EFFECTIVENESS OF HERBICIDES AT CONTROLLING COMMON INVASIVE PLANTS ON ROADSIDES

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HERBICIDES ARE ONE OF MANY TOOLS FOR INVASIVE PLANT MANAGEMENT

- Each tool has positive and negative aspects
- Some fit better into roadside IVM than others
WHAT IS AN INVASIVE SPECIES?

Many definitions, two main points

1. Not native to the area

2. Capable of causing harm
   - Environmental
   - Economic
   - Harm to human health
IMPACTS ARE SPECIES AND LOCATION SPECIFIC

• Issues that justify a high priority for roadside invasive plant control
  1. Harm to human health
  2. Impact infrastructure
  3. Prevent establishment of desired vegetation
  4. Reduce ecosystem services of roadside
     • Examples: biodiversity, erosion

WHICH ONES I WOULD BE WORRIED ABOUT

• Japanese knotweed, phragmites
  • potential to impact road infrastructure

• Wild parsnip, bush honeysuckles, Japanese barberry
  • increased harm to humans

• Crown vetch, birdsfoot trefoil
  • reduced ecosystem services
MANY SPECIES WE DON’T KNOW HOW BAD THEY ARE........

• Yellow toadflax (butter and eggs)
• Yellow starthistle
• Japanese hedgeparsley

I recommend removing if small/easy and monitoring larger populations

APPROACH TO MANAGING INVASIVE PLANTS

Step 1: Plant identification

Step 2: Distribution of population

Step 3: Select appropriate control tactic(s)

Step 4: Apply control method(s)

Step 5: Monitor and adapt management
STEP 3: SELECT APPROPRIATE CONTROL TACTIC

- Manipulation of the environment
- Physical/mechanical management
- Prescribed fire
- Biological control
- Herbicide

USING HERBICIDES CAN BE COMPLICATED!
RESOURCES ARE AVAILABLE TO HELP

- Factsheets
- Online guides
- Experts
RESOURCES TO ASSIST IN CONTROL

University of Wisconsin Extension (UWEX)
- [https://fyi.uwex.edu/wifdn](https://fyi.uwex.edu/wifdn)
- Google UWEX invasive factsheet

Midwest Invasive Plant Network
- [www.mipn.org](http://www.mipn.org)
- google mipncontroldatabase

FACTSHEETS ON INVASIVE PLANTS MIDWEST

- UWEX has 49 species with detailed factsheets
  - Information collected and summarized
  - Research
  - Experts
  - Summarizes common and effective control methods
  - Effectiveness
  - Details on how to apply
### SPECIES PRESENT IN THE DATABASE

- Amur honeysuckle
- Asian bittersweet
- Bell’s honeysuckle
- bird’s-foot trefoil
- black locust
- black swallowwort
- border privet
- bull thistle
- Canada thistle
- common buckthorn
- common privet
- common tansy
- common teasel
- creeping bellflower
- crown vetch
- cut-leaved teasel
dame’s rocket
- European marsh thistle
- field bindweed
garlic mustard
- glossy buckthorn
- hill mustard
- hybrid cattail
- Japanese hedge parsley
- Japanese honeysuckle
- Japanese hop
- Japanese knotweed
- Japanese stiltgrass
- leafy spurge
- Morrow’s honeysuckle
- multiflora rose
- musk thistle
- narrow-leaved cattail
- plumeless thistle
- poison hemlock
- purple loosestrife
- quackgrass
- sericea lespedeza
- spotted knapweed
- spreading hedge parsley
- Tatarian honeysuckle
tree-of-heaven
- white sweetclover
- wild chervil
- wild parsnip
- yellow sweetclover

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### PICK YOUR HERBICIDES CAREFULLY!

We killed it..., but is this what we wanted?
FOLLOW THE LABEL / DIRECTIONS PROVIDED CAREFULLY

• Legally required to follow the label

• Key issues to understand/research:
  1. When should I spray (growth stage)
  2. How to apply (method)
  3. Restrictions
     • Where and how much can I apply
  4. How can I minimize non-target impacts?

MONITOR AND ADAPT MANAGEMENT

• When should you retreat?
  • Dependent on goals of land
    • suppression vs eradication

• Often it is expensive in first year
• If effective cost is much lower in subsequent years
## SPECIES OF CONCERN IN IOWA

<table>
<thead>
<tr>
<th>Species</th>
<th>Lifecycle</th>
<th>Why control?</th>
<th>Eradication?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japanese knotweed</td>
<td>Creeping perennial</td>
<td>Impact infrastructure</td>
<td>Hard, &gt; 3 years</td>
</tr>
<tr>
<td>crown vetch</td>
<td>Creeping perennial</td>
<td>Biodiversity, erosion, N loading</td>
<td>medium, ???</td>
</tr>
<tr>
<td>birdsfoot trefoil</td>
<td>Creeping perennial</td>
<td>Biodiversity, erosion, N loading</td>
<td>medium, ???</td>
</tr>
<tr>
<td>phragmites</td>
<td>Creeping perennial</td>
<td>Impact infrastructure</td>
<td>Hard, 4-6 years</td>
</tr>
<tr>
<td>miscanthus</td>
<td>Creeping perennial</td>
<td>Biodiversity, infrastructure?</td>
<td>Hard, ???</td>
</tr>
<tr>
<td>wild parsnip</td>
<td>Biennial/ monocarpic perennial</td>
<td>Human Health</td>
<td>Easy, 2-3 years</td>
</tr>
</tbody>
</table>

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**PREVENTION/EARLY DETECTION AND REMOVAL IS THE BEST OPTION**
PHRAGMITES (NON-NATIVE)

- Perennial grass with rhizomes, stolons
- Difficult to control with non-chemical methods
- Herbicides effective but........
  - Non-selective
    - Imazapyr, glyphosate
  - Takes 4-6 years of treatment to eradicate
PERENNIAL KNOTWEED EFFECTIVE MANAGEMENT METHODS

• Excavation
• Smothering
• Herbicides

HERBICIDES

• Usually the most cost efficient method
• Several herbicides can give 90+% control for > 1 year

• Applications can be
  • Broadcasted
  • Treated to individual plants
  • Injected into stems
## HERBICIDES EVALUATED

<table>
<thead>
<tr>
<th>Herbicide</th>
<th>Active Ingredient</th>
<th>Selectivity</th>
<th>Residual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arsenal (Habitat)</td>
<td>Imazapyr</td>
<td>Not selective</td>
<td>YES</td>
</tr>
<tr>
<td>Capstone</td>
<td>Triclopyr + aminopyralid</td>
<td>Safe to established grasses</td>
<td>YES</td>
</tr>
<tr>
<td>Perspective</td>
<td>Aminocyclopyrachlor + chlorsulfuron</td>
<td>Safe to established grasses</td>
<td>YES</td>
</tr>
<tr>
<td>Milestone</td>
<td>Aminopyralid</td>
<td>Safe to established grasses</td>
<td>YES</td>
</tr>
<tr>
<td>Rodeo</td>
<td>Glyphosate</td>
<td>Not selective</td>
<td>NO</td>
</tr>
<tr>
<td>Crossbow</td>
<td>2,4-D + triclopyr</td>
<td>Safe to established grasses</td>
<td>Limited</td>
</tr>
</tbody>
</table>

## EFFECTIVENESS 1 YEAR AFTER FALL TREATMENT

- **Milestone**
- **Arsenal**

- Milestone: Present
- Arsenal: Present
SUMMARY OF HERBICIDE OPTIONS

- Arsenal/Habitat
  - Effective in summer or fall
  - Get bareground residual may prevent revegetation

- Milestone
  - Best results in fall at spot trt rate (14 fl oz/A)
  - Safe to established grasses

- Roundup/glyphosate
  - Effective, but need REALLY HIGH RATE (9% Rodeo)
  - Only effective homeowner option

DETAILS RELATED TO HERBICIDE APPLICATIONS

- Applications in the **fall prior to a frost** (flowering) gave best results

- **Don’t need to mow** to obtain high levels of control
  - Mowing can make applications easier

- Higher application volume **doesn’t improve control**
CAN WE ERADICATE KNOTWEED ON WI ROADS AND WHAT DOES IT COST?

• Evaluated **effectiveness** and **cost** at 8 locations in WI
  • Mowed in July then applied herbicide to resprouting tissues in September
    • 14 fl oz/A milestone
  • Repeated as long as ample resprouting occurred

• Estimated cost of each method EACH YEAR
  • Herbicide
  • Time for staff to mow/treatment

INITIAL YEAR (2014)
SECOND YEAR (2015)

- 87% control
  - Ranged from 75−98%
- Retreated 2 of 7 sites
- COST: $1/1000 ft²

THIRD YEAR (2016)
REPEATED CONTROL OVER THREE YEARS CAN REDUCE COVER BUT NOT ERADICATE POPULATIONS

INITIAL COSTS ARE HIGH, BUT MANAGEABLE AFTER THE FIRST YEAR!
Are the resulting plants what we wanted?

CROWN VETCH AND BIRDSFOOT TREFOIL ARE EASIER TO MANAGE, BUT OFTEN POPULATIONS ARE MORE WIDESPREAD
HERBICIDE TRIALS HAVE FOUND OPTIONS EXIST THAT ARE EFFECTIVE

- Milestone (5-7 fl oz/A) is effective if applied in June or
- Crown vetch > 95% control 1 YAT
- BFT 90-95% control 1 YAT

WHAT ABOUT BIENNIAL WEEDS LIKE WILD PARSNIP?

- Why/where manage
  - Areas where people contact the plant
  - Unmanaged cool season most sensitive
- Does it reduce ecosystem services?
  - No data supports that it has major impacts
    - Plant biodiversity
    - Erosion
WILD PARSNIP HERBICIDE STUDIES

• Can be controlled spring, summer or fall
  • Plants most sensitive in fall
  • Spring applications kill plants that flower and seedlings

• Wide range of herbicides available
  • Match herbicide application to site

EFFECTIVE WILD PARSNIP HERBICIDES

<table>
<thead>
<tr>
<th>Herbicide</th>
<th>Spring</th>
<th>Summer</th>
<th>Fall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glyphosate (many)</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>2,4-D (many)</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Dicamba (many)</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Metsulfuron (Escort)</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Triclopyr (Garlon)</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Aminocyclopyrachlor (Method)</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Aminopyralid (Milestone)</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
</tr>
</tbody>
</table>
HOW MUCH CONTROL CAN YOU GET FROM ONE APPLICATION?

• Effective herbicides applied
  • in spring provide 90-100% control 1 year after treatment (Rosettes)
  • In summer provide 95-100% control 1 year after treatment (Rosettes)
  • In fall provide 100% control following spring
    • seedlings not controlled the following year

RESULTS FROM RECENT STUDY

Number of Rosettes or Seedlings 1 year after treatment

<table>
<thead>
<tr>
<th></th>
<th>rosettes/m²</th>
<th>Seedlings/m²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Untreated</td>
<td>2.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Method 8 oz/A</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Method 16 oz/A Milestone 7 fl oz/A Escort 0.5 oz/A</td>
<td>0.5</td>
<td>0.0</td>
</tr>
</tbody>
</table>
OTHER THINGS TO CONSIDER WHEN CONTROLLED WILD PARSNIP AND OTHER INVASIVES ON ROADSIDES

• Non-target impacts (soybeans)
• Herbicide product restrictions
  • Application restrictions near/in water
  • Where they can be applied (habitat)
• Cost of application
SUMMARY

• Invasive plants can be managed, but require site specific plans to be the most effective
  - Consider goals of land and how invasive plant affects these goals before initiating

• Develop a plan before managing (IVM)
  - Lots of resources and people available to help

• Herbicides are a great tool, but need to use it wisely

QUESTIONS