Incision Point Application: Moving the Science of Girdling and Hack and Squirt Techniques Forward

Stephen F. Enloe
UF-CAIP
Hack and squirt is...

1. an IPT technique for woody plants...
2. within a specified target diameter...
3. that uses a cutting instrument such as a machete or hatchet to make a series of cuts...
4. at an approximate 45 degree angle...
5. in a continuous or evenly spaced pattern...
6. around the entire circumference of the target...
7. to a specified depth...
8. and the cuts are then injected using a spray bottle...
9. at a specified volume...
10. of a concentrated solution...
11. of a limited number of herbicides...
12. that will slowly kill the target plant...
13. in a selective manner.
Girdle + treat
Note the five major portions of the tree trunk.

- Complete girdle
- Target area
- Sapwood
- Heartwood
- Cambium
- Outer bark (rhytidome)
- Inner bark (phloem)
Continuous or Overlapping hacks

Evenly Spaced Hacks
Note the five major portions of the tree trunk.

Hack and squirt target area

- Heartwood
- Sapwood
- Cambium
- Outer bark (rhytidome)
- Inner bark (phloem)
Can we do hack and squirt/girdle more efficiently?
Reduced Hack and Squirt (incision point application)
Single hack/stem + 0.5 ml/hack
Milestone or Method
Our Reduced Hack and Squirt (IPA) Approach
It can be difficult to get the herbicide into hacks without runoff.
Issues to address: variation in delivery per stroke among spray bottles

1.26 ± 0.09 ml

2.78 ± 0.11 ml

3.14 ± 0.09 ml
What we are trying to avoid
Species Tested with IPA

- *Casuarina equisetifolia* - Australian pine
- *Triadica sebifera* - Chinese tallow tree
- *Bischofia javanica* - Bishopwood tree
- *Schinus terebinthifolius* - Brazilian peppertree
- *Melaleuca quinquenervia* - Melaleuca
- *Leucaena leucocephala* - Leadtree
- *Eugenia uniflora* - Surinam cherry
- *Aleurites fordii* - Tungoil tree
Single versus multi-stem approach

• Single stemmed trees treated with one hack, no matter what the diameter
• Multistemmed trees treated with 1 hack per stem, no matter how many stems
## Example Species Comparisons

<table>
<thead>
<tr>
<th>Species</th>
<th>Casuarina</th>
<th>Melaleuca</th>
<th>Bishopwood</th>
<th>Brazilian Pepper</th>
</tr>
</thead>
<tbody>
<tr>
<td>DBH Average (inches)</td>
<td>4.4</td>
<td>5.5</td>
<td>5.89</td>
<td>13.06</td>
</tr>
<tr>
<td>DBH Range (inches)</td>
<td>1.5 – 10.75</td>
<td>1.5 – 13.7</td>
<td>1 – 29.75</td>
<td>2.25 – 43.25</td>
</tr>
<tr>
<td>Stem Number (Average)</td>
<td>1</td>
<td>1.1</td>
<td>1.54</td>
<td>4.28</td>
</tr>
<tr>
<td>Stem Number Range</td>
<td>1</td>
<td>1 - 3</td>
<td>1 - 7</td>
<td>1 - 16</td>
</tr>
</tbody>
</table>
Comparative treatments: Garlon 4 Ultra (20% v/v)
Comparative Treatments: Garlon 3A (50% v/v)
Comparative girdle/spray treatment for Melaleuca: 10% Arsenal + 40% Rodeo
Data collected
Melaleuca time to treat (sec)
Melaleuca herbicide mix used per tree (ml)
Melaleuca 2 YAT

Mortality: 1.0 = 100% of the treated trees died
0.0 = 0% of the treated trees died
Australian Pine 2 YAT

Mortality: 1.0 = 100% of the treated trees died
0.0 = 0% of the treated trees died
Mortality: 1.0 = 100% of the treated trees died
0.0 = 0% of the treated trees died
Brazilian peppertree @ 2 YAT with Milestone and Method, reduced hack and squirt approach, 1 hack per major stem, 0.5 ml herbicide per hack
Graph showing the effect of different treatments (TRT) on Bishopwood herbicide (ml) per inch of DBH.

- Basal bark
- Cut stump
- Method
- Milestone

Herbicide levels are indicated by points labeled 'a', 'b', and 'c' with error bars. The graph shows a decrease in herbicide levels from 'a' to 'c' with 'b' in between.

**Method**
- 0.0
- 0.5
- 1.0
- 1.5
- 2.0
Mortality of Bishopwood:

- Basal bark: 44%
- Cut stump: 79%
- Method: 100%
- Milestone: 93%
Is herbicide flashback a problem?

1. Loss of herbicide from dead or dying roots
2. Herbicide available in soil solution
3. Herbicide absorbed by nearby trees
Incision point Application Summary

• Milestone and Method are powerful when injected directly into the veins of a tree
• We routinely killed 6-10 inch diameter trees with a single hack and 500 microliters of either herbicide
• We reduced application time by 5x compared to cut stump
• We reduced herbicide use by 4-8x per treated tree compared to cut stump and basal
Questions?

Stephen F. Enloe
Center for Aquatic and Invasive Plants
University of Florida
sfenloe@ufl.edu