Management of tough perennial and annual weeds

Kim Patten
WSU Long Beach
Research support by:

- BC Cranberry Growers Association
- WA Cranberry Commission
- Cranberry Institute
- WA State Comm. Pesticide Registration
- USDA NW Center for Small Fruit Research
- Ocean Spray
Outline

– Notes on using Poast and Lontrol
– Maximize herbicide longevity in the field
– Herbicide spray volume effects
– Herbicide timing application
– Surfactants
– Best use of Callisto
– Control of odd weeds
• Notes on using Poast and Lontrol
Poast

- Best activity if not stressed (rapid growing)
- Young plants vs. mature plants
- Fine fescues and annual bluegrass – tolerant
- Perennial grasses and crabgrass and foxtails require higher rates
- Rushes and sedges with grass names – no effects
- Crop damage – can occur with crop oils when temperature is too hot
  - avoid application when temperatures are high, or
  - Use lower rate of COC
  - Use NIS
Lontrel

- Timing and rate is critical for achieving efficacy and avoiding phytotoxicity.
  - Late winter/very early spring window is safe. Multiple applications required to avoid skips. Good for lotus, clover and biannual composites species.
  - Mid-summer OK as long as bud set has occurred, weeds are not too big, and rate is accurate.
• Maximize herbicide longevity in the field
Herbicide fate

<table>
<thead>
<tr>
<th>Sorption</th>
<th>Leaching/runoff</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degradation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Volatilization</td>
</tr>
<tr>
<td>Herbicide</td>
<td>Microbial degradation</td>
</tr>
<tr>
<td>-----------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>Casoron</td>
<td>Slow</td>
</tr>
<tr>
<td>Devrinol</td>
<td>Slow, except where used often</td>
</tr>
<tr>
<td>2,4-d</td>
<td>Rapid (10 days)</td>
</tr>
<tr>
<td>Callisto</td>
<td>Rapid – 50% in 2 weeks</td>
</tr>
</tbody>
</table>
• Herbicide calibration & spray volume effects
Spray Calibration and uniformity
“How many ounces of Lontrel or Callisto do I put in a backpack?”

- It depends on your application volume (some people spray to wet @~ 100 gpa others spray 400 gpa.

- This is one of the main reasons Lontrol has been too hot on cranberries.
Sprayer calibration doesn’t mean much if you screw up and don’t apply as per label instructions
• Application spray volume
  – Herbicide absorption increases with smaller droplet and reduced spray volume (concentrated droplets) compared to larger droplet and higher spray volume (diluted droplets)
    • 2 to 10 gpa is better than 20 to 30 gpa is better than 100 to 200 gpa
    • For some weeds it doesn’t matter; for others it does.
    • We found some Lily control was achieved with Callisto when it was applied at ultra-low volume, but not at traditional volumes
• Herbicide timing application
  – Stage of weed and cranberry development
  – Timing for rain events
Stage of plant development

– Poast: best - young tender; worst – old and tough

– Callisto:
  • Annuals: best- young tender; worst- large, already seeded
  • Perennials: best – wait for first flush & treat, then treat again second flush; worst – mid-season, mature plants

– Lontrel: best – smaller canopy, no cranberry growth, worst – roughneck to hook
• Dry Time
  – Callisto - rainfast in one hour.
  – Lontrel - 6-hour rain-free period
  – Poast - rainfast in one hour
• Surfactants
<table>
<thead>
<tr>
<th></th>
<th>NIS</th>
<th>MSO</th>
<th>COC</th>
<th>Silicon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grass Herbicides</td>
<td>0.25% v/v</td>
<td>1%</td>
<td>1%</td>
<td></td>
</tr>
<tr>
<td>Lontel</td>
<td>NO!</td>
<td>NO!</td>
<td>NO!</td>
<td>NO!</td>
</tr>
<tr>
<td>Roundup type</td>
<td>NO!</td>
<td>NO!</td>
<td>NO!</td>
<td>NO!</td>
</tr>
<tr>
<td>products</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Callisto</td>
<td>0.25%</td>
<td>maybe</td>
<td>1% or less</td>
<td>maybe</td>
</tr>
<tr>
<td>2,4-D</td>
<td>NO!</td>
<td>NO!</td>
<td>NO!</td>
<td>NO!</td>
</tr>
</tbody>
</table>

Callisto label states “use NIS instead of COC to reduce crop injury. COC will provide increased weed control over a NIS.”

In general expect ~ 5-10% reduction in efficacy (minor) when switching from a COC to NIS.
Outline

– Best use of Callisto
Callisto

- Has pre and post emergent activity
- Half-life in soil 5 to 15 days
- Little runoff or soil mobility
- Label says –
  - Always include 1% v/v crop oil concentrate and either 2.5% UAN or 8.5 lb/100 gal AMS. Do not use methylated seed oils.
  - We haven’t seen much benefit from UAN or AMS
  - We haven’t seen much difference using MSO
- Label says -
  - Do not tank mix with emulsifiable concentrate grass herbicides (Poast).
  - We haven’t seen any difference in crop damage
# Callisto performance by weed species

<table>
<thead>
<tr>
<th>Weed</th>
<th>Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silver leaf</td>
<td>Excellent – 2 applications (April &amp; June)</td>
</tr>
<tr>
<td>Purple Aster</td>
<td>Excellent – 2 applications (May/June &amp; July/Aug)</td>
</tr>
<tr>
<td>Lotus</td>
<td>Excellent – 2 applications (April &amp; June)</td>
</tr>
<tr>
<td>Arrowgrass</td>
<td>Poor</td>
</tr>
<tr>
<td>Fern</td>
<td>Good</td>
</tr>
<tr>
<td>Louse grass &amp; other small rushes</td>
<td>Excellent – if applied when young, poor- fair once old or flowering</td>
</tr>
<tr>
<td>Buttercup</td>
<td>Fair- regrowth after every application</td>
</tr>
<tr>
<td>St. John’s Wort</td>
<td>Good – if young and 2 applications</td>
</tr>
<tr>
<td>Tussock</td>
<td>Excellent if very young, otherwise poor</td>
</tr>
<tr>
<td>“Sedges”</td>
<td>Good if young</td>
</tr>
<tr>
<td>Clover</td>
<td>Poor</td>
</tr>
<tr>
<td>“Grasses”</td>
<td>Good if young</td>
</tr>
<tr>
<td>Yellow weed</td>
<td>Poor, will prevent seeding and reduce height</td>
</tr>
<tr>
<td>Sourgrass</td>
<td>Poor</td>
</tr>
<tr>
<td>Lily</td>
<td>Poor</td>
</tr>
</tbody>
</table>
Silverleaf % control

2005

2006

Callisto vs. Casoron
Yield (bbl/ac)

2005

Callisto vs. Casoron

2006
% bare control after two years of treatment
June 2006

Callisto vs. Casoron
Callisto – silverleaf control at 11 very weedy experimental sites

- Two applications of Callisto @ 8 oz/ac April and June
  - First treatment year
    - Mean late season Silverleaf control 92%
    - Mean yield increase compared to untreated control 33%
  - Second treatment year
    - Mean yield increase compared to untreated control 412%
Surfactant effects – Callisto
(8 studies for phytotoxicity and efficacy across several weed species)

• Methylated seed oil
  – Hasten, Competitor
• Silicon hybrid
  – Kinetic
• Crop Oil
  – Agridex, Moract
• Non Ionic
  – Li700, X77
• Invert emulsion
  – Thinvert
• Crop oil hybrid with 21-0-0
  – Bronco Total
Surfactant effects – Callisto

• False Lily of the Valley: Invert emulsion >> COC w/ 21-0-0 > Silicon Hybrid > all others

• Yellow Weed: Silicon Hybrid > COC w/ 21-0-0 or = all others

• Sour Grass: MSO+ 21-0-0 > others

• Cranberry phytotoxicity: Silicon hybrid > all others

Summary
• No single best treatment.
• Differences for the most part were minor.
• Spray volume might be a more significant variable.
• Lily control using an invert emulsion appears promising.
My surfactant recommendations for Callisto

Low volume broadcast – 1 qt/ac COC or 0.25 % NIS based on conditions*

Higher volume sprays – 1% COC or 0.25 to 1% NIS based on conditions*

*Conditions where phytotoxicity might occur
  • high temperatures
  • low temperature
  • high humidity
  • lush tender growth

* Not all COC are created equal with respect to problems with phytotoxicity.

* Some weeds may require the addition of AMS or UAN to improve herbicide efficacy. Use sparingly if phytotoxicity is a concern. We haven’t seem much improvement in efficacy

* When in doubt use 0.25% NIS
• Control of various weeds
  – Perennial weeds
  – Annual weeds
First step - prevent seed production

<table>
<thead>
<tr>
<th>Species</th>
<th>Seeds/plant</th>
<th>Longevity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barn yard grass</td>
<td>7,000</td>
<td>3 - 5 years</td>
</tr>
<tr>
<td>Smart weed</td>
<td>3,000</td>
<td>5 – 10 years</td>
</tr>
<tr>
<td>Silverleaf</td>
<td>4,000/m²</td>
<td>4 years</td>
</tr>
<tr>
<td>Lotus</td>
<td>10,000</td>
<td>20 to 60 years</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Up to 1000 years in peat beds</td>
</tr>
</tbody>
</table>
Perennial Weeds

• Buttercup – wait for the “new herbicide” with registration pending (07 or 08). This new product results in no crop damage, works across most all application windows and is fairly cheap.
• Loosestrife – products that work are in the pipeline, suppress with Callisto?
• Sheep sorrel – winter Lontrel + summer Callisto to suppress
• Blackberry – wiping, cut stem application?
• Bog violet- Callisto early
• Grey sedge- Callisto early
Callisto plots – Marsh Violet  July application
## Callisto for Horsetail

<table>
<thead>
<tr>
<th></th>
<th>% control June</th>
<th>% control August</th>
</tr>
</thead>
<tbody>
<tr>
<td>Callisto–April &amp; May</td>
<td>16</td>
<td>0</td>
</tr>
<tr>
<td>Callisto -April, May &amp; June</td>
<td>75</td>
<td>89</td>
</tr>
<tr>
<td>Casoron 35# - April</td>
<td>67</td>
<td>64</td>
</tr>
<tr>
<td>Callisto for Yellowweeds</td>
<td>% control - June</td>
<td>% control - Aug</td>
</tr>
<tr>
<td>--------------------------</td>
<td>------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Control</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Callisto 5/5 &amp; 5/25 w/ COC</td>
<td>26</td>
<td>28</td>
</tr>
<tr>
<td>Callisto 5/5 &amp; 5/25 w/ Kinetic</td>
<td>29</td>
<td>40</td>
</tr>
</tbody>
</table>
Vinegar for False lily-of-the-valley control
Best treatments of several experiments

<table>
<thead>
<tr>
<th>Date of treatment</th>
<th>% Acetic acid</th>
<th>Application volume (gpa)</th>
<th>Washoff Volume (gpa x10^3)</th>
<th>Lily (% control)</th>
<th>Vine damage rating*</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/25/04</td>
<td>3</td>
<td>8000</td>
<td>2500</td>
<td>97</td>
<td>2</td>
</tr>
<tr>
<td>3/23/05</td>
<td>4</td>
<td>5000</td>
<td>2500</td>
<td>89</td>
<td>2.1</td>
</tr>
<tr>
<td>4/20/05</td>
<td>4</td>
<td>6000</td>
<td>2500</td>
<td>97</td>
<td>3.3</td>
</tr>
</tbody>
</table>

*1=none, 5=dead

2006 Treatments – 3, 4 & 5 % acetic acid @ 7500 gpa; 5% @ 5000 gpa, all with 2500 gpa washoff (late March/early April).
Summary – three years of vinegar experiment

- Timing – late April
- Rate – 4 to 5% acetic acid
- Volume – 7500 gpa
- Washoff- 2500 gpa
- Inconsistent effects occurred on highly saturated and poorly drained peat or muck soils.
- Most consistent efficacy occurred on sandy well drained soils.
Annual Weeds

• Herbicides
  – barnyard grass & witchgrass – Poast when small
  – sweet vernalgrass – Poast when small or during over-wintering
  – vetch - Callisto
  – bedstraw – Callisto

• Prevent Seeding (1000’s per plant)
• Use ultra low-spray volumes to minimize bed traffic