Common Herbicides...
Used in Forestry Operations

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Presentation Outline

- Basic Techniques
- General Equipment
- Common Herbicides
- Sources of Information
Cut-Stump Applications

• Herbicide is applied directly to cut-stump
  – Chainsaw, brush cutters, mowers, etc.

• **Amine formulations:** apply to freshly cut surface
  – Apply to cambium only

• **Ester formulations:** apply herbicide anytime
  – Apply to cambium and root collar
Water-Based vs. Oil-Based

• Amine formulations = water-based

• Ester formulations = oil-based
  – Basal oil, diesel, kerosene as “carrier”
Amine: Cut-Stump Application

Photo: James H. Miller
Frilling or Girdling

• Method of deadening standing trees with or without the use of herbicides
  – Chainsaw, axe/hatchet

• Double girdle, no herbicide

• Single girdle with herbicide
  – Use amine-based herbicides w/ color marker dye
Girdle/Frill: Hack-n-Squirt Method

Jim Miller, USDA FS, forestryimage.org
Girdle/Frill: Hack-n-Squirt Method

Photo: Steve Manning
Basal Bark Application

• Use ester or oil-based carriers such as Axe-it™ basal oil
• Apply to lower 12-18” of woody stems
• Thin barked trees and those trees < 6” dbh
• Use during growing or dormant season

“Basal Spray”

Photo: James H. Miller
Basal Bark Wick Application

• Basal bark mixture applied using wick application

• Directed herbicide delivery mechanism

Photo: James H. Miller
Foliar Wick Application

• Directed herbicide delivery mechanism

• Can use a variety of herbicides
  – 1-2% glyphosate, etc.

Photo: forestry-suppliers
Low-Volume Foliar Application

- Backpack sprayers w/ various-sized nozzles

Photo: Steve Manning
E-Z-Ject® Lance

- Stem injection system
- Glyphosate or Imazapyr capsules
- Inject one capsule every 4 inches evenly around base of stem
  - One capsule per stem for trees < 2.5 inches
E-Z-Ject® Lance

Photo: forestry-suppliers
Herbicide-Delivery Equipment
Commonly Used Herbicides

- Triclopyr
- Garlon 3A
- Garlon 4
- Tahoe 3A
- Tahoe 4E
- Picloram
- Pathway®
- Tordon®
- Stalker®
- Arsenal®
- Imazapyr
- Chopper®
Triclopyr

- Amine: Garlon® 3A
- Ester: Garlon® 4, Pathfinder II, Crossbow®
- Numerous commercial products available
- Foliar, cut stump, basal
- **Flashback Potential:** none
- My preferred herbicide for woody species control

Photo: forestry-suppliers
Garlon® 3A

Plants Controlled

Woody Plant Species

alder  dogwood  salt cedartm
arrowwood  elderberry  salmonberry
ash  elm  sassafras
asper  gallberry  scotch broom
Australian pine  hazel  sumac
beard clover (bearmat)  hornbeand  sweetbay magnolia
beech  kudzu  sweetgum
birch  locust  sycamore
tallow  madrone  tan oak
blackberry  maples  thimbleberry
gum  mulberry  tulip poplar
Brazilian pepper  oaks  waxmyrtle
cascara  persimmon  western hemlock
ceanothus  pine  wild rose
chorse  poison ivy  willow
cherry  poison oak  wirged elm
chinquapin  pine  willow
doctor cherry  poison oak  plant
choke cherry  poison oak  willow
cottonwood  poplar  plant

1For complete control, re-treatment may be necessary.
2Use cut surface treatments for best results.
Glyphosate

- Amine or water-based
- 41% amine-salt
- Roundup®, Razor® Pro, Forester®, etc.
- Numerous commercial products available
- Foliar, Frill, and Cut-Stump
- **Flashback Potential:** Yes

Photo: forestry-suppliers
Picloram

- Amine- and ester-based formulations

- Pathway® ~ $30/gal
  - Tordon RTU, etc.

- Flashback Potential: Yes

Photo: forestry-suppliers
Imazapyr

- Amine-based formulation
- Chopper®, Stalker®, Arsenal®
- Girdle, Cut-Stump, Foliar, and Basal bark*

Flashback Potential: Yes

Photo: forestry-suppliers
<table>
<thead>
<tr>
<th>Commercial Product</th>
<th>Active Ingredient</th>
<th>Method of Application</th>
<th>Application Rate</th>
<th>Approx. Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Arsenal - BASF</strong></td>
<td>Imazapyr amine 28.7%</td>
<td>No</td>
<td>Yes&lt;sup&gt;1&lt;/sup&gt;</td>
<td>Yes&lt;sup&gt;23&lt;/sup&gt;</td>
</tr>
<tr>
<td><strong>Stalker - BASF</strong></td>
<td>Imazapyr amine 21.6%</td>
<td>Yes&lt;sup&gt;1&lt;/sup&gt;</td>
<td>Yes&lt;sup&gt;3&lt;/sup&gt;</td>
<td>Yes&lt;sup&gt;23&lt;/sup&gt;</td>
</tr>
<tr>
<td><strong>Garlon 3A - Dow</strong></td>
<td>Triclopyr amine 44.4%</td>
<td>No</td>
<td>Yes&lt;sup&gt;2&lt;/sup&gt;</td>
<td>Not Observed</td>
</tr>
<tr>
<td><strong>Garlon 4 - Dow</strong></td>
<td>Triclopyr ester 61.6%</td>
<td>Yes</td>
<td>No</td>
<td>Yes&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td><strong>AG 200 - premixed Garlon 4 &amp; Ax-It</strong></td>
<td>Triclopyr ester + basal oil w/ dye</td>
<td>Yes</td>
<td>No</td>
<td>Yes&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td><strong>Pathfinder II - Dow</strong></td>
<td>Triclopyr ester 13.6%</td>
<td>Yes</td>
<td>No</td>
<td>Yes&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td><strong>Pathway - Dow</strong></td>
<td>Picloram amine 5.4% + 2,4-D 20.9%</td>
<td>No</td>
<td>Yes&lt;sup&gt;2&lt;/sup&gt;</td>
<td>Yes&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td><strong>Glypro Plus - Dow</strong></td>
<td>Glyphosate amine 41.0%</td>
<td>No</td>
<td>Yes&lt;sup&gt;4&lt;/sup&gt;</td>
<td>Yes&lt;sup&gt;23&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

**Note**: There are approximately 1,200 spray bottle “squirts” (one squirt will cover one inch of tree diameter) per gallon of herbicide. This means over 5,000 inches of undesirable trees can be girdled or stump sprayed with one gallon of herbicide. This would equal 500 two-inch trees, 300 four-inch trees, 100 six-inch trees, 100 eight-inch trees, 100 ten-inch trees, plus 50 larger trees averaging eighteen-inches in diameter. Thus, it is possible to girdle or stump spray 1,150 trees on several acres of TSI using one gallon of herbicide.

<sup>5</sup> From R. Scott Brundage, Consulting Forester 7/27/2001
Things to Consider

Species Susceptibility to Herbicides

Timing
*Late fall, dormant season, before spring sap flow*

Low-Volume Foliar, Basal Bark, Girdle, or Cut-Stump

Cost and Herbicide Availability
Last Minute Hints and Tips

Step 1 – No single “best” herbicide

Step 2 – Herbicide recommendations change

Step 3 – Ask twice, apply herbicide once!
Wisconsin DNR

• WDNR Herbicides for Forest Management
Penn State University

- Herbicides and Forest Vegetation Management
  - [http://pubs.cas.psu.edu/freepubs/pdfs/uh174.pdf](http://pubs.cas.psu.edu/freepubs/pdfs/uh174.pdf)
CDMS Agro-Chemical Database

- CDMS Labels
  - [http://www.cdms.net/LabelsMsds/LMDefault.aspx](http://www.cdms.net/LabelsMsds/LMDefault.aspx)
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