DEP Research Funding Program for Invasive Plants

DEP Research Funding Program Facts:

1970-2008 **$17,604,352**

Funded **178 projects**

DEP Research Funding Program Facts:

1970-2008 Research Projects

- Aquatic plants $11,479,492
- Upland plants $4,501,890
- Both $1,622,670

DEP Funding History of Invasive Plant Management Research in Florida

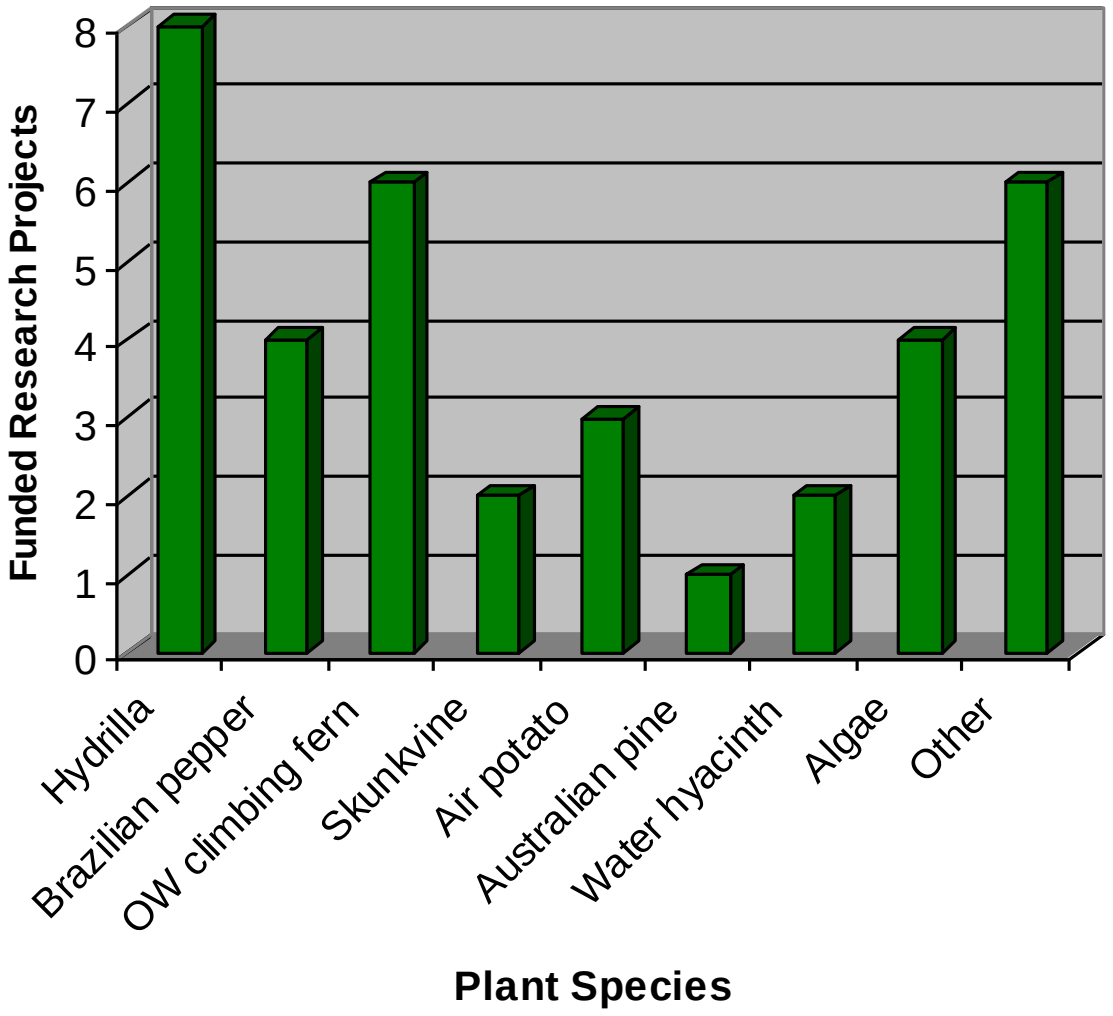
1970s The "Golden Age", physiology, ecology, herbicides, grass carp, mechanical harvesting, biocontrol $4.0 million (55)

1980s Fluridone research, defining use of new and existing management tools, biocontrol $1.9 million (13)

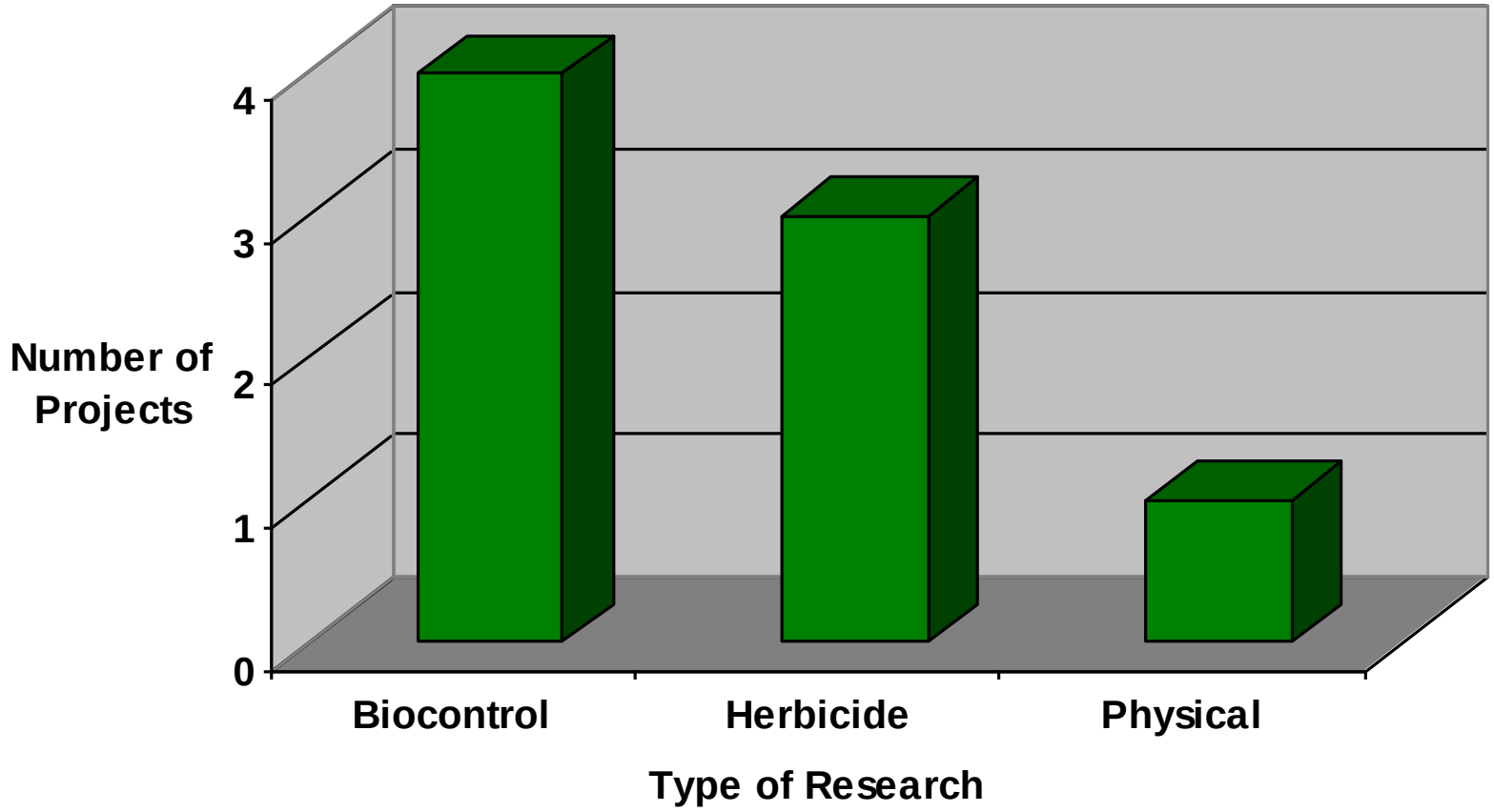
1990s Wetland and upland plant species, biocontrol $2.8 million (31)

2000s Hydrilla and Old World climbing fern, new herbicides, biocontrol $8.9 million (79)

Number of Research Projects by Species 07-08



Number of Research Projects for hydrilla 07-08



DEP High priority Species 2007-08: *Hydrilla*

"Every path to a new understanding begins in confusion" Mason Cooley

DEP Funded Research - Herbicides

- Number of herbicides or modes of action for use against hydrilla is limited.
- Approximately 300 herbicides registered in the US representing 6 general modes of action.
- Many of these compounds are too toxic for aquatic use, many do not control hydrilla, and many are off patent which greatly reduces the potential for incurring high registration costs.
- "Decisions on registration and use of aquatic herbicides made in the next few years will determine managers' abilities to control aquatic weeds, particularly hydrilla, 20 years from now." *(source: Koschnick, et al. 2006, Aquatics)*

High Priority: *Hydrilla* Research

- **Target: tuber formation and viability – "the Holy Grail"**
- **Present research on herbicides - more than 130 screened and/or combinations to find environmentally compatible and cost effective herbicides to manage hydrilla**
- **Insect biological control – searching Africa, China, and Indonesia**

" Research is to see what everybody else has seen, and to think what nobody else has thought." Albert Szent-Gyorgyi

DEP Funded Research - Herbicides

Penoxsulam (Galleon) – Labeled for use for aquatic weeds (July 2007)

(Lake Smart study, Mike Netherland, UF-USACE)

- **ALS (Acetolactate synthase) herbicide**
- **Initial treatments between 10-20 ppb (1/2 L 25-50 days)**
- **Slow activity did not change hydrilla biomass during the first 2 months of exposure**
- **Emergent plants showed strong initial injury, but recovered**
- **Hydrilla has been controlled for 14 months**
- **Resistant problems, don't use for two consecutive years, don't use sub-lethal rates**

DEP Funded Research - Herbicides

Penoxsulam (Galleon) – Knowledge gaps

- **Need to improve understanding of exposure requirements**
- **We need to set realistic expectations in terms of selectivity**
- **Fall treatments were slow to knock down hydrilla**
- **Drought conditions favors use (low flow, greater contact time)**

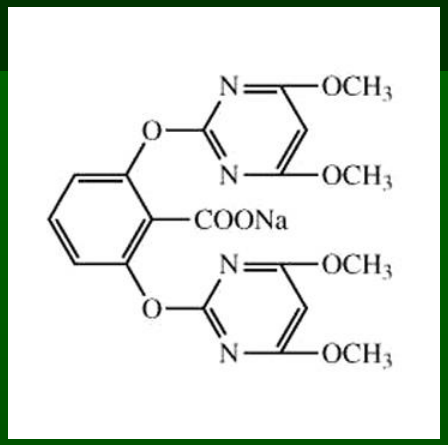
DEP Funded Research - Herbicides

Imazamox (Clearcast) EUP 2006, Section 24C applied for

(Lake Maude study, Mike Netherland, UF-USACE)

- **ALS (Acetolactate synthase) herbicide**
- **Initial treatments between 50 –150 ppb (1/2 L 25-50 days)**
- **Treatments knocked down surfaced out hydrilla**
- **Bottom hydrilla biomass remained the same**
- **Approximately a half year of growth regulation**
- **Treatment resulted in severe injury to cattails, but impacts to other plant species were minimal**
- **Higher application rate did not improve effectiveness in slowing growth rate**

DEP Funded Research - Herbicides



Bispyribac – EUP

(Laboratory and mesocosm studies, Mike Netherland,UF-USACE)

- **ALS (Acetolactate synthase) herbicide**
- **Hydrilla growth reduction achieved with rates between 15-45 ppb (1/2 L between 20 and 40 days)**
- **Exposure requirements and selectivity similar to penoxsulam**
- **Need good contact time, 20-40 DAT**
- **Timing and rates not well understood**

DEP Funded Research - Herbicides

Flumioxazin EUP

(Laboratory and mesocosm studies, Mike Netherland, UF-USACE)

- **Contact herbicide for hydrilla**
- **Selectivity and timing, rates not well understood (under evaluation)**
- **100-400 ppb treatments are likely needed**
- **1/2 L very short, minutes to hours depending upon water pH – could be a big problem.**

DEP Funded Research - Herbicides

Avoid Resistance using ALS herbicides:

Following practices are recommended:

1) alternate modes of action or use herbicide mixtures

2) utilize chemical, biological, and mechanical control options when feasible

3) do not use herbicides with the same mode of action repeatedly, and

4) treat aquatic weeds when infestations are low.

DEP Funded Research - Biocontrol

Target: Hydrilla

- **Africa – coming up short, no good candidates identified (UF – Overholt and Cuda)**
- **China - *Bagous* spp. weevil found to consume hydrilla, unknown - if host specific, easy to raise in captivity, etc. (USDA-ARS - Wheeler)**
- **Indonesia – foliage feeding moth's larvae (*Paracymoriza* spp.) observed to be voracious feeders on hydrilla, collected and being cultivated for testing (USDA-ARS - Wheeler)**

DEP Funded Research - Biocontrol

Target: Hydrilla

- **Thailand – midges, mites, and weevil larvae identified feeding on hydrilla, lab in Australia is testing them (with the exception of the mites)**

  (USDA-ARS - Wheeler)

- **A native fungal pathogen, *Mycoleptodiscus terrestris* (MT) is being developed to reduce contact time with fluridone and ALS herbicides and others – Integrated Plant Management (USACE – Nelson)**

"Research is what I am doing when I don't know I am doing."
Werner von Braun

DEP Funded Research - Biocontrol

Why integrate ?

MT Potential Benefits:

- Increased efficacy
- Lower use rates
- Reduced contact time requirements
- Improved selectivity
- Reduced reliance on herbicides alone
- Resistance management


Untreated


Fluridone alone


Mt alone


Fluridone + Mt

DEP Research Funding Program

Florida Department of Environmental Protection

Invasive Plant Research Newsletter

Fall 2008

Vol. 1, Number 1
Don C. Schmitz, Editor

Florida Department of Environmental Protection, Bureau of Invasive Plant Management Newsletter.

Why a new newsletter? During the past 400 years, Florida's natural areas have been invaded with mostly tropical and subtropical non-native plants and these invasions increased during the twentieth century with the rise of the ornamental plant industry and through unintentional contaminants of imported co-mmodities. Recognizing that research is the basis of environmentally and economically sound invasive plant management programs, the State of Florida, through the Department of Environmental Protection (FDEP), then the Florida Department of Natural Resources, began funding invasive plant research in 1971.

During its 36 years as the lead agency for invasive plant management in Florida, FDEP has contracted for over 150 research projects at cost of $15.1 million. These research projects have led to better management techniques and insights to invasive plant control in Florida. However, cutting edge research takes time to filter down to the resource manager's level and this newsletter hopes to bridge the information gap between research scientists and resource managers in Florida.

It doesn't make much sense for FDEP to fund research but with no real pathway to get these results to those in the field. The Bureau of Invasive Plant Management hopes that you will find this newsletter, to be published at least once a year, informative and easy to read. Research information will be presented in easily digestible bite size bits about current FDEP funded research projects by plant species and their results.

Updates from current DEP Funded Research:

Hydrilla

The **U.S. Army Corps of Engineers** is involved with research on the frictional and flow blocking effects of hydrilla on the movement of water. They are also conducting research on integrating herbicides with the native fungal pathogen, *Mycoleptodiscus terrestris*, that, once operational, would likely improve hydrilla control in areas where contact time is influenced by water exchange.

During the past three years, the **University of Florida** has screened nearly 130 new herbicides or herbicide combinations for use to control hydrilla. As a result of these studies, four new herbicides are in various phases of registration for aquatic plant control: flumioxazin, imazamox, penoxulam, and bispyribac sodium.

Field studies conducted by the **University of Florida** of ALS herbicides imazomox and penoxulam regarding target and non-target vegetation indicate that

The **U.S. Dept. of Agriculture** is searching for suitable biological control agents for hydrilla in Southern China and in Australian and Southeast

Florida Department of Environmental Protection, Bureau of Invasive Plant Management, 3900 Commonwealth Blvd., MS 705, Tallahassee, FL 32399 (850) 245-2809. Website: http://www.dep.state.fl.us/lands/invaspec

A new newsletter summarizing DEP funded research in clear and concise language targeting resource managers in the aquatic and upland plant areas

(Fall 2008)

Questions?

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