



Biological  
Control of  
Waterhyacinth in  
South Florida

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Research Laboratory

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Waterhyacinth  
*Pontederia*  
[*Eichhornia*]  
*crassipes*

- Free-floating
- Fast reproduction
- Blocks flood control structures
- Blocks navigation
- Displaces native plants



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Waterhyacinth covered >120,000 acres in the 1960s, now it is kept to ≤2,000 acres.



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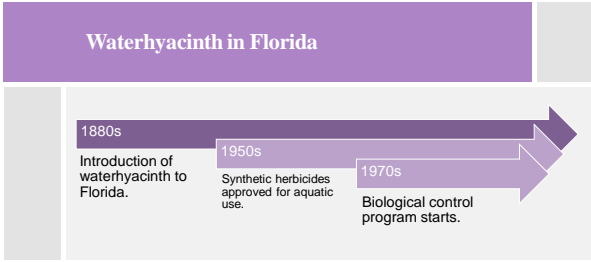
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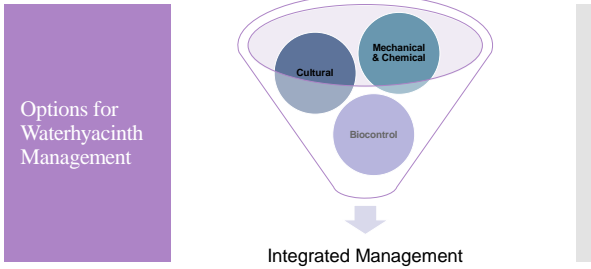
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### Chemical Management

Different herbicides/ herbicide combinations for different situations  
Large or small scale treatments  
Routine application necessary

A person wearing a blue protective suit and a hat is standing in a small boat, using a long-handled spray wand to apply herbicide to a dense field of waterhyacinth. The background shows a clear blue sky and a body of water.

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### Difficult Control Situations

- Near mangroves/kite nests
- In waterbodies with no boat access
- During moratoriums on herbicidal treatments
- Funding cuts



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### Biological Control

Reuniting an invasive species with its native herbivore/predator.

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### Developing a Biocontrol Agent



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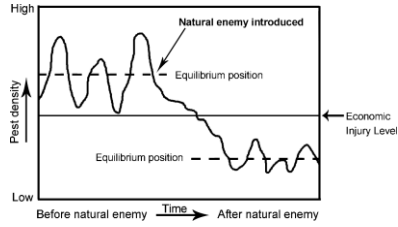
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How  
biocontrol  
works...



Hajek, A., & Eilenberg, J. (2018). Ecological Basis for Use of Predators, Parasitoids, and Pathogens to Control Pests. In *Natural Enemies: An Introduction to Biological Control* (pp. 109-136). Cambridge: Cambridge University Press. doi:10.1017/9781107280267.007

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Persists and disperses without additional input



Impacts on Waterhyacinth

Smaller plants  
Slower growth  
Fewer seeds

Utility of  
Biocontrol  
Agents

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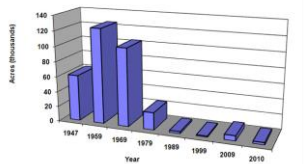
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Water Hyacinth 1947 - 2010



Waterhyacinth  
Coverage Over  
Time

Graph from "Plant Management in Florida Waters - An Integrated Approach", Center for Aquatic and Invasive Plants - UF IFAS

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**Waterhyacinth  
Biocontrol Agents**

*Niphograpta albiguttalis*  
*Neochetina bruchi*  
*Neochetina eichhorniae*

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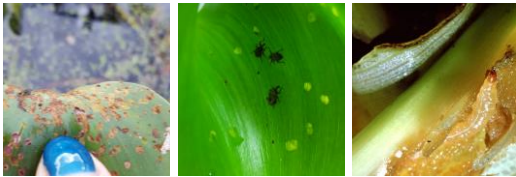
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*Neochetina eichhorniae* and *N. bruchi*

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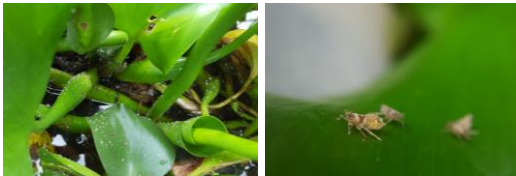
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*Megamelus scutellaris*

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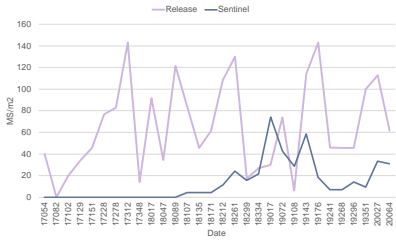
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### STA 3/4 – Release and Control Sites



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*Megamelus  
scutellaris* was  
released in 2010  
and was monitored  
until 2020

Tracked dispersal and  
population  
size/composition



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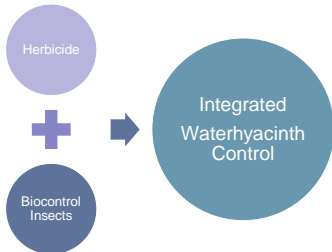
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### Integrated Plant Management Experiment

How can we combine  
herbicide treatments  
and biocontrol  
insects to maximize  
waterhyacinth control?



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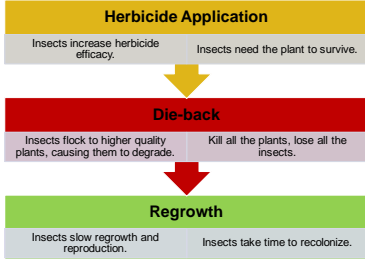
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Integration of Management Techniques is a Balancing Act

To support insect populations, there must be plants.




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IPM Experiment

Conducted at the Invasive Plant Research Laboratory

Leave plants untreated to help insects destroy treated plants.

- 2 Diquat Herbicide Concentrations
  - Full Rate - 0.5% solution
  - Half Rate - 0.25% solution

- 4 Spray Coverages
  - 0%, 40%, 80%, 100% of tank surface area (~1.6 m<sup>2</sup>)

- Biocontrol Insect
  - Presence/Absence

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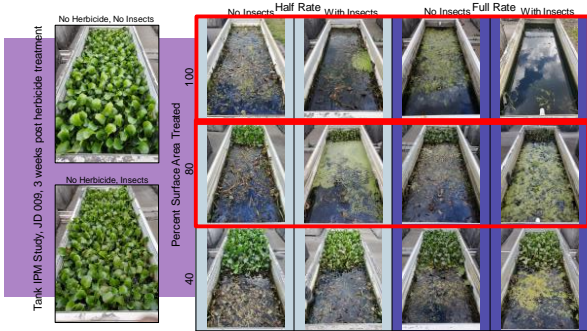
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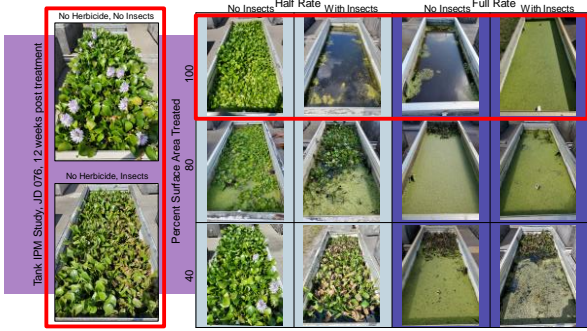
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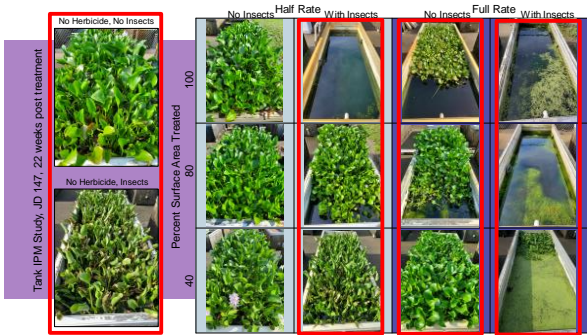
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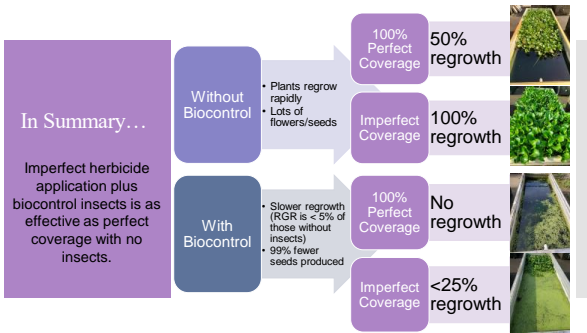
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Why integrate herbicide treatments with biocontrol agents?

No Insects

- Use of full / field rate of herbicide necessary
- Rapid regrowth after initial die-back



With Biocontrol Agents

- Lower rate of herbicide necessary for similar results
- Slower regrowth after initial die-back
- Less seed production



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Thank you!

USDA Agricultural Research Service

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