Controlling Invasive Knotweeds Using Low-Volume Foam Herbicide

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Overview

• Non-Chemical Control

• Chemical Control

• Focus on: Low Volume Foam Herbicide
Knotweed Colony at Southwood
Knotweed – Grows in Tough Conditions

Photo Credit: Popplewell Associates, York, UK
Knotweed Rhizome Extension
Non-Chemical Control

- Not practical except with small infestations
- Danger of vegetative spread
- See King County, Best Management Practices (2008)
Chemical Control
Knotweed Rhizome – Tough to Kill!
Chemical Control: Key Problem

Older parts of rhizomes are weak sinks
Can herbicide reach the weak sink buds?
Chemical Control Methods

- Stem injection
- Cut stem
- Foliar
Key Herbicides

• Glyphosate – aquatic label

• Triclopyr – aquatic label; only foliar

• Imazapyr – aquatic label; only foliar
Stem Injection
Stem Injection

- Use hypodermic or special injector
- Inject up to 5 ml into stem
- Between 1\textsuperscript{st} and 2\textsuperscript{nd} node above ground
Stem Injection

• **Advantages:**
  – Precision
  – No stem disposal
  – Avg control: 91-100 % (Prather + Miller 2009)

• **Disadvantages:**
  – Time-consuming
  – Identifying treated stems
  – Difficulty in treating small stems
  – Non-target injury: 26% (Miller 2005)
  – And...
Biggest Disadvantage of Stem Injection

• Requires *5 ml of herbicide per aerial shoot*
  – Equivalent to cut surface application on 10 to 15 inch woody stem. AquaMaster Label.

• May explain 26% non-target injury found by Miller.
Cut Stem

- Cut stem 5 to 10 inches off ground
- Immediately pour up to 3 ml into hollow of stem
Pouring Herbicide into Cut Stem
Cut Stem

• **Advantages:**
  – Low cost equipment
  – Control? (Miller did not test)

• **Disadvantages:**
  – Time-consuming
  – Disposal of green aerial shoots
  – Amount of herbicide used
Foliar

• Advantages
  – Fastest application method
  – Decent control: 81%. (Miller 2005)
  – No disposal issues
  – Less herbicide used

• Disadvantages
  – Off-target harm: \textit{Avg. injury: 68\%}. (Miller 2005)
  – Hard to treat tall plants
Follow-Up Applications

• Washington State Dept. Agriculture:

  – Data show “significant decrease in knotweed following six years of annual treatments.”

  – However, knotweed is still present at each monitoring site.” (Statewide Knotweed Control Program; 2010 Progress Report)
How Can Methods Be Improved?

• Reduce repeat applications

• Reduce quantity of herbicide used

• Reduce off-target harm
We Have Been Trying Several Methods
Rhizome Injection
Injecting into Rhizome through Cut Stem
Rhizome Injection

Needle reaches to below-ground Internode
Herbicide Used

• AquaMaster – glyphosate; 54% a.i.

• Dose at 2ml
Results?
Not very impressive

- I would guess around 70% to 80%
Other New Methods Being Explored
Bend and Treat with Foam Herbicide
Large Foam Herbicide Dispenser with Foliar Nozzle
Treat Regrowth with Low Volume Application of Foam Herbicide
Foam Stream Ejected from Dispenser – Reduced Drift
What is Low Volume?

- Use more herbicide (about 4% a.i.) and less water volume.

- Cover 10% to 30% of foliage.
Why Low Volume?

“The most consistent application factor that can increase glyphosate efficacy is lower carrier volumes.” Young 2006.
Deposits Foam on Leaves – Virtually No “Fines”
Foam Herbicide Clings to Leaf – No drops to bead off
Herbicide Spreads on Leaf
Herbicide Slowly Dries on Leaf – increasing absorption
Before: dense knotweed colony
After: Small, isolated knotweed plants
Approximately 11 months after single treatment

Native Pilewort dominates now

Scattered knotweed
Our Mission: To recognize opportunities and provide leadership to make our region a vibrant, place-based model for the nation.

563-864-7112; www.northeastiowarcd.org
Use on Japanese knotweed along Paint Creek in Northeast Iowa
Report from Richard Kittelson from the Northeast Resource, Conservation and Development Organization:

- “We had an excellent result at the Hardees site, I'd say 80-90% effective. I just foam treated the resprouts on 9/30. The resprouts covered aprox. 10% of the area sprayed last year. It took 1/2 liter of mix.”

- “The west bank that had been 95% stem injected had more resprouts, aprox. 25% of the area. That side took 1 liter of mix to treat.”
Testing By Dr. Timothy Miller at Washington State University

• Late Summer 2014
• Comparing Spray and Foam Herbicide
• Bohemian and Himalayan knotweed
• Herbicides:
  – Rodeo (glyphosate)
  – Habitat (imazapyr)
  – Perspective (aminocyclopyrachlor)
  – Milestone (aminopyralid)
WSU testing (con.)

- Used 1 liter per plot with foam herbicide
- Used 2 liters per plot with spray
- I.e., using $\frac{1}{2}$ as much foam herbicide as spray.
- Plots (I believe are 20 by 20 feet)

- Research is not funded by Green Shoots; we did provide WSU with a dispenser
Early WSU Results – Percent Control Determined by Defoliation

<table>
<thead>
<tr>
<th>Type</th>
<th>2 WAT</th>
<th>4 WAT</th>
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<tbody>
<tr>
<td>Foam</td>
<td>51% avg.</td>
<td>69% avg.</td>
</tr>
<tr>
<td>Spray</td>
<td>46 avg.</td>
<td>66 avg.</td>
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Note: Averages across all herbicides used and two species of knotweed.
Why **Might** Foam Work Better?

- Foam is well suited for low volume applications
  - Less dripping
  - Slower drying of herbicide
  - Foam clings tenaciously to foliage

- More surfactant used

- Key Benefit: Virtually eliminates drift
Green Shoots

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