Old World Climbing Fern
(*Lygodium microphyllum*)
a.k.a. “Land Hydrilla”
2013

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1. Background

2. Research
   A. Biological control
   B. Herbicides
      A. Summarize Jeff Hutchinson’s research

3. Operational
   1. SFWMD
   2. SJRWMD
   3. SWFWMD
   4. NPS
Old World Climbing Fern in Florida

Collected from wild in Martin Co

Herbicide ground trials
Biological control research
Aerial herbicide Applications
CFLS implemented
Defoliating moth

28,000 ac
39,000 ac
109,000 ac
123,000 ac
Biological Control Progress

In February 2005, a defoliating moth (*Austromusotima camptonozale*) was released in southeast Florida but failed to establish in any of the release range.

Another defoliating moth, *Neomusotima conspurcatalis*, has established from releases made in 2008 and 2009. Populations are thriving in several areas and have spread to other points beyond the initial releases.

A leaf-galling mite (*Floracarus perrepae*), released in 2007, has established in the Jupiter, Florida area.
Feeding damage from *Neomusotima conspurcatalis* larvae.

“*This is NOT herbicide damage!*”

Two more insects are currently being tested for future releases: another defoliating moth within the same family as the previous two released moths, and a sawfly whose larvae are heavy defoliators. A discussion of these efforts is presented in the “Lygodium Management Plan”, which is available on at http://fleppc.org.
### Evaluation of Backpack Applications

- 20 sq m plots
- 7 locations

<table>
<thead>
<tr>
<th>Product</th>
<th>Rate(s)</th>
<th>A.I./MOA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rodeo</td>
<td>2% and 4%</td>
<td>Glyphosate/PEP</td>
</tr>
<tr>
<td>Escort XP</td>
<td>1 and 2 oz/100</td>
<td>Metsulfuron/ALS</td>
</tr>
<tr>
<td>Garlon 3A</td>
<td>2%</td>
<td>Triclopyr/PGR</td>
</tr>
<tr>
<td>Plateau</td>
<td>1.5%</td>
<td>Plateau/ALS inhibitor</td>
</tr>
<tr>
<td>Escort + Rodeo</td>
<td>1 oz + 2%</td>
<td></td>
</tr>
<tr>
<td>Escort + Garlon</td>
<td>1 oz + 2%</td>
<td></td>
</tr>
<tr>
<td>Escort + Plateau</td>
<td>1 oz + 1.5%</td>
<td></td>
</tr>
<tr>
<td>Rodeo + Plateau</td>
<td>2% + 1.5%</td>
<td></td>
</tr>
<tr>
<td>Rodeo + Garlon</td>
<td>2% + 2%</td>
<td></td>
</tr>
<tr>
<td>Rodeo + Escort + Garlon</td>
<td>1% + .7 oz + 1%</td>
<td></td>
</tr>
</tbody>
</table>
% Reduction of OWCF Cover

Months After Application
Initial aerial and two annual ground applications in LNWR

- 5 tree islands per treatment
- +0.5% DLZ aerial
- +0.5% Sunwet ground

<table>
<thead>
<tr>
<th>Product</th>
<th>Rate Aerial, Ground</th>
<th>% Reduction One year after aerial</th>
<th>% Reduction Aerial and two annual ground</th>
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</thead>
<tbody>
<tr>
<td>Escort</td>
<td>1 oz/ac, 1 oz/100gal</td>
<td>99a</td>
<td>99a</td>
</tr>
<tr>
<td>Escort</td>
<td>2 oz/ac, 2 oz/100gal</td>
<td>99a</td>
<td>98a</td>
</tr>
<tr>
<td>Rodeo</td>
<td>3.75 pt/ac, 2%</td>
<td>86b</td>
<td>81b</td>
</tr>
<tr>
<td>Rodeo</td>
<td>7.5 pt/ac, 4%</td>
<td>88b</td>
<td>87b</td>
</tr>
<tr>
<td>Rate</td>
<td>Dahoon</td>
<td>Swamp bay</td>
<td>Wax myrtle</td>
</tr>
<tr>
<td>----------</td>
<td>--------</td>
<td>-----------</td>
<td>------------</td>
</tr>
<tr>
<td>Escort</td>
<td>1 oz</td>
<td>80</td>
<td>77 a</td>
</tr>
<tr>
<td>Escort</td>
<td>2 oz</td>
<td>89</td>
<td>93 a</td>
</tr>
<tr>
<td>Rodeo</td>
<td>3.75</td>
<td>75</td>
<td>6 b</td>
</tr>
<tr>
<td>Rodeo</td>
<td>7.5</td>
<td>70</td>
<td>20 b</td>
</tr>
</tbody>
</table>
Re-growth After Herbicide Application
## Sporophyte Development from Soil Samples at 6 Months

<table>
<thead>
<tr>
<th>Site</th>
<th>Sporophytes per m²</th>
<th>% Fertile Leaflets</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3051</td>
<td>1.2</td>
</tr>
<tr>
<td>2</td>
<td>1811</td>
<td>4.2</td>
</tr>
<tr>
<td>3 (treated site)</td>
<td>2885</td>
<td>13.7</td>
</tr>
<tr>
<td>4</td>
<td>1694</td>
<td>7.7</td>
</tr>
</tbody>
</table>
Spore Germination

- Germination rates can be as high as 96%
- Spores can remain viable for at least 8 years

→ This means that even if you kill the mature ferns, there will be re-growth from spore germination
Sensitivity of OWCF Spores to Herbicides

✓ 35,000 spores treated / Petri dish, containing herbicide treated agar solution

<table>
<thead>
<tr>
<th></th>
<th>$I_{50}$</th>
<th>$I_{95}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metsulfuron</td>
<td>0.01 a</td>
<td>0.06 a</td>
</tr>
<tr>
<td>Imazapyr</td>
<td>16 b</td>
<td>70 b</td>
</tr>
<tr>
<td>Triclopyr</td>
<td>18 b</td>
<td>78 b</td>
</tr>
<tr>
<td>Glyphosate</td>
<td>56 c</td>
<td>244 c</td>
</tr>
</tbody>
</table>
DON'T BE A VECTOR!
Operational

SFWMD

✓ Initial aerial applications with 1 oz Escort or 7.5 pt glyphosate product depending vegetation/season
✓ Maintain ~10,000 ac
✓ 3,800 ac treated annually (3-yr average)
  • 1-2 yr interval
  • ~80% Ground application
    o 3% glyphosate prod. or + 1 oz/50 gal Escort

SJRWMD

✓ Aerial application with 2 oz Escort every 2-3 yr
  • Most areas dominated by sawgrass
  • Areas (BCM) too remote for ground application
  • 10,000 acres treated annually (5-yr average)

SWFWMD,

✓ Ground applications only
Operational cont.?

NPS
- ✓ 2005 1,700 ac treated aerially with glyphosate
- ✓ 2006 1,159 ac treated aerially with glyphosate
- ✓ 2008 840 ac treated with metsulfuron
- ✓ 2009-2012 > 20 ac/yr ground treatments only
  - ✓ Funding
  - ✓ Non-target
    - ✓ Concentrating on prescribed fire
- ✓ 2010 2,006 acres present
- ✓ Concentrating on fire suppression

Private land
- ✓ CFLS


