target weed. Infestation depends upon the concentration of sticking agent, the number of eggs and the percent cover of water hyacinth. Studies also indicate that the eggs of this insect, *Arzama densa*, can be stored, thus having a "shelf-life" for future use.

***Cercospora rodmanii*: Spore Application Method of Water Hyacinths in Louisiana**

Chris Piehler and Dr. Arthur S. Allen, Department of Biological Sciences,
Northwestern State University, Natchitoches, Louisiana

Culture techniques now provide the increase in spore production of *C. rodmanii* at levels yielding a high concentration leading to high inoculum potential. New microtechnique allows for the collection of spores on a collection screen and in turn, storage of spores for inoculative work is accomplished. Utilizing portable boat equipment, 12-volt system, small compressor at low psi and a misting-type nozzle, pathogenesis can be followed in field plots and local lesion dynamics can be calculated.

Factors Affecting the Uptake of Fenac-¹⁴C and Fluridone-¹⁴C by Hydrilla

James E. Cobb, Thai K. Van and William T. Haller, University of Florida,
Center for Aquatic Weeds, Gainesville, Florida

Placing hydrilla (*Hydrilla verticillata* Royle) in 0.5 ppmw and 1.0 ppmw solutions of carbon-¹⁴ labeled Fluridone or Fenac under controlled conditions resulted in linear uptake rates. Apical sections of hydrilla absorbed greater amounts of labeled material than did subapical sections. The effects of pH on the solution of both herbicides were also examined. As the pH of the solution increased, uptake of Fluridone increased. In contrast, uptake of Fenac decreased as the pH of the solution increased.

Developments in Aquatic Weed Control Research in India Relating to Fisheries

V. Ramachadnran and T. Ramaprabhu, Central Inland
Fisheries Research, Cuttack, Orissa, India

The aquatic weed problems in fisheries in India range from the blue-green algal blooms to the challenging water hyacinth, salvinia, and hydrilla problems. Need-based researches on control have led to the development of a technique for water hyacinth control by 2,4-D on plant-weight-dose relationships, discovery of ammonia for the control of submersed weeds and also for *Pistia* and *Peridium* control. Paraquat for floating weeds, simazine and diuron treatments for algal blooms have also been successful. Cheap sand-granular brick pellet formulations with herbicides have recently been successfully tried. Biological control by grass carp has also been used successfully.

Effect of Substrate Enrichment on Hydrilla Growth

Ken Langeland and D. L. Sutton, Center for Aquatic Weeds,
University of Florida, Gainesville, Florida

Experiments were conducted that demonstrated the importance of substrate characteristics to hydrilla growth. A series of artificial substrates were prepared by combining progressively greater proportions of a muck soil with builders sand. This procedure resulted in a series of substrates with increasing levels of total combustible organic matter and levels of extractable N, P, K, and Ca. Hydrilla sprigs were allowed to grow with their roots exposed to these different substrates and their shoots in the same water. Hydrilla growth responded positively to the enrichment of substrate with the muck soil, and indicates that hydrilla growth may be limited under natural conditions by certain substrate characteristics.

A new Technique for Direct Microscopic Observation of Periphyton Assemblages on Natural Substratum

Chris C. Carter, Center for Aquatic Weeds, Institute of Food and
Agricultural Sciences, University of Florida, Gainesville, Florida

Community structure of periphyton assemblages was examined on two submersed and two emergent macrophytes in Orange Lake, Florida, utilizing a new sampling technique designed for direct microscopic observation of natural substratum. The submersed species were *Ceratophyllum demersum* L. and *Hydrilla verticillata* Royle and the emergents were *Nuphar luteum* (L.). Subtrop and Smith and *Panicum repens* L. Opaque (emergents) and semi-transparent (submersed) plant segments were subjected to bleaching using Chlorox, then stained with Lugol's preservative. The viewing clarity of periphyton structure was much improved, increasing ease of observation, identification, and quantification of organisms per unit area.

Effects of Surfactants on Control of Water Hyacinths

Don Thayer, Center for Aquatic Weeds,
University of Florida, Gainesville, Florida

Several surfactants were tested in combination with sub-lethal doses of 2,4-D and diquat. Initial testing indicates no significant added control as a result of the addition of surfactants to the spray mix. Variability between plots solved by additional replicated tests may show significance, however, the surfactants would add a control factor of only 10% or less.