Preemergent Herbicide Timing Trials: Year 2 Updates

Mike Basedow and Janet van Zoeren, Cornell Extension
Should I apply pre-emergent products in the fall instead of the spring?

+ Excellent weed control
  - Alion, Casoron, Goaltender, Matrix, Chateau + Prowl

+ One less “to-do” come spring

+ Adequate rainfall

- How does fall applied efficacy compare to the same product applied the following spring?

- What if we only use post-emergent herbicides?

- How do these practices impact the trees?
Objective 1

Evaluate the effects of three commonly used herbicide programs on weed species density and diversity throughout the year, over multiple growing seasons, in two commercial field trials.
Field Layout

- 2 rows of NY-1 on M.26 (Albion) or G.935 (Peru) rootstock, planted in 2017 (Albion) and 2018 (Peru)
- 12 trees in each treatment plot
- 6 of 12 trees in each plot also fitted with a Tyvek trunk guard
- Treatment plots randomly distributed in each replicate running down the rows

![Map and Field Image]
**Peru Treatment Timeline**

<table>
<thead>
<tr>
<th>Date</th>
<th>Treatment 1: Fall Applied</th>
<th>Treatment 2: Spring Applied</th>
<th>Treatment 3: Posts Only</th>
</tr>
</thead>
<tbody>
<tr>
<td>11/4/2021</td>
<td>Alion 5 fl oz /Acre + Rely 280 48 fl oz/Acre</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4/26/2022</td>
<td>Select Max 16 fl oz / Acre</td>
<td>Select Max 16 fl oz / Acre</td>
<td>Select Max 16 fl oz / Acre</td>
</tr>
<tr>
<td>4/30/2022</td>
<td>Alion 5 fl oz /Acre + Rely 280 48 fl oz/Acre</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5/11/2022</td>
<td>Rely 280 48oz/Acre</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5/20/2022</td>
<td>Rely 280 48oz/Acre</td>
<td></td>
<td>Rely 280 48 fl oz/Acre</td>
</tr>
<tr>
<td>5/31/2022</td>
<td>Select Max 16 fl oz / Acre</td>
<td>Select Max 16 fl oz / Acre</td>
<td>Select Max 16 fl oz / Acre</td>
</tr>
<tr>
<td>6/3/2022</td>
<td>Milkweed hand cut</td>
<td>Milkweed hand cut</td>
<td>Milkweed hand cut</td>
</tr>
<tr>
<td>6/16/2022</td>
<td>Milkweed hand cut</td>
<td>Milkweed hand cut</td>
<td>Milkweed hand cut</td>
</tr>
<tr>
<td>6/28/2022</td>
<td>Milkweed hand cut</td>
<td>Milkweed hand cut</td>
<td>Milkweed hand cut</td>
</tr>
<tr>
<td>7/7/2022</td>
<td>Glystar Plus 3qt/Acre</td>
<td>Glystar Plus 3qt/Acre</td>
<td>Glystar Plus 3qt/Acre</td>
</tr>
<tr>
<td>8/12/2022</td>
<td>Milkweed and rootsucker hand cut</td>
<td>Milkweed and rootsucker hand cut</td>
<td></td>
</tr>
<tr>
<td>8/16/2022</td>
<td>Gramoxone 3pt/Acre</td>
<td>Gramoxone 3pt/Acre</td>
<td>Gramoxone 3pt/Acre</td>
</tr>
</tbody>
</table>

*Salmon colored treatments applied with a backpack CO₂ sprayer, using a single 8004 nozzle at 34PSI at a volume of 60 GPA. All other treatments applied by grower’s boom sprayer at 60 GPA.
## Albion Treatment Timeline

*all treatments applied with a backpack CO₂ sprayer, using a single 8004 nozzle at 34PSI at a volume of 60 GPA.*

<table>
<thead>
<tr>
<th>Date</th>
<th>Treatment 1: Fall Applied</th>
<th>Treatment 2: Spring Applied</th>
<th>Treatment 3: Posts Only</th>
</tr>
</thead>
<tbody>
<tr>
<td>10/22/2021</td>
<td>Alion 5 fl oz /Acre + Interline 48 fl oz/Acre</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4/30/2022</td>
<td></td>
<td>Alion 5 fl oz /Acre + Interline 48 fl oz/Acre</td>
<td></td>
</tr>
<tr>
<td>6/8/2022</td>
<td>Select Max 16 fl oz / Acre</td>
<td>Select Max 16 fl oz / Acre</td>
<td>Select Max 16 fl oz / Acre</td>
</tr>
<tr>
<td>6/25/2022</td>
<td></td>
<td></td>
<td>Interline 48 fl oz/Acre</td>
</tr>
<tr>
<td>7/29/2022</td>
<td></td>
<td>Interline 48 fl oz/Acre</td>
<td></td>
</tr>
<tr>
<td>8/18/2022</td>
<td></td>
<td></td>
<td>Interline 48 fl oz/Acre</td>
</tr>
</tbody>
</table>
Seasonal Weed Monitoring

Weed cover

Maximum weed height

Weed counts by species at four .25m$^2$ transects randomly within the plot, straddling the drip line

Twice in early spring, every other week May through July (weed-free period), twice in August, twice in late fall
Weed Composition by Site

**Peru – Perennials**
- Quackgrass
- White Campion
- Sowthistle
- Milkweed

**Albion – Winter Annuals**
- Annual bluegrass
- Common chickweed
- Common mallow
Across the weed free period, fall gave the best control, followed by spring, then post only.

Weed cover was lowest in the fall-applied plots on 7 of the 11 dates. Equivalent to spring plots on 3 dates, highest on 1.

Post-emerge plots had highest cover on 6 of the 11 dates, equivalent to spring on the other 5, lower than fall on 1.
Albion Seasonal Weed Monitoring

- Across the weed free period: fall controlled the best, followed by spring, then control (post-emergent only).
- Weed cover was lowest in the fall-applied plots on 4 of the 12 dates. Equivalent to spring plots 6 dates, and to control plots on the other 2 dates.
- Post-emerge plots had highest weed cover on 3 of the 12 dates.

Applications
Fall (2): 10/22, 6/8
Spring (3): 4/30, 6/8, 7/29
Post-only (4): 4/30, 6/8, 6/25, 8/18
11 months of annual weed control

Post-emerge Only Program

Fall- Applied Alion Program
Takeaways from Year 2 with Alion:

- Fall-applied Alion gave excellent weed control, surpassing the spring applied program throughout much of the weed free period at both sites.
- Fall applications take one more thing off the spring to do list.

- Alion is a finicky material:
  - Needs to be applied to bare ground for good activation.
  - Needs to be applied when it won't rain for a solid two days after.
  - Needs to then receive moisture to activate.

- While Alion gave very good control, we saw similar trends from our Chateau + Prowl combo last year, though did not last as long as Alion.

- Post-emergent only program can be done, but constant battle to fight newly emerging annuals.
Other preemergent materials recommended for the fall

Breth et al., 2016

Goaltender, Alion, Chateau + Prowl, Matrix, Casoron, Simazine + diuron, Sinbar, Alion + Matrix all gave excellent control in the fall
Objective 2:
Evaluate the effects of herbicide treatments and trunk guards on tree health.
Can we prevent spray from reaching trunks?

- 10-inch tall Tyvek trunk guards
- Placed on ½ of trees in research block
Trunk guards prevent spray deposition.
Can we prevent spray from reaching trunks?

- Guards led to 98% less contact in WNY ($p=0.0125$), and 98.7% less in ENY ($p=.0008$)
What’s it worth?

- Estimated $326 per acre for materials (high density planting at ~1200 trees/acre)
- Time spent to cut to size and staple in place
- Expected to last 3-5 years
- ~$81/yr/acre + time

- Trunk guards do prevent spray contacting trunk.
- How much does that spray contact affect tree health?
Guarded trees had marginally greater fruit weight in ENY (p=.0427). No significant effects of herbicides or guards on harvest values in WNY.
What’s the impact on tree growth?

No significant effects of herbicides or guards on tree growth in 2022.
No significant impact of herbicides or guards on tree survival.
Trunk Cankers
What’s the impact on canker development?

Trees protected with guards had significantly fewer cankers in WNY ($p=.0418$)
What’s the impact on canker development?

No significant impact of herbicides or guards on canker development in ENY.
Takeaways on Tree Health:

• From 2 years of data, inconclusive impacts of herbicides and guards on canker development

• Effects are expected to be from chronic herbicide exposure, so more years’ data is needed

• Follow-up trial comparing Tyvek guards, vs latex paint, vs no trunk guard is already in the ground
Overall Study Takeaways

• Fall pre-emergent applications = effective weed control with Alion or Chateau + Prowl, no negative effects on tree health to date. We highly recommend putting on a fall material if field conditions permit.

• Consider rotating pre-emergent materials in fall and spring applications, tank-mixed with appropriate post-emergent as needed.

• Trunk guards keep herbicides off trunks, which may reduce canker development, but still somewhat inconclusive results between the two sites. Other concerns like borers and WAA.

• We have submitted a new proposal to evaluate systemic herbicide materials for perennial weed control and for long term trunk protection product evaluation.
Tips for fall preemergent applications:

• Scout your fields. Choose, mix, and rotate products that will best control your weed species mix.

• Apply to unfrozen, bare ground, at the appropriate rate for your soil texture(s).

• Treatments should receive enough water (at least 0.5”) within 7 to 10 days after application so that herbicide can be “activated” (penetrate into the ground) and protected from photo-degradation or volatilization.

• Apply with a “conventional” fixed-boom sprayer calibrated to accurately deliver 40 to 60 gals. of water/A using flat fan nozzles and 30 to 40 psi, unless otherwise stated.

• Apply before targeted weeds germinate. If weeds have already emerged, use a pre-emergent herbicide with post-emergence activity or tank-mix a post-emergence herbicide.
Post-emergent product review

Contact materials

Gramoxone and generics (Paraquat) – small annual broadleaves and grasses

Rely and generics (Glufosinate) – annual broadleaves and grasses

Group 14’s

• Aim, Treevix, Venue – small annual broadleaves

Organic Materials

• Fatty acid derivatives (Final-San-O, Homeplate)
• Caprylic acids (Suppress)
Post-emergent product review

Grass systemics

Group 1’s – Select Max, Poast, Fusilade

Broadleaf systemics

Group 4’s
• 2,4-D (annual and perennial broadleaves)
• Stinger (leguminous weeds and thistles)

Non-selective systemic
• Glyphosate – annual and perennial weeds except sedges
Post-emergent timings

**Contacts** – when weeds are small
- 6” for paraquat, 4” for venue etc.

**Systemic herbicides** – apply at appropriate growth stage listed on the label
- Stinger when Canada thistle between the *rosette up to bud stage*
- Weeds are most sensitive to 2,4-D while *vigorously growing and before flowers appear*. *Post harvest prior to frost* for tough perennials has also worked well in NY
Thank you!

• Thank you NYS Apple Research and Development Program for funding this project!

• Thank you to Drs. Lynn Sosnoskie, Juliet Carroll and Bryan Brown; Andy Galimberti, Liz Tee, and our grower collaborators for their efforts in this project!

• Questions?
  Janet van Zoeren – jev67@cornell.edu
  Mike Basedow – mrb254@cornell.edu
Peru Seasonal Weed Monitoring

Seedlings per m² by Sampling Date - ENY

- **Fall Applied**
- **Spring Applied**
- **No Pre-Emergent**