

Aquatic Plant Management



Jack Whetstone

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Coastal Aquatic & Land Management**

Managing A Pond is Like Farming

- **Soil is Important**
- **Liming and Fertilizing Increases Production**
- **“Seed /Stocking Rate” Determines Productivity**
- **Prevention - Best Weed Control**
- **Weed ID - Critical**
- **Herbicides are Weed Specific**
- **IPM - Best Weed Management**
- **Proper Harvest Keeps You in Business**



Integrated Aquatic Weed **Management**

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Importance of Aquatic Plants

- Food, shelter, resting, and breeding habitat for fish, waterfowl, and other wildlife
- Protection against shoreline erosion
- Oxygenation of water
- Aesthetics

Why Do Aquatic Plants Become Weeds?

- Clear, shallow water
- Nutrients, particularly N and P
- Lack of natural enemies (introduced weeds)
- Metabolic characteristics greater than native plants

How Do Aquatic Weeds Get Into a Pond or Lake?

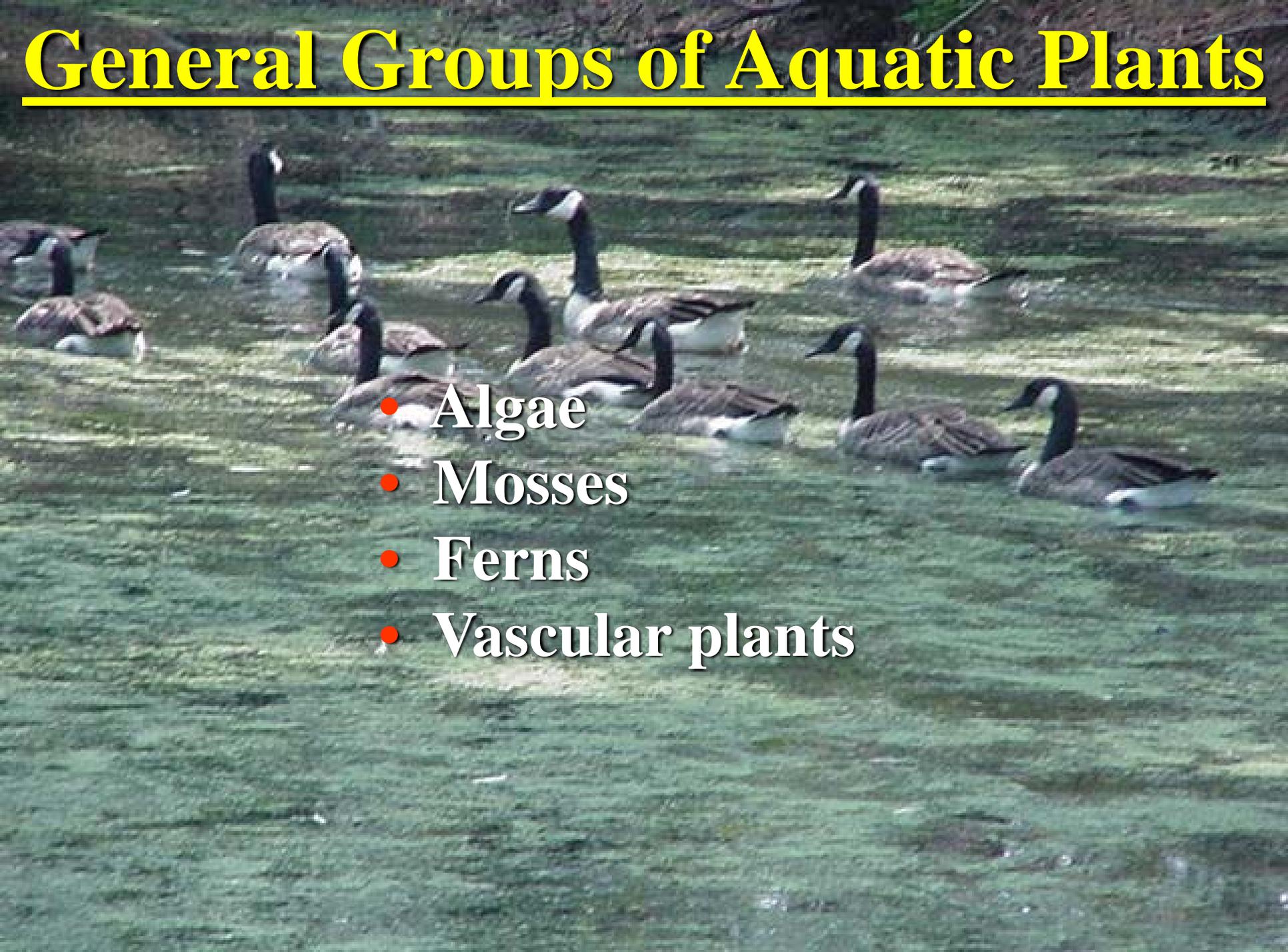
- Intentional or accidental results of human activities (wildlife plantings, boating, fishing enhancement, aquarium dumping, water gardens, dredging, mechanical harvesting)
- Animals (wading birds, aquatic mammals)
- Water movement (tides, currents, waves)
- Transport by wind and rain

Why Do We Have to Manage Aquatic Weeds in South Carolina?

To prevent interference with:

- Irrigation
- Drainage
- Flood control
- Water supplies
- Power generation
- Aesthetics
- Aquaculture
- Transportation
- Mosquito control
- Fishing/Recreation

General Groups of Aquatic Plants

- 
- A group of approximately 15 Canada geese are swimming in a pond. The water is a deep green color, and the background shows a grassy bank. The geese have dark brown wings and necks, with white bodies and black heads and necks.
- Algae
 - Mosses
 - Ferns
 - Vascular plants

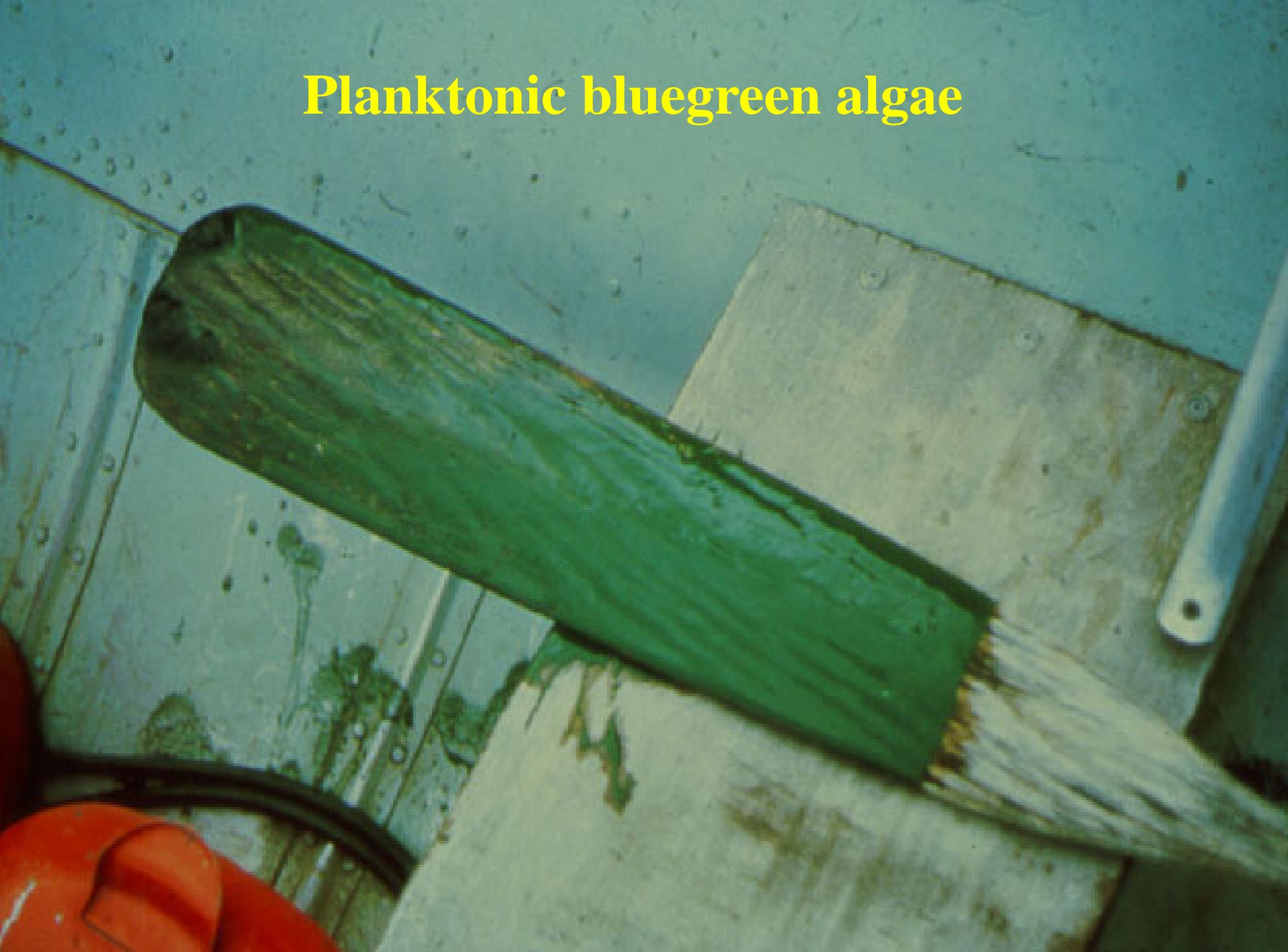
Aquatic Plants Classified According to Growth Habit

- **Submersed**
- **Free-floating**
- **Floating-leaved**
- **Emergent**

Types of Algae

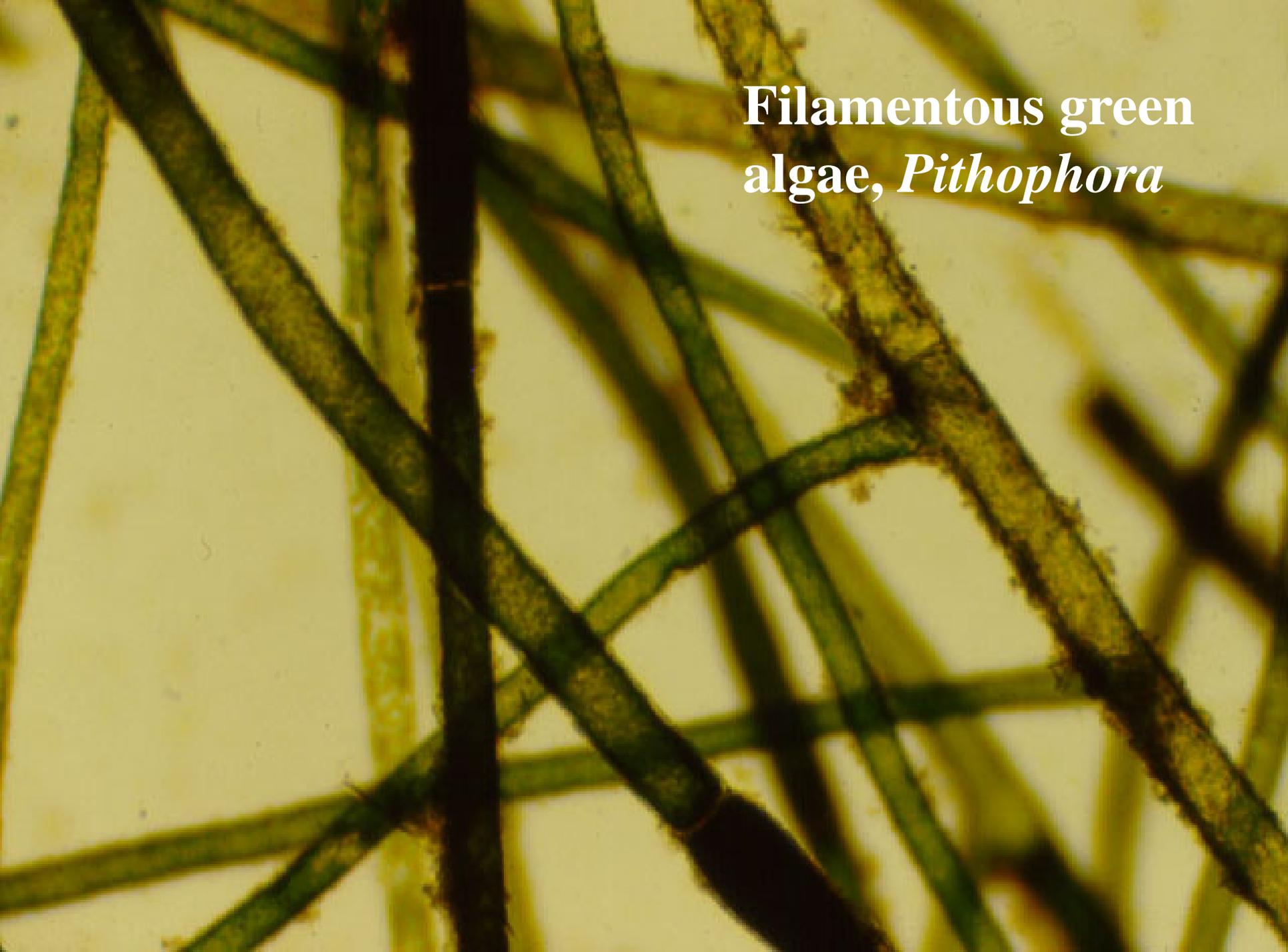
- Planktonic
- Filamentous
- Macroalgae

Planktonic bluegreen algae



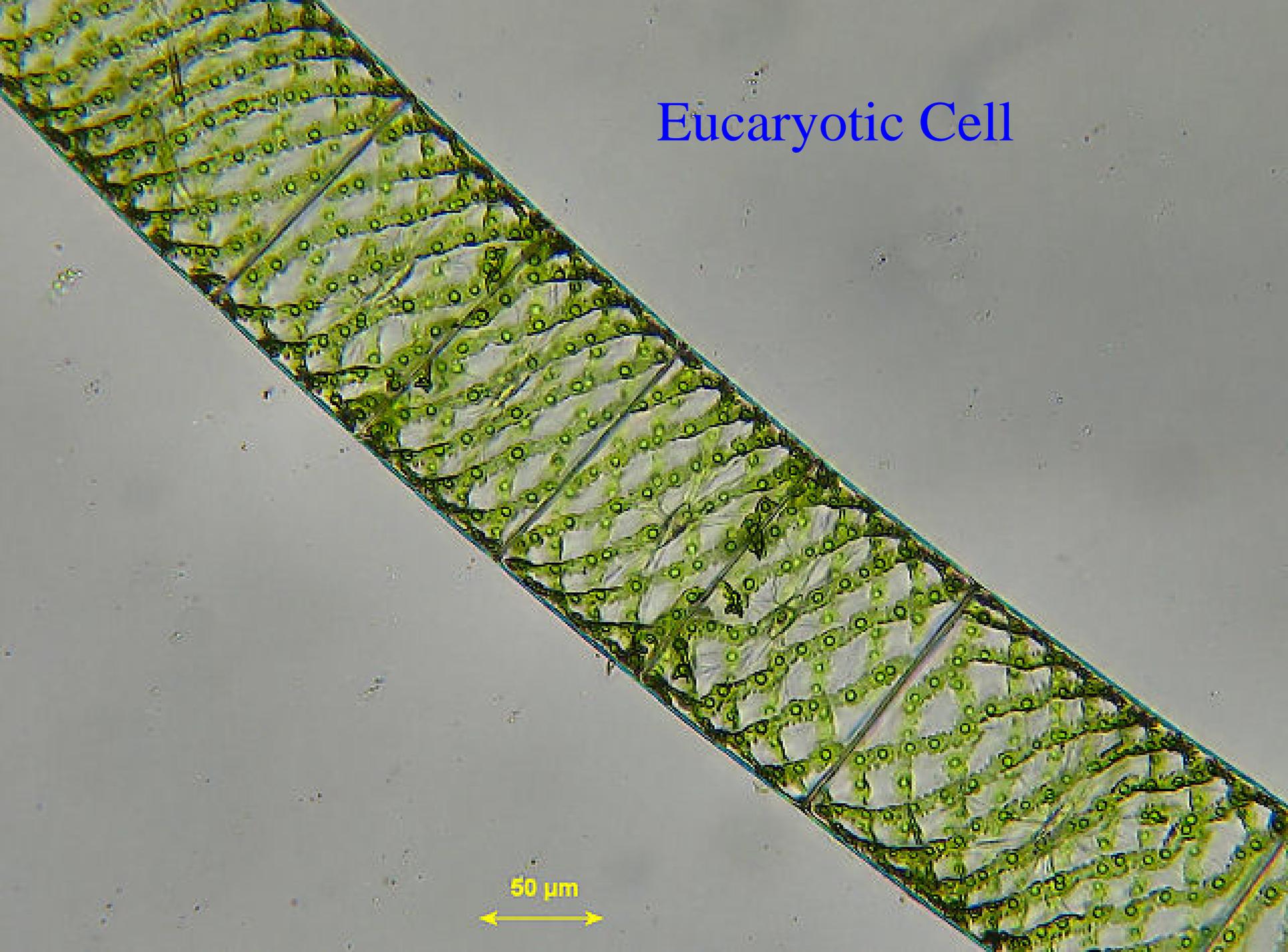
**Filamentous green
algae, *Spirogyra***



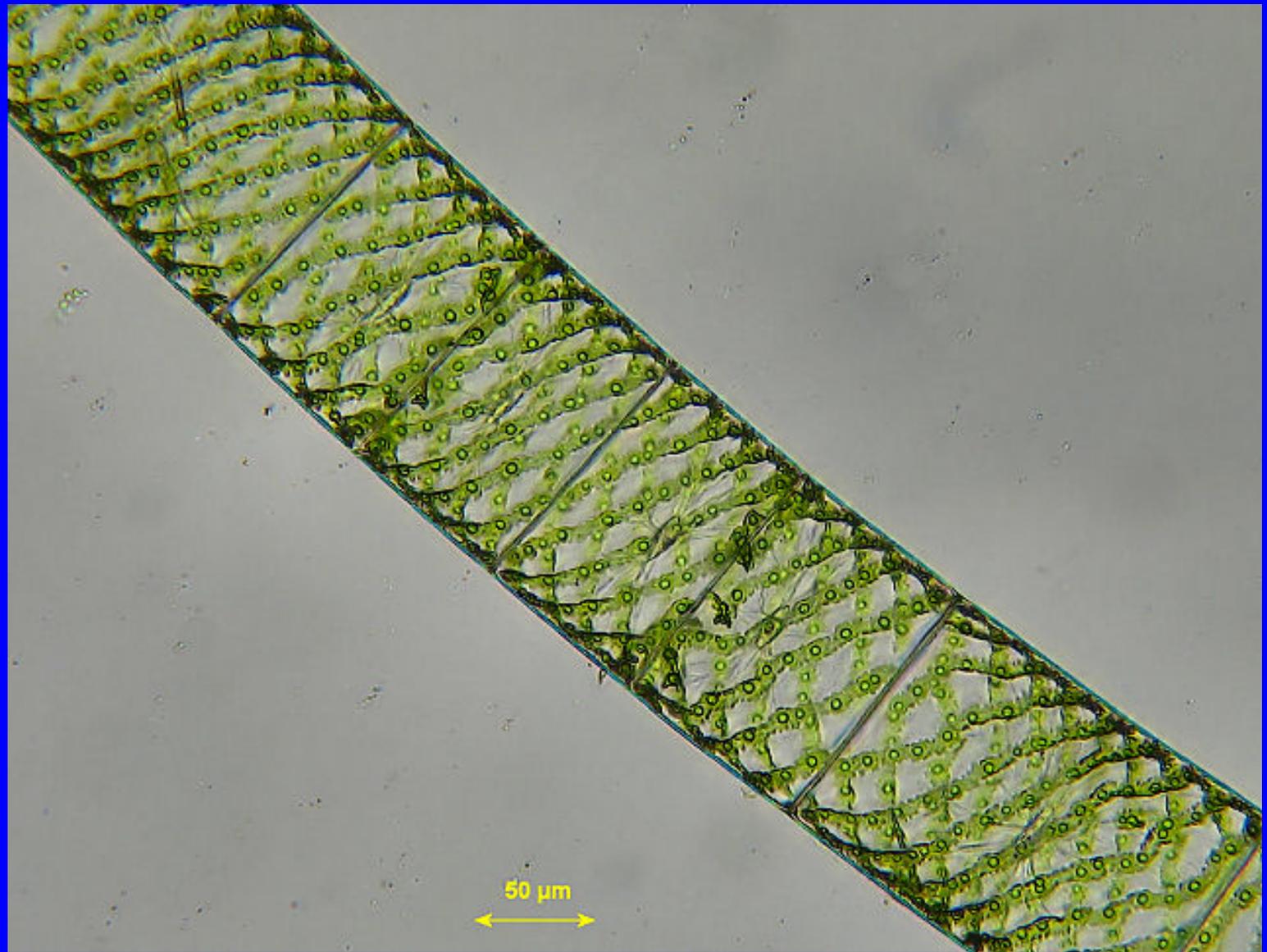


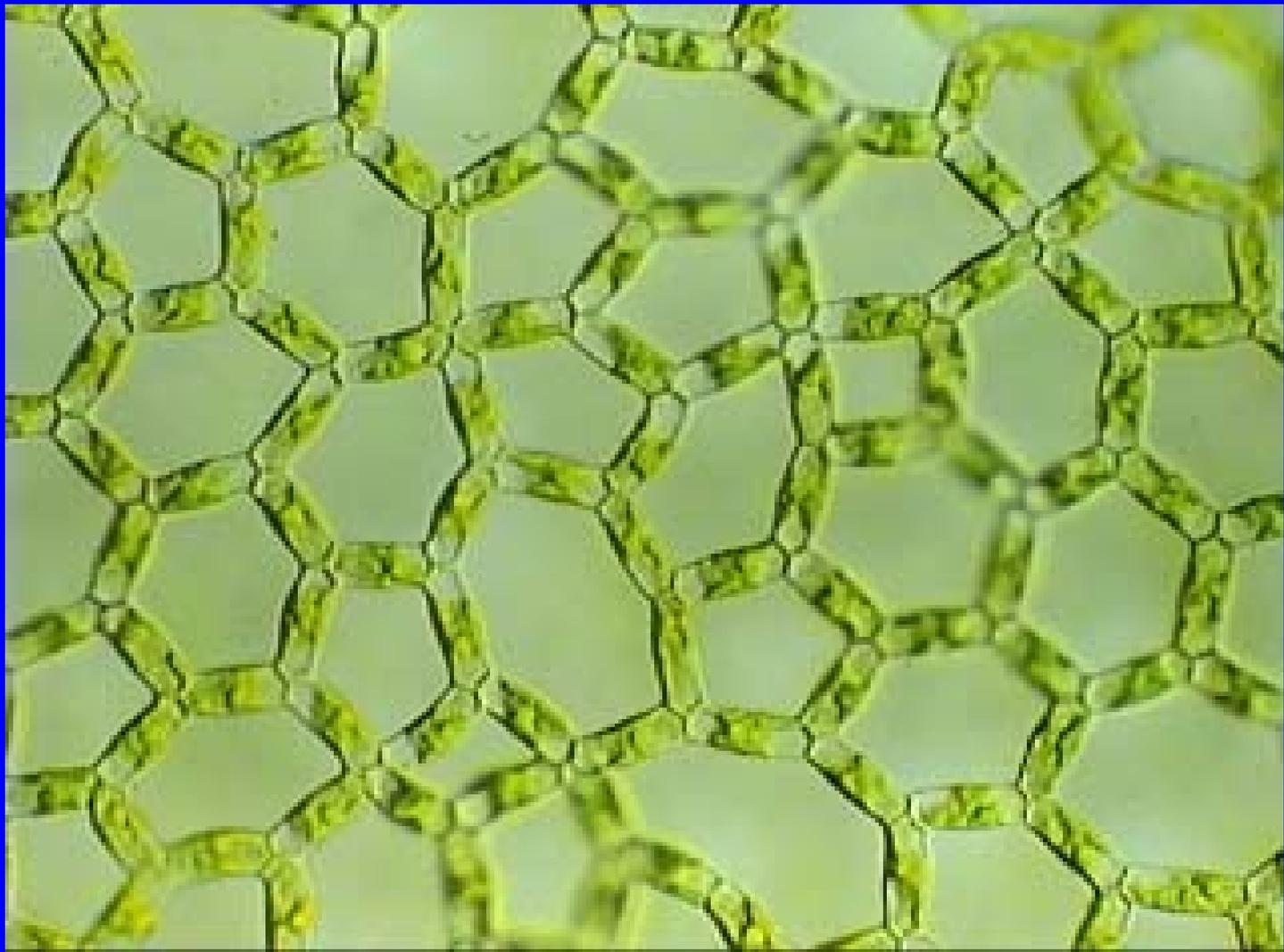
Filamentous green
algae, *Pithophora*

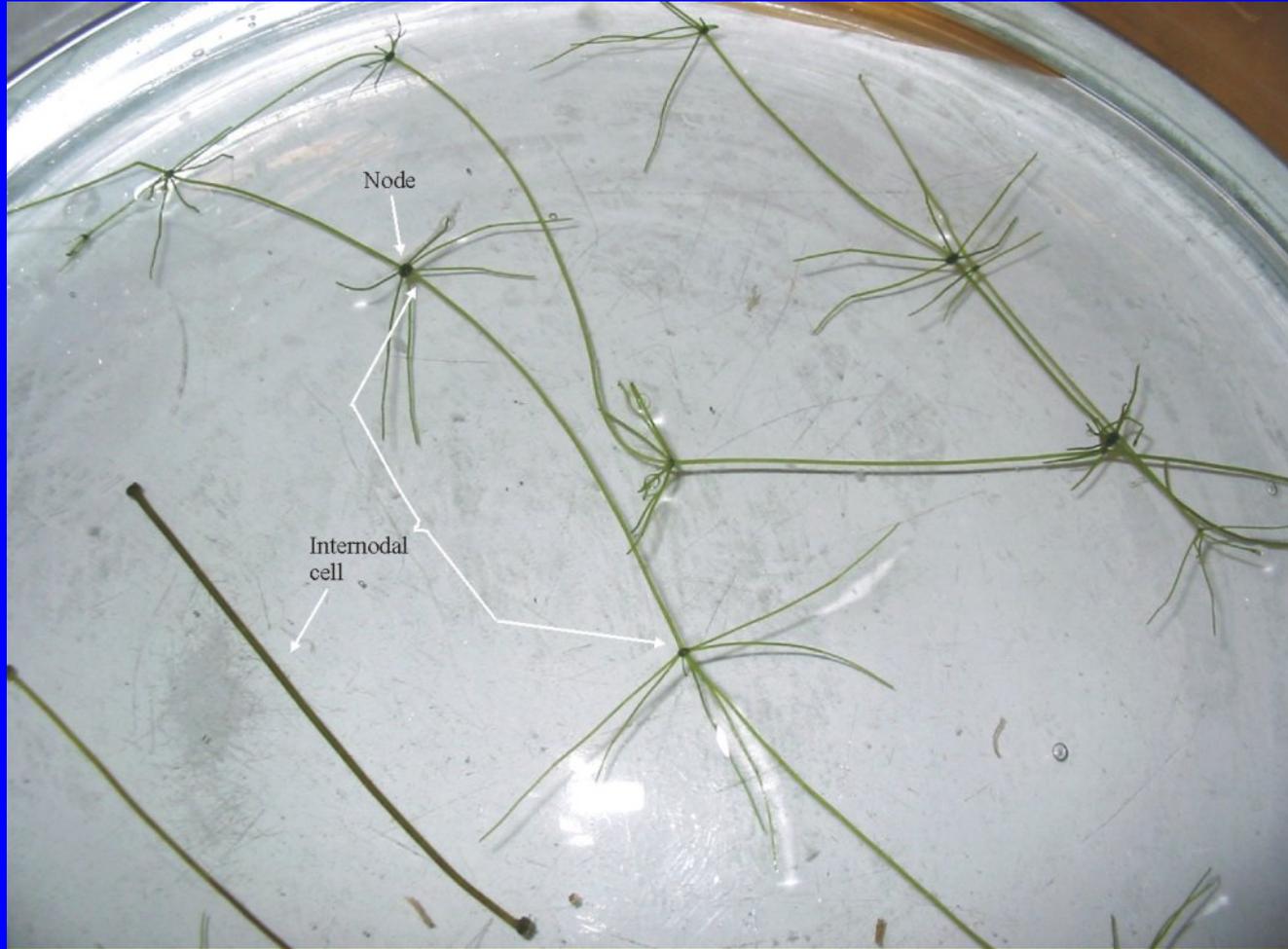
Eucaryotic Cell



50 μm







Starry Stonewort

May have a whitish bulb at the base of each cluster

Green gelatinous stems

Listed as an invasive aquatic species in New York

Algae looks like an Aquatic Vascular Plant



Algae Look-Alikes

**Brittle naiad,
a flowering plant**

**Muskgrass (*Chara*),
a macroalga**



Submersed Plants

- Biomass entirely or largely beneath the water's surface at peak of season
- Flower or floral spike may extend above water's surface
- May be rooted or unrooted
- Often form dense surface mats

***Examples:* coontail, bladderwort, hydrilla, naiads, pondweed, watermilfoils**

Egeria and Hydrilla





Coontail,
Ceratophyllum demersum

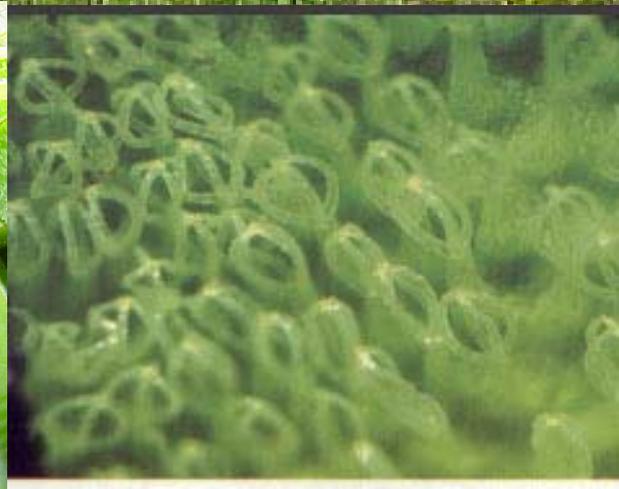
Bladderwort,
Utricularia inflata



Free-Floating Plants

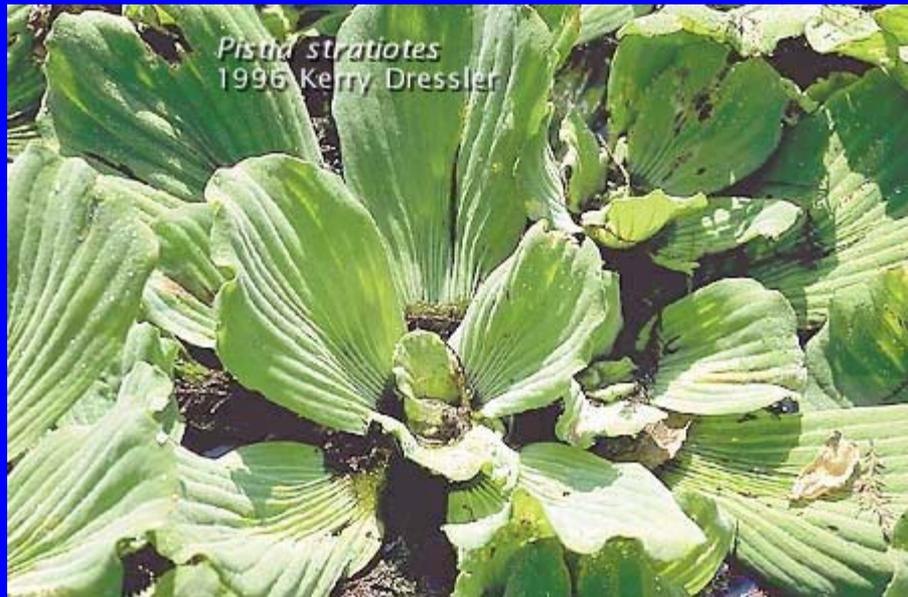
- **Plants not rooted in the soil, often are blown about by the wind**
- **Biomass floating on, above, or just below the water's surface**
- **May or may not have roots**
- **Often form dense surface mats**







Pistia - Water Lettuce







Water meal
Wolffia columbiana
Photo by A. Murray
Copyright 2000 Univ. Florida

Floating-Leaved Plants

- Leaves usually floating on surface, but occasionally raised above water in mid-summer
- Roots and rhizome systems in soil
- Flowers may float directly on surface or be raised above surface on a stem

Examples: watershield, fragrant waterlily, spatterdock, American lotus



American lotus, *Nelumbo lutea*



Watershield, *Brasenia schreberi*

Emergent Plants

- Biomass largely above the water's surface at peak of season
- Flower or floral spike extends well above water's surface
- Usually confined to very shallow water

Examples: pickerelweed, alligatorweed, creeping waterprimrose, rushes, bulrush, spikerush, cattail



Asphalt Control of Phragmites





Alligatorweed





Creeping Waterprimrose - *Ludwigia hexapetala*



Cattail, *Typha latifolia*



Samples

- **Water Samples**
- **Plant Samples**
- **Pond Bottom Samples (SPB)**
- **Algae Samples**

Pond Bottom Samples

- Liming Recommendation
- Better than Water Sample
- Raise pond bottom pH to 6.0
- Collect like soil sample – underwater
- Dry overnight – Makes the secretaries **HAPPY**
- \$3 per sample

Water Samples – Ag Service Lab

- **Irrigation water analysis - \$6 Standard
– pH, EC, TDS**
- **Irrigation Water Analysis - \$25 Special**
- **Ca & Mg – $2.497(\text{Ca}) + 4.118(\text{Mg}) =$
Total Hardness**
- **Bicarbonate times 61 = Total
Alkalinity**

Plant Samples

- **Plant Problem Clinic - \$10**
- **Baruch – IMS Mail – Georgetown County**
- **No Water**
- **Wrap in Damp Paper Towel in Ziplock Bag**
- **One Weed per Towel**
- **Refrigerate**

Algae Samples

- **Plastic Sample Jar**
- **Plant Problem Clinic**
- **Sample in Water**
- **Do NOT Refrigerate**

Weed Management Decisions

- **Plant identification**
- **Budget and Equipment**
- **Control Period - Speed and Duration**
- **Use of the body of water (irrigation, potable water, livestock, fishing, etc.)**
- **Physical, environmental, and economic constraints**
- **Water quality**
- **Fish and wildlife populations (including threatened and endangered species)**

Prevention

- Proper Pond Location
- Proper Pond Design and Construction
- Regular Maintenance
- Avoidance of Weed Introductions

Attributes, Advantages and Disadvantages of Hand Removal

- Most common form of aquatic weed management
- Highly labor-intensive (aquatic plants vary from about 93% to 98% water)
- Highly inefficient, may not be able to keep up with weed growth, may spread weeds via fragmentation
- May be only technique available for certain circumstances (e.g., around drinking water intakes or irrigation systems which can not be

Attributes of Cultural (Physical) Management Techniques

- **Cultural management techniques (sometimes called “physical control”) modify the environment so that conditions are less suitable for the growth of undesirable vegetation.**
- **Cultural techniques - easy and pose little threat**
- **Cultural management techniques include:**
 - Fertilization**
 - Benthic barriers**
 - Pond dyes**
 - Water level manipulation**

Mechanical Removal

Advantages

- Complete, immediate vegetation removal
- No herbicide residues
- Nutrients are removed from the system
- More aesthetically appealing
- No decaying vegetation to cause odors, oxygen depletion, and fish kills
- Considered environmentally benign by the public

Mechanical Removal

Disadvantages - I

- **Accessibility - obstructions, depth, or launching limitations.**
- **Disposal of vegetation necessary**
- **Equipment is expensive, slow, inefficient (only a few acres can be harvested per day), and susceptible to frequent breakdowns.**

Advantages of Biological Control

- **Permanence (classical or inoculative approach)**
- **Low maintenance costs, not necessary to repeat every growing season**
- **No chemical residues**
- **Minimal environmental damage**
- **Desirable species usually unaffected (classical)**
- **Usually perceived by the public as**

Disadvantages of Biological Control

- **Effective control may require several growing seasons, even under the best circumstances.**
- **Initial costs are relatively high (when amortized over the long term, costs usually are low, compared with other methods of aquatic weed management).**
- **Biological control agents are susceptible to a wide variety of human and**



Triploid Grass Carp



Tilapia



Alligator weed Flea Beetle

Blue Tilapia





Mainly used for Filamentous Algae

Stocked Annually at a rate of 250 – 400 per acre

Stocked in the spring when water temps reach 60 F

Can be harvested and eaten in the Fall

Use of Tilapia in Aquatic Weed Management

- Blue tilapia (*Oreochromis aurea*) - algae
- Redbelly tilapia (*Oreochromis zillii*) - macrophytic vegetation.
- All tilapia are tropical species which do not overwinter in climates where water temperatures drop below 60° F .
- Fish removal at end of the season may be required.

Tilapia Broods



Triploid Grass Carp



Using Triploid Grass Carp

1. Identify your weed problem!
2. Be prepared to Stock enough!
3. Beware of escapement
4. Stock a 12” minimum size
5. Purchase from a licensed dealer
6. Stock in the spring
7. Be patient

Benefits of using Triploid Grass Carp

Multiple years of control

Less expensive to use over the life of the fish

Negatives

Initial cost

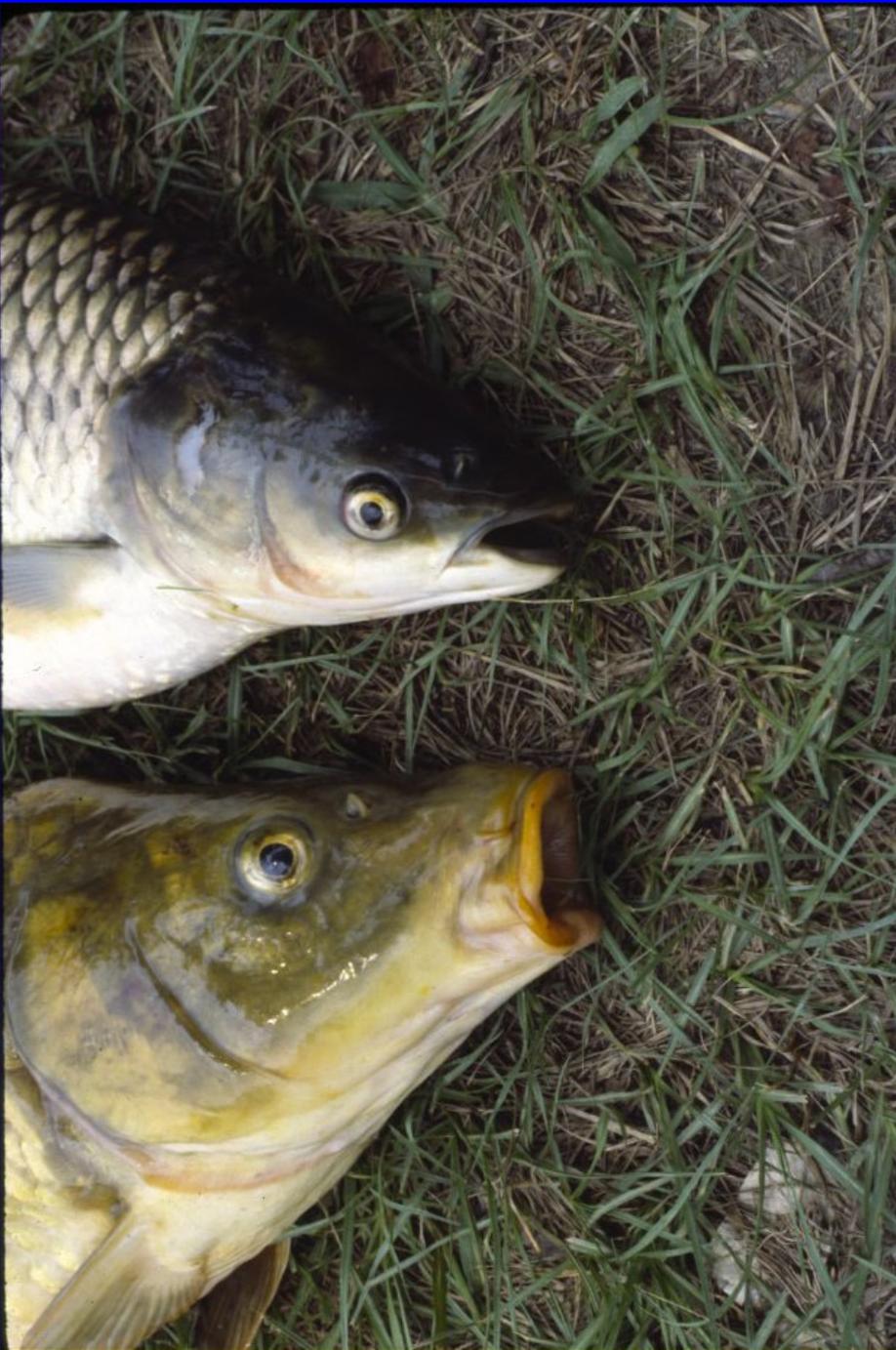
Takes 3 months or longer for results

Triploid Grass Carp



Common Carp







**Triploid Grass Carp
*Ctenophyrangodon idella***

Use of Grass Carp in Aquatic Weed Management

- Grass carp - 10 years or longer & 50 lbs.
- Grass carp may provide effective, long-term control of macroalgae and submersed weeds.
- Only the triploid sterile grass carp are permitted in most states.
- Stocking usually is limited to ponds and larger impoundments with little outflow.
- Stocking in open systems usually is not

Stocking Recommendations

Triploid Grass Carp

- Most states require a *permit* from the state fisheries agency before grass carp may be purchased.
- Stocking rates vary but generally are 5 fish per acre for prevention or 20-25 fish per *vegetated* acre.
- Fish should be 10" to 12" long.

Weeds Usually Controlled by the Triploid Grass Carp

- American elodea
- Bladderwort
- Brazilian elodea
- Brittle naiad
- Creeping rush
- Coontail
- Fanwort
- Hydrilla
- Muskgrass (*Chara*)
- Pondweed
- Proliferating spikerush
- Southern naiad
- Stonewort (*Nitella*)
- Widgeongrass

Introduction to Chemical Control

- EPA registered aquatic herbicides and algaecides
- Proper handling and use of these herbicides poses no significant threat to the aquatic environment or human health.
- All aquatic weed management techniques have some impact on the environment.
- The impacts of aquatic weed management activities, including herbicide and algaecide application are short in duration.

Advantages of Chemical Control

- **Relatively easy to use**
- **Fairly broad-spectrum activity**
- **Fairly quick kill of target weeds (most cases)**
- **Most herbicides effective for spot treatments (prevent spread of new weeds)**
- **Less expensive and labor intensive than hand removal or mechanical control**
- **Gives longer control than with hand removal or mechanical control**

Disadvantages of Chemical Control

- **Accessibility sometimes limited (obstructions, etc.)**
- **Limited choice of products (some very expensive)**
- **May damage desirable vegetation as well as weeds**
- **Limited contact time due to dilutions and flow**
- **Off-target movement of chemicals with water flow**
- **Localized oxygen depletion may occur**
- **Nutrient release from dying and decaying weeds**
- **Damaged weeds may float away and root elsewhere**
- **Herbicide persistence and toxicity problems**

Aquatic Herbicides

- Copper
- Peroxyhydrate
- Endothall
- Diquat dibromide
- Carfentrazone
- Imazamox
- Flumioxazin
- 2,4-D
- Glyphosate
- Fluridone
- Triclopyr
- Imazapyr
- Penoxsulam
- Bispyribac

Uses of Copper

- **Primarily an algaecide**
- **Several formulations marketed for macrophyte control**
- **Often used in tank mixes with either diquat dibromide or endothall**
- **Formulations included copper sulfate pentahydrate and several chelated (complexed copper) formulations**



Comparison of Solubility of Complexed Copper and CuSO_4

Sodium Carbonate Peroxyhydrate

- GreenClean and PAK 27
- Granular Algaecide - Contact Action
- All Waters - treated, finished drinking water reservoirs and drinking water receptacles
- No Alkalinity Concerns
- Apply as Granule, Liquid and Spot Treatment
- Rapid control
- No Tank Mixing

Uses of Endothall

- Used only for submersed weed control
- Occasionally tank mixed with copper
- Two basic formulations:
 - Dipotassium salt (Aquathol)
 - Amine salt (Hydrothol 191)- good algaecide
- Amine formulations very toxic to fish at the normal application rate for macrophytes
- Both liquid and granular products available for both formulations

Uses of Diquat Dibromide

- **Excellent algaecide, particularly for difficult species of algae (*Spirogyra*, *Pithophora*, etc.)**
- **Used extensively for control of submersed weeds and duckweed (not effective on watermeal)**
- **Often used in tank mixes with copper**
- **Should not be applied to muddy water or mixed in a tank with muddy water due to irreversible binding onto soil particles**

Carfentrazone-ethyl

- **Contact Herbicide**
- **Floating and Emergent Species**
- **Low Application Rates**
- **Tank Mixes with Other Herbicides**
- **Reduced Efficacy in Muddy Water**
- **“Diquat-like” Alternative**
- **Irrigation Restriction – 1 – 14 Days**
- **1 Day Livestock Drinking Restriction**

Uses of Fluridone

- **Slow acting herbicide for control of most submersed weeds in ponds and lakes where there is minimal water exchange.**
- **Only product effective on watermeal.**
- **Requires a long contact time.**
- **No fish kills from oxygen depletion, as plants die slowly (several weeks to several months)**
- **Essentially non-toxic to fish, wildlife, humans**

Uses of 2,4-D

- **Primarily a broadleaf herbicide used for many submersed dicot weeds and a few selected broadleaf monocots**
- **Both liquid and granular formulations**
- **Best available product for waterhyacinths**
- **Excellent for all of the watermilfoil group (parrotfeather, variable-leaf milfoil, etc.) and for fragrant waterlily**

Uses of Glyphosate

- **Broad-spectrum herbicide applied for control of most emergent weeds**
- **Certain species such as waterlily and watershield may be controlled effectively, provided that there is minimal wave action to wash the herbicide off the floating leaves.**
- **Not applied into the water column.**
- **Not effective on small, floating plants such as duckweed, watermeal, or mosquito**

Triclopyr

- **Renovate - SePRO Co.**
- **Broadleaf and Woody Vegetation Control**
- **Emerersed, Submersed & Floating Aquatic Plants**
- **Ponds, Lakes, Non-irrigation Ditches and Canals**
- **Non-irrigation Ditches and Canals - No/Low Flow**
- **Shoreline and Wetland Plants**

Imazapyr

- **Habitat - BASF**
- **Broad Spectrum - Floating and Emergent Weeds**
- **Annual & Perennial Grasses & Broadleaf Weeds**
- **Mode of Action - Inhibits Plant-specific Enzyme**
- **In and Around Standing & Flowing Water**
- **Ponds, Lakes, Streams, Rivers, Canals, Marine**
- **One Hour Contact, 10 Hours Activity**

1-800-4-A-WEEDS | Not for Use in | 1-800-4-A-WEEDS | Death

Penoxsulam

- **ALS-inhibitor**
- **Emergent, floating and submersed aquatics**
- **No restrictions on swimming and fishing**
- **No irrigation established food crops > 1 ppb**
- **No restriction for turf irrigation if < 30 ppb**

Imazamox

- **BASF – ClearCast**
- **Broadcast, spot sprayed or in water**
- **Floating, submerged or emergent vegetation**
- **Systemic action**
- **Rate varies with plant**
- **Tolerance exemption from EPA – no food residue limits at labeled rates**

Flumioxazin

- Registered in 2011 by Valent - Clipper
- Fast acting / contact herbicide
- Will control certain algae, watermeal, cabomba, milfoils, hydrilla, numerous floating plants, and others
- Activity in water is pH dependent

Bispyribac

- **Registered in 2011 by Valent – Tradewind**
- **Acetolactate synthase (ALS) inhibitor**
- **Considered low-risk by EPA**
- **Used in rice, turf, and other settings**
- **Expensive, but excellent on most floating species and good on many others**

Water Use Restrictions

Associated with each herbicide (except copper formulations) are one or more water use restrictions.

- Fishing (consumption of fish or use for fish meal)**
- Swimming (any activity which immerses the body)**
- Irrigation (including use for preparation of agricultural pesticidal sprays)**
- Livestock watering (may include humidification of poultry houses)**
- Domestic drinking water supplies (a setback**

Questions

- **Applicator License?**
- **Water Use Restrictions?**
- **Downstream Uses?**
- **Ownership?**
- **Local Ordinances?**
- **SC DHEC Buffers?**
- **Read and Follow The Label?**

Do I Need A Pesticide License?

- **South Carolina Law requires individuals to possess a Commercial Pesticide Applicators License in Category 5, Aquatic Pest Control, before they apply aquatic herbicides if the work is done for compensation on the property of another. A license is also required, regardless of ownership, if the application is made to an area where public access to the treated site is expected. Private swimming lakes, where the public would be exposed to the treated waters, are the most obvious example of the latter requirement. On all public facilities, such as golf courses, driving ranges, subdivisions, condominium/apartment complexes and mobile home parks, applicators are required to possess a Category 5 License to apply aquatic pesticides. Rotenone and Habitat labels require an Aquatic Pesticide License.**

The label is the law!

Web Resources in Aquatic Weed Management

- Texas A&M University: Aquaplant
<http://aquaplant.tamu.edu/>
- U. of Florida:
<http://aquat1.ifas.ufl.edu/>
- Corps of Engineers, Aquatic Plant Control:
<http://el.erdc.usace.army.mil/aqua/apis/apishelp.htm>

Websites

- **Clemson HGIC –**
<http://HGIC.Clemson.EDU>
- **SC DNR-**
<http://www.dnr.sc.gov/water/aquaff/pdf/AquaculturalistVendorsList.pdf>
- **SCAPMS -<http://scapms.org/>**



HOME

- [Plant Identification](#)
- [Management Options](#)
- [Glossary](#)
- [FAQ](#)
- [About AQUAPLANT](#)
- [Personnel](#)
- [Contact Us](#)
- [Printing AQUAPLANT](#)
- [Texas Cooperative Extension](#)
- [Dept. of Wildlife and Fisheries Sciences](#)
- [Wildlife and Fisheries Extension](#)
- [Texas A&M University](#)

A POND MANAGER DIAGNOSTICS TOOL



This web site was designed to help pond owners and their advisors in the identification and management of aquatic vegetation.

If you need assistance with identification then proceed to [Plant Identification](#).

- Plant Identification
- Management Options
- Glossary
- FAQ
- About AQUAPLANT
- Personnel
- Contact Us
- Printing AQUAPLANT
- Texas Cooperative Extension
- Dept. of Wildlife and Fisheries Sciences
- Wildlife and Fisheries Extension
- Texas A&M University
- Other Links

Plant Identification

[Alphabetical Index](#) [Visual Index](#)

This section of AQUAPLANT is designed to help you identify aquatic plants using photos, drawings, and descriptions. Using this section involves viewing photos and drawings of aquatic plants until you identify the plant in question.

Aquatic plants are generally divided into four groups for management purposes. These groups are the Algae, Floating Plants, Submerged Plants, and Emergent Plants.



[Algae](#) are very primitive plants. Some algae are microscopic (planktonic algae), others are thin and stringy or hair-like (filamentous algae), while still others are large and resemble higher plants but without true roots (chara).

True [Floating Plants](#) are not attached to the bottom. Floating plants come in sizes from very small (duckweed) to over a foot in diameter (water hyacinth). Most have roots that hang in the water from the floating green portions.



[Submerged Plants](#) are rooted plants with most of their vegetative mass below the water surface, although some portions may stick above the water. One discerning characteristic of submerged plants is their flaccid or soft stems, which is why they do not usually rise above the water's surface.

[Emergent Plants](#) are rooted plants often along

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[http://aquaplant.tamu.edu/database/index/visual_id_index.htm](#)
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Go
275 blocked
Check
Look for Map
AutoFill

Visual Index
Page

- [Plant Identification](#)
- [Management Options](#)
- [Glossary](#)
- [FAQ](#)
- [About AQUAPLANT](#)
- [Personnel](#)
- [Contact Us](#)
- [Printing AQUAPLANT](#)
- [Texas Cooperative Extension](#)
- [Dept. of Wildlife and Fisheries Sciences](#)
- [Wildlife and Fisheries Extension](#)
- [Texas A&M University](#)
- [Other Links](#)

Plant Identification

Visual Index

[Alphabetical Index](#)

[Algae Plants](#)

[Floating Plants](#)

[Submerged Plants](#)

[Emergent Plants](#)

[Back to Top](#)

Search by Google

[Texas Cooperative Extension](#)

[Dept. of Wildlife and Fisheries Sciences](#)

[Wildlife and Fisheries Extension](#)

[Texas A&M University](#)

[Other Links](#)

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Please answer a few questions to help AQUAPLANT. (Some Qs have been updated on June 1, 2007. Even if you already answered our survey before, we appreciate your continued help.)



[Curly-Leafed Pondweed](#)



[Eelgrass](#)



[Egeria](#)



[Elodea](#)



[Eurasian Watermilfoil](#)



[Fanwort \(Cabomba\)](#)



[Hydrilla](#)



[Illinois Pondweed](#)



[Parrotfeather](#)



[Sago Pondweed](#)



[Southern Naiad](#)



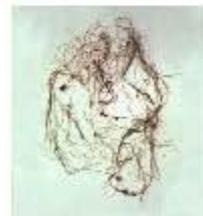
[Variable-Leaf Pondweed](#)



[Variable-Leaf Watermilfoil](#)



[Watergrass](#)



[Widgeon Grass](#)

- [Glossary](#)
- [FAQ](#)
- [About AQUAPLANT](#)
- [Personnel](#)
- [Contact Us](#)
- [Printing AQUAPLANT](#)
- [Texas Cooperative Extension](#)
- [Dept. of Wildlife and Fisheries Sciences](#)
- [Wildlife and Fisheries Extension](#)
- [Texas A&M University](#)
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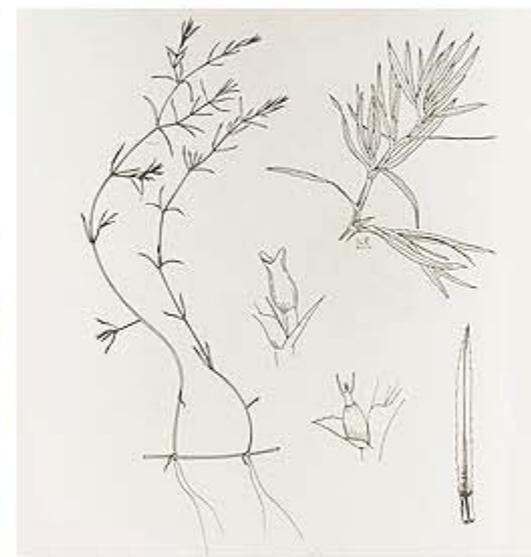
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▶ [Please answer a few questions to help AQUAPLANT](#) (Some Op

Southern Naiad (Bushy Pondweed)

- [Description](#)
- [Management Options](#)
- [Other Photos](#)



Najas guadalupensis

Southern naiad is an annual plant that branches profusely and forms very dense stands of rooted submerged vegetation. Leaves are dark green to greenish-purple, ribbon-like, opposite or in a whorl of three, mostly less than 1/2 inch long and 1/8 inch wide. Single seeds are found encased in the leaf sheath. Southern naiad reproduces by seeds and fragmentation. Flowers are at the base of the leaves but so small that they can only be observed with magnification. Bushy pondweed is often confused with sago pondweed and widegeongrass.

[←](#) [→](#) http://aquaplant.tamu.edu/database/submerged_plants/southern_naiad_mgmt.htm

Google Go

Southern Naiad or Bushy Pondweed - Manag...

- [Management Options](#)
- [Glossary](#)
- [FAQ](#)
- [About AQUAPLANT](#)
- [Personnel](#)
- [Contact Us](#)
- [Printing AQUAPLANT](#)
- [Texas Cooperative Extension](#)
- [Dept. of Wildlife and Fisheries Sciences](#)
- [Wildlife and Fisheries Extension](#)
- [Texas A&M University](#)
- [Other Links](#)

Southern Naiad or Bushy Pondweed

[Control Options](#) | [Cultivation Options](#) | [Description of This Plant](#)

Control Options

Mechanical/Physical

Southern naiad can be removed by raking or seining it from the pond but will reestablish from any remaining fragments and roots.

Fertilization to produce a phytoplankton or algal "bloom" prevents the establishment of most bottom rooted aquatic weeds and produces a strong food chain to the pond fish.

Non-toxic dyes or colorants prevent or reduce aquatic plant growth by limiting sunlight penetration, similar to fertilization. [Aquashade](#) is an example of non-toxic dye and other products are available. However, dyes do not enhance the natural food chain and may suppress the natural food chain of the pond.

Biological

Grass carp will seldom control aquatic vegetation the first year they are stocked. They will consume southern naiad. Grass carp stocking rates to control southern naiad are usually in the range of 7 to 15 per surface acre. In

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Chemical

The active ingredients that have been successful in treating southern naiad include copper complexes (G), diquat or copper with diquat (E), endothall (E), and fluridone (E). E = excellent, G = good

Komeen is a copper compound registered for use on southern naiad (8% active). It is a contact herbicide. Contact herbicides act quickly and kill all plants cells that they contact.

Nautique is a copper compound registered for use on southern naiad. (9.1% active) It is a contact herbicide. Contact herbicides act quickly and kill all plants cells that they contact.

Reward is a liquid diquat formulation that has been effective on southern naiad and is very effective if mixed with a copper compound. It is a contact herbicide. Contact herbicides act quickly and kill all plants cells that they contact.

Aquathol, **Aquathol K**, and **Aquathol Super K** are dipotassium salts of endothall and comes in both liquid and granular formulations. These endothall products have been effective on southern naiad and can be mixed with copper compounds for additional effectiveness. Contact herbicides act quickly and kill all plants cells that they contact.

Hydrothol 191 is an alkylamine salt of endothall and comes in both liquid and granular formulations. It is a contact herbicide and has been effective on southern naiad. Contact herbicides act quickly and kill all plants cells that they contact. Hydrothol can be toxic to fish.

Sonar and **Avast** are fluridone compounds, come in both liquid and granular formulations, and have been effective on southern naiad. These are broad spectrum systemic herbicides. Systemic herbicides are absorbed and move

Navigation bar of a web browser showing the address bar with the URL <http://www.syngentacropprotection-us.com/pdf/labels/SCP1091AL2C0605.pdf>, search engines (Google, Bing), and various utility icons like 'Save a Copy', 'Print', and 'Zoom'.



PULL HERE TO OPEN ▶

REWARD[®]

Landscape and Aquatic Herbicide

TO PREVENT ACCIDENTAL POISONING, NEVER PUT INTO FOOD, DRINK, OR OTHER CONTAINERS, AND USE STRICTLY IN ACCORDANCE WITH ENTIRE LABEL.

DO NOT USE THIS PRODUCT FOR REFORMULATION.

Active Ingredient:

Diquat dibromide [6,7-dihydrodipyrido (1,2-a:2',1'-c)	37.3%
pyrazinedium dibromide	37.3%
<i>Other Ingredients:</i>	62.7%
<i>Total:</i>	100.0%

Contains 2 lbs. diquat cation per gal. (3.73 lbs. diquat dibromide per gal.)

KEEP OUT OF REACH OF CHILDREN.

WARNING/AVISO

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle. (If you do not understand the label, find someone to explain it to you in detail.)

See additional precautionary statements on label.

EPA Reg. No. 100-1091
EPA Est. 100-TX-001

Product of United Kingdom
Formulated in the USA

SCP 1091A-L2C 0605

Pages

Attachments

Comments

Water Use Restrictions

Common Name	Human Use			Livestock	Irrigation		
	Drinking	Swimming		Fish	Watering	Turf	Crops
bispyribac	0	0		0	0	30	30
copper complexes	0	0		0	0	0	0
diquat	1-3 ³	0		0	1	1-3 ³	5
endothall ⁴	7-25	1		0	7-25	7-25	7-25
flumioxazin	0	0		0	0	5	5
fluridone ⁶	0	0		0	0	7-30	7-30
glyphosate ⁵	0	0		0	0	0	0
imazamox	0	0		0	0	1	1 ¹⁰
imazapyr	*14	0		0	0	120 ⁹	120 ⁹
penoxsulam	0	0		0	0	0	*15
SCP ¹¹	0	0		0	0	0	0
triclopyr	*13	0		0	0	0 ⁷	120 ⁸
2,4-D	*12	*12		*12	*12	*12	*12

¹ Aquatic vegetation control can result in period of low dissolved oxygen which can stress and/or kill fish. It is best to treat most aquatic vegetation early in the growing season, when the plant is rapidly growing. Treating small areas (e.g. 1/4) of pond at a time at 10-14 day intervals will allow for decomposition usually without causing an oxygen depletion.

² If water is for drinking, the elemental copper concentration should not exceed 1.0 ppm (i.e. 4.0 pp. copper sulfate).

³ Depending on formulation - **Read label.**

⁴ Length of use restriction for endothall varies with concentration used. **Read label.**

⁵ Do not apply within 0.5 mile of a functioning potable water intake.

⁶ Do not apply within 0.25 mile of a functioning potable water intake.

⁷ No restriction on irrigating established grasses but **do not harvest hay for 14 days after application.** **Read label.**

⁸ Or until non-detectable concentrations in immunoassay analysis.

⁹ or until <1.0 ppb

¹⁰ Do not use treated water to irrigate greenhouses, nurseries or hydroponics.

¹¹ Sodium carbonate peroxy-hydrate

¹² Water restrictions on 2,4-D vary with formulation, location, rate, and time of year. **Read label.**

¹³ Minimum setback distances from potable water intakes required and laboratory tests to determine < 0.4 ppm for use. **Read label.**

¹⁴ > 1/2 mile from potable water intake

¹⁵ Do not use water from any treated site for food crop irrigation until residues are determined to be less than or equal to 1 ppb.

Any Questions, Please?

There are no Dumb Questions!

There may be Dumb Answers!

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