

S.A.L.T.

SHARKS AQUACULTURE LIFE TRAINING

Freshwater Plant Aquaculture



**2018 Summer SALT Schedule:
Introduction to Florida Aquaculture Commodities**

All sessions are scheduled on Mondays from 10 – 11:30 am
and will be held at the FWC Marine Lab conference room.

- June 18th – Recirculating Aquaculture Systems
Meet with Brian Catanzaro, Pentair Aquatic Ecosystems, Apopka, FL
Website: <https://pentairaes.com>
- June 25th – Molluscan Shellfish Aquaculture
Meet with Leslie Sturmer, UF/IFAS Shellfish Extension, Cedar Key, FL
Website: <http://shellfish.ifas.ufl.edu>
Tour Clamastics Shellfish Hatchery with Anthony Hinkle, Cedar Key, FL
- July 2nd – No session due to holiday week
- July 9th – Aquatic Plant Culture
Meet with Brandon McLane, Florida Aquatic Nurseries, Davie, FL
Website: <http://www.floridaaquatic.com/>
- July 16th – Shellfish aquaculture regulations and leasing process
Meet with DACS Division of Aquaculture representative, Tallahassee, FL
Website: <https://www.freshfromflorida.com/Divisions-Offices/Aquaculture>
- July 23rd – Food Fish Culture
Meet with Geno Evans, Evans Fish Farm, Pierson, FL
Website: <http://evansfishfarm.com/>
- July 30th – Ornamental Fish Culture
Meet with Eric Cassiano, UF/IFAS Tropical Aquaculture Lab, Ruskin, FL
Website: <http://tal.ifas.ufl.edu>
- August 6th – Alligator and Reptile Culture
Meet with Allen Register, Gatorama, Palmdale, FL
Website: <http://gatorama.com/>

Any questions about these sessions, please contact Leslie Sturmer,
Lnst@ufl.edu (email) or 352-543-5057 (office phone) or 352-493-8340 (cell).

Plant Aquaculture:
Freshwater Plants
M. Dennis Hanisak

HARBOR BRANCH



FLORIDA ATLANTIC UNIVERSITY

Ocean Science for a Better World™

OUTLINE

- Major Uses of Freshwater Plants
- Current Cultivation of Freshwater Plants in Florida
- Future Applications in Florida



CULTIVATION OF FRESHWATER PLANTS IN FLORIDA

This industry began in Florida in the 1930's

Current aquatic plant production mainly for

- aquariums
- food
- water gardening
- wetland restoration

Industry is primarily in central and southern parts of the state

CULTIVATION OF FRESHWATER PLANTS IN FLORIDA

Annual sales of aquatic plants = \$17.6 million by 19 growers in 2005

Aquatic plants are ~23.4% of Florida Aquaculture sales

Plants for water gardens, aquariums, wetlands restoration, and food markets such as watercress were included.

AQUACULTURE - Value of Sales - Florida, 2005

Item	Operations With Sales	Net Sales
Ornamental Fish	133	\$33,232,000
Aquatic Plants	19	17,560,000
Clams ^{1/} & Oysters	153	10,694,000
Alligators	14	4,070,000
Other Food Fish ^{2/}	19	1,731,000
Catfish	23	1,434,000
Tilapia	18	477,000
Live Rock	6	341,000
All Sportfish	8	191,000
All Other Aquaculture ^{3/}	-	5,245,000

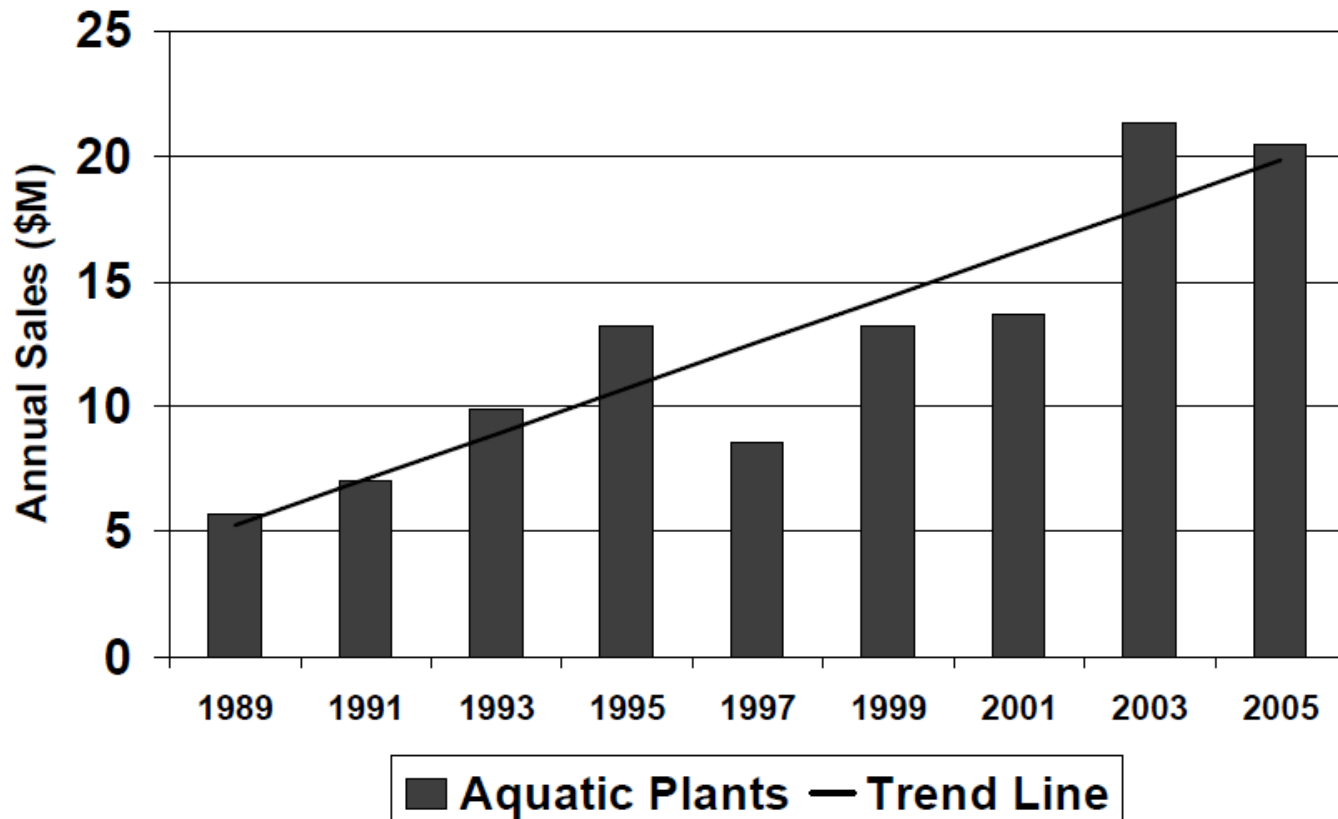
^{1/} Includes clam seed

^{2/} Hybrid Striped Bass, Largemouth Bass, Carp, and Sturgeon.

^{3/} Includes baitfish, crustaceans, and other aquatics.

National Agricultural Statistics Service 2006

CULTIVATION OF FRESHWATER PLANTS IN FLORIDA



National Agricultural Statistics Service 2006

CULTIVATION OF FRESHWATER PLANTS IN FLORIDA

Aquaculture, Value of Sales - Florida: 2012 and 2005

Item	Value of Sales		Operations with Sales	
	2012	2005	2012	2005
	(dollars)	(dollars)		
Ornamental Fish.....	27,269,000	33,232,000	101	133
Mollusks	11,889,000	10,694,000	139	153
Alligators	7,995,000	4,070,000	10	14
Aquatic Plants	5,327,000	8,360,000	19	17
Other Food Fish	2,978,000	1,731,000	31	19
Tilapia	1,227,000	477,000	47	18
Catfish.....	390,000	1,434,000	17	23
Live Rock	373,000	341,000	12	6
All Other Aquaculture	11,303,000	5,436,000	(NA)	(NA)
Total.....	68,751,000	65,775,000	404	359

(NA) Not Available

National Agricultural Statistics Service 2013

Food markets such as watercress were not included in reported sales values.

PERMITTING

Regulated by 2 Florida Department of Agriculture and Consumer Services (FDACS) divisions

- Division of Aquaculture
- Division of Plant Industry (DPI)

Aquaculture Certificate of Registration &
Certificate of Nursery Registration



<i>Alternanthera philoxeroides</i>	Alligatorweed, green lead plant
<i>Casuarina</i> spp.	Australian Pine
<i>Crassula helmsii</i>	Swamp stone crop
<i>Eichhornia</i> spp.	Waterhyacinth
<i>Hydrilla verticillata</i>	Hydrilla, Florida elodea, stargrass, oxygen grass
<i>Ipomoea aquatica</i>	Water spinach
<i>Ipomoea fistulosa</i>	
<i>Lagarosiphon</i> spp.	African elodea
<i>Limnocharis flava</i>	Sawah flowing rush
<i>Lythrum salicaria</i>	Purple loosestrife
<i>Melaleuca quinquenervia</i>	Melaleuca
<i>Mimosa pigra</i>	Giant sensitive plant, cat's claw
<i>Monochoria hastata</i>	
<i>Monochoria vaginalis</i>	
<i>Myriophyllum spicatum</i>	Eurasian watermilfoil
<i>Nechamandra alternifolia</i>	
<i>Oryza rufipogon</i>	Wild Red rice
<i>Pontederia rotundifolia</i>	Tropical pickerelweed
<i>Salvinia</i> spp., (excluding <i>S. minima</i>)	
<i>Schinus terebinthifolius</i>	Brazilian-pepper
<i>Sparganium erectum</i>	Exotic bur-reed
<i>Stratiotes aloides</i>	Water-aloë, soldier plant
<i>Trapa</i> spp.	Water chestnut
<i>Vossia cuspidata</i>	Hippo grass



PROHIBITIONS

Class I plants are not permitted for possession, collection, transportation, cultivation, and importation, except as provided in Rule 5B-64.011, F.A.C.

PEPPER BUSTING AT LUKENS... FULL THROTTLE

March 6, 2018



Often going unnoticed, Cedar Key Pepper Busters are about and active. Sometimes so very active that one can't even find them in the woods. They are deep in the scrub and pinelands, with saws, canisters, and doggedness, dashing the number of pepper trees around Cedar Key. Often one can spot their cars, their trailers, and their tracks, but so deep in the woods are they, one cannot hear nor see them.

The team includes leader Roger McDaniels and Tom Simpson, Doug Maple, Jay Bushnell, Dave Trehane, Ed DeHaan, Refuge Wildlife Fire Management Officer Vic Doig, and Lower Suwannee and Cedar Keys National Wildlife Manager Andrew Gude.

The Brazilian pepper, a Category I Invasive plant, infects both aquatic and terrestrial habitats. Introduced



into Florida in the mid-1800s from Argentina, Paraguay, and Brazil, the plant was initially used as a decorative bush as it is lush and full, and has beautiful red berries.

The plant, though, in the same family as ivy and sumac, can be irritating to the skin, with some individuals highly allergic to it. As an invasive, it adapts easily and is steadily creeping its way north along the state of Florida.

Pictured here are: Roger McDaniels distributing equipment and Tom Simpson, Andrew Gude, only four of the seven cars operated by the busters.

PROHIBITIONS

Class II plants may be cultured in an aquatic plant nursery and exported out-of-state **only with DPI approval.**

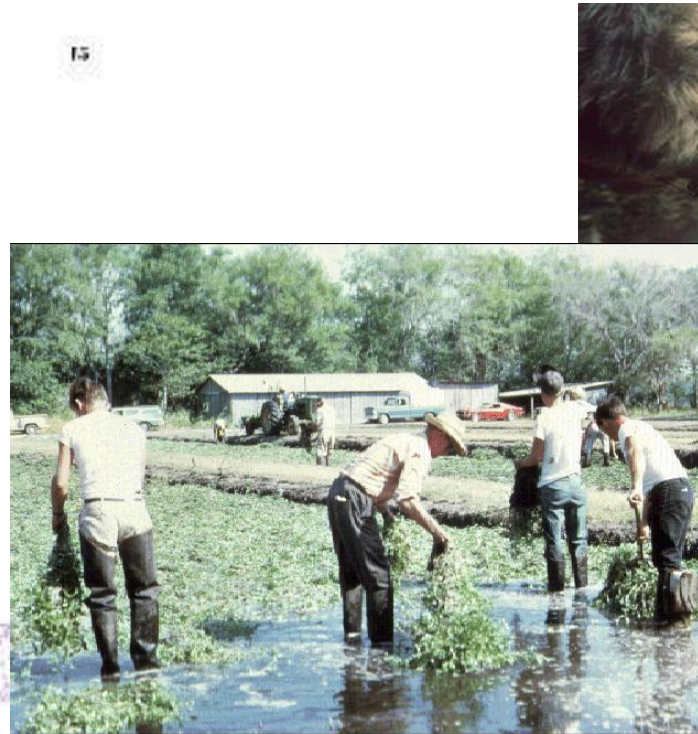


SCIENTIFIC NAMES	COMMON NAME
<i>Hygrophila polysperma</i>	Hygro
<i>Limnophila sessiliflora</i>	Ambulia
<i>Pistia stratiotes</i>	Waterlettuce

USES OF FRESHWATER PLANTS: FOOD



Eleocharis dulcis
(Water Chestnut)



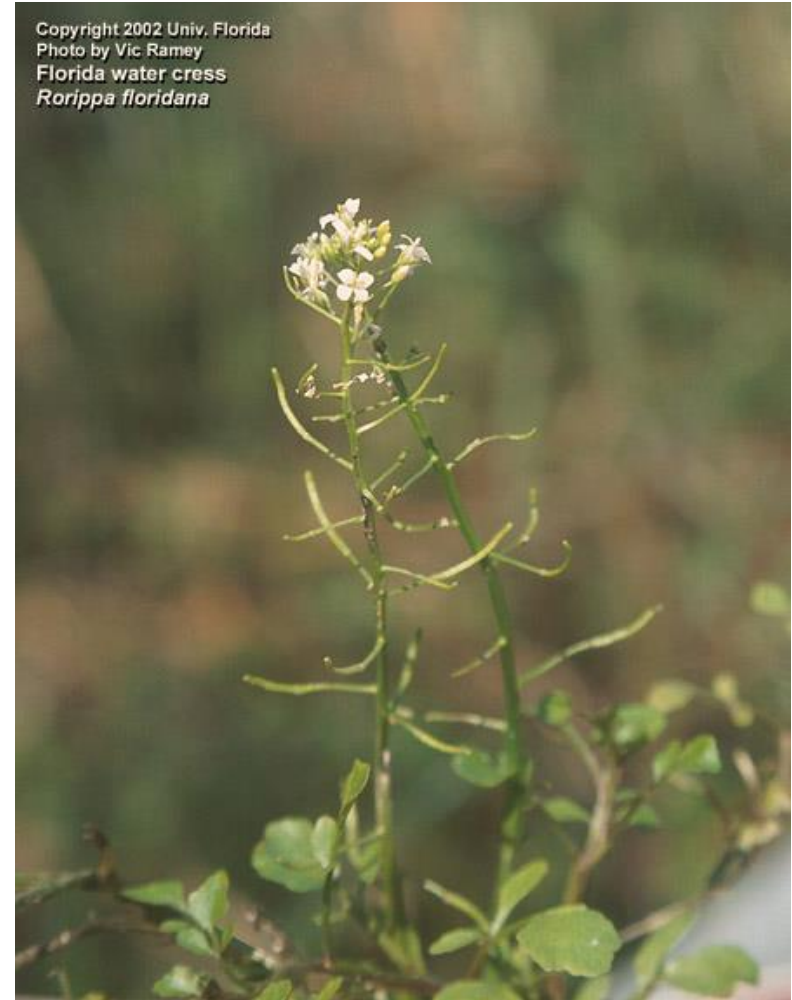
“Aquacrops”



Nasturtium officinale
(Watercress)

USES OF FRESHWATER PLANTS: FOOD

- Much of the U.S. winter supply of watercress is grown in Central Florida
- Watercress is a good source of vitamins A and C, niacin, thiamine, riboflavin, and iron. Zesty flavor often added to foods



Nasturtium officinale (Watercress)

USES OF FRESHWATER PLANTS: FODDER



Water hyacinth
Eichhornia crassipes
Photo by A. Murray
Copyright 2001 Univ. Florida

Eichhornia crassipes
(Water Hyacinth)



Small duckweed
Lemna valdiviana
Photo by Vic Ramey
© 2000 University of Florida

Lemna valdiviana
(Small Duckweed)

WATER HYACINTH

Introduced into the U.S. in 1884 at an exposition in New Orleans

Within 70 years of reaching Florida, the plant covered 126,000 acres of waterways

Blocks waterways and limits boat traffic, recreation, flood control and wildlife use



Water hyacinth
Eichhornia crassipes
Photo by Vic Ramey
© 2002 University of Florida



Water hyacinth
Eichhornia crassipes
Photo by Ann Murray
© 2002 University of Florida

PERMIT REQUIREMENTS FOR CULTIVATION: WATER HYACINTH

It is illegal to collect, transport, possess or cultivate this plant (Rule 62C-52.011 FAC)

Federal noxious weed & FDACS Class I prohibited aquatic plant

Steps in obtaining a special state permit:

1. Register as a nursery with the Division of Plant Industry.
2. Apply for a collection permit using the information provided on the Arthropod, Plant and Plant Pest Movement Permit page.
3. Request and submit the Compliance Agreement for Water Hyacinth to the Division of Plant Industry. This compliance agreement is available from your local plant inspector.

Note: If you plan to export water hyacinth out of Florida, you must obtain a federal permit for interstate movement using the Application for Permit to Move Live Plant Pests or Noxious Weeds.

USES OF FRESHWATER PLANTS: AQUARIUM PLANTS/ORNAMENTALS

Nymphaea odorata
(Yellow Water Lilly)

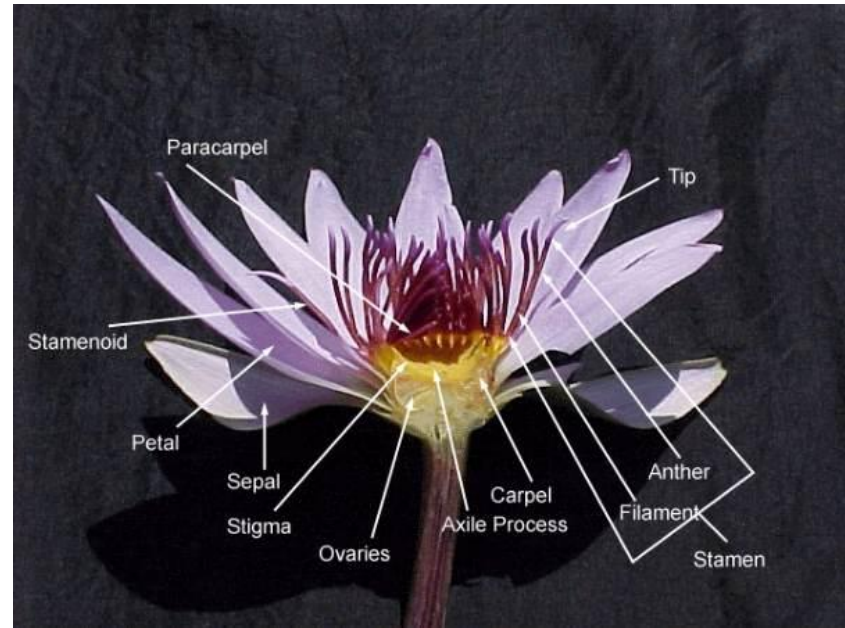


Egeria densa
(Common Water weed)

WATER LILLY HYBRIDS

https://www.victoria-adventure.org/waterlilies/growing_from_seed.html

1. 1st day flower – female
 - Remove stamen so it can't self pollinate
2. 2nd or 3rd day flower – male
 1. Pluck anthers for pollen
3. Drop anthers inside stigma of 1st day flower
4. Close flower and cover with cheesecloth to fertilize
5. Seed forms
6. Pod develops



CULTIVATION OF FRESHWATER PLANTS IN FLORIDA: AQUARIUM PLANTS

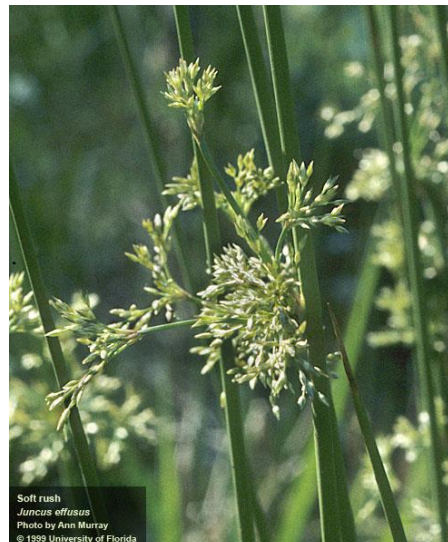
Cabomba caroliniana
(Fanwort)

Elodea canadensis (Elodea)



CULTIVATION OF FRESHWATER PLANTS IN FLORIDA: WETLAND RESTORATION

- Using native plants to restore ecosystem services provided by plants
- Includes a wide range of aquatic plants depending on habitat(s) in a project



EMERGING USES OF FRESHWATER PLANTS

Bioremediation

- Nutrients (Wastewater Treatment, Aquaculture)
- CO₂ Scrubbers (Climate Change)
- Biofuel (Bioconversion to Ethanol, Methane, Methanol)
- Heavy Metals

Aquaponics

- Cultivation of plants and aquatic animals in a recirculating environment
- Sea Vegetables



AQUAPONICS



Aquaponic Swiss chard



Aquaponic red lettuce



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Handouts

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Break Time

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Tour: Florida Aquatic Nurseries, Davie, FL

Host: Brandon McLane

Website: <http://www.floridaaquatic.com/>