**Pest Control**

**Weed control & New varieties**

Kim Patten
360-642-2031
pattenk@wsu.edu

---

**Lotus management**

- Long-lived (40 years) seeds with prolonged germination during summer
  - Prevent from seeding – or you’ll be fighting its control for next 40 years
- Slow canopy development in spring makes it hard to find and successfully treat with Stinger.
  - Post-harvest mapping /flagging
  - Spot treatments of winter Stinger
  - High spray volumes (200 gpa) to get under canopy
  - Treat areas bigger than infested zone
- Lotus very susceptible to Callisto, but only if treated early
  - Post-harvest mapping /flagging
  - High spray volumes (200 gpa or chemigation) to get under canopy
  - Treat twice
  - Don’t let the canopy gets too big before treatment.
  - Treat areas bigger than infested zone

**Prevent from seeding, early season treatment with Stinger followed by Callisto**

---

**Perennial grass management**

- Single plants can produce up to 10,000 seeds, seeds remain viable from 2 to 7 years, and germinate late when soil temperature warms up
  - Consider removing seed heads prior to their maturity
  - Spray out all off-bed infested sites
  - Don’t let new plants get infested
- Pre-emergence control
  - Devrinol provides good grass control, but unlikely to provide season long efficacy.
- Post-emergence control
  - Select (30 day PHI)
    - Treat early to late spring while vigorous
    - May require two or more treatments
  - Callisto (45 day PHI)
    - Only works on some grass species
    - Not very well on perennials
    - Ok if new seedlings

**Prevent seeding establishment, control with Select**

---

**Purple Aster Management**

- Late emergence makes management difficult
  - Prevent from seeding
  - Consider fumigation of new planting if there is rich seed bank
  - Difficult to hand pull and not rip up cranberries
- Casoron effective for suppression only
  - Requires high rates & effect might wear off by mid-season.
  - Use on established beds as last resort
- Callisto for suppression &/or control
  - Requires >1 application, early timing, lower spray volumes.
  - Mixed report of success from growers.
  - Carefully monitor new plantings and treat when first observed.
- Partial control/suppression with Stinger possible
  - Wiping after bud set
  - Broadcast early post-harvest

**Prevent from seeding and establishment in new beds, Callisto effective, but requires persistence**

---

**Yellow loosestrife management**

- Spreads rapidly from seeds, rhizomes and bulblets
  - Good bed sanitation following harvest to prevent spread
- Late spring Casoron will suppress
  - Doesn’t provide permanent control, long-term use will damage bed, suggest alternative year usage
- Early Callisto will reduce height and prevent bulblets
  - Not really a viable option
- Wiping with Roundup
  - Difficult to do when height suppressed with Casoron or Callisto
  - Only a few growers have been successful with this treatment
- New herbicides look very promising

**Prevent from spreading with good sanitation, Casoron to suppress, Improve drainage**

---

**Blackberries/brambles management**

- Some susceptibility to Callisto
  - Each species a little different in their susceptibility
  - Growers report varying degrees of success based on rate and frequencies (within year and across years)
- Wiping
  - Upright species reasonable easy
  - Consider using Roundup in lanolin as dormant season hand application
  - Trailing species not wipeable without special precautions such as staking.

**Wiping and maybe Callisto**
Silverleaf management

- Deep-rooted, swollen rhizomes with large food reserves, seeds medium-lived 3 years, with ~100 seeds per flower
  - Difficult to control on long-established beds
- Pre-emergence control
  - Casoron for suppression, high rate on peat, low split applications on sand
- Post-emergence control
  - Callisto efficacy ranges for suppression (one application) to complete control (two applications/yr for several years)
  - Timing is important: one early when weed canopy first full developed, second when weed canopy regrowth has occurred.

Callisto usually adequate, if not suppress with Casoron

Blackhead fireworm management without diazinon

- Most new alternative chemistries are showing good efficacy with broadcast applications - chemigation is the problem.
- Ovicides
  - One new chemistry, with label pending, but we don’t know how to use it for this purpose or if it works.
- Larvicides – getting closer
  - Efficacy with broadcast
    - Success/Entrust: OK to good @ right timing
    - Confirm: OK@ right timing
  - Intrepid: OK to good@ right timing
  - Efficacy with chemigation
    - Success/Entrust: poor to OK@ right timing
    - Delegate: good at high rate & right timing

Blackhead fireworm management without diazinon

- First generation (good control critical to reduce population base and avoid damage from 2nd generation)
  - Sweep net in May, especially along warm edges
  - Timing for Intrepid or Confirm is 2 weeks after onset of moth flight and again 10 days later (Not 10 days after peak moth flight).
  - Intrepid or Confirm are bee safe; Spinosyn products are moderately toxic to bees.

Blackvine Weevil management

- All individuals are females and very fecund: an overwintering adult lays 600-700 eggs, new adults lay 200 to 300 eggs
  - High fecundity requires >95% control for success
- Adulticides
  - Orthene – knockdown only
  - Avaunt – good tool, apply two – three times, 10 to 14 days apart, based on sweep counts. Start at first adult emergence
  - Assail – OK, but not great
  - Sodium silicofluoride-based baits: poor to fair
  - Aclara – poor
  - Rimon – poor to fair
- Larvicides
  - Entomopathogenic Nematodes – several species, efficacy variable from fair to good, not always predictable, $, requires exacting application
  - Entomopathogenic Fungus – label pending, initial data from USDA/OSU looks promising
  - Several insecticides in US, variable efficacy with nothing too great
  - Admire: good on sand, poor on peat

Avaunt is a great tool for BVW control, but don’t assume it will be 100% effective. Scout for damage, larvae, adults and notching yearly.
## Insecticide Bee Toxicity

<table>
<thead>
<tr>
<th>Insecticide</th>
<th>Bee Toxicity (µg/bee)</th>
<th>Rate used (lbs/ac)</th>
<th>Relative risk quotient (use rate/toxicity)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admire</td>
<td>0.0037</td>
<td>0.5</td>
<td>135</td>
</tr>
<tr>
<td>Success</td>
<td>0.003</td>
<td>0.15</td>
<td>50</td>
</tr>
<tr>
<td>Lorsban</td>
<td>0.06</td>
<td>1.5</td>
<td>25</td>
</tr>
<tr>
<td>Diazinon</td>
<td>0.09</td>
<td>2</td>
<td>22</td>
</tr>
<tr>
<td>Actara</td>
<td>0.024</td>
<td>0.4</td>
<td>16</td>
</tr>
<tr>
<td>Delegate</td>
<td>0.11</td>
<td>.13</td>
<td>1</td>
</tr>
<tr>
<td>Assail</td>
<td>8.09</td>
<td>0.1</td>
<td>0.01</td>
</tr>
<tr>
<td>Avaunt</td>
<td>17.32</td>
<td>0.1</td>
<td>0.01</td>
</tr>
<tr>
<td>Intrepid</td>
<td>100</td>
<td>0.25</td>
<td>0.002</td>
</tr>
</tbody>
</table>

The lower the risk quotient the safer the insecticide for bees.

## Vole Control

- None registered on beds, use on dike (non producing ground) only
- PNW raspberry industry uses
  - Weatherblock XT
  - Rozol Pellets
- Works best when very cold and dry
- Bait must be available until the vole population is controlled.
  Therefore use for several weeks until feeding is no longer observed.
- Winter is best time to control

<table>
<thead>
<tr>
<th>Active ingredient</th>
<th>Toxic to mammals</th>
<th>Method of application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rozol Pellet</td>
<td>Chlorophacinone</td>
<td>low Drop down holes</td>
</tr>
<tr>
<td>Weatherblock XT</td>
<td>Brodifacoum</td>
<td>high Bait stations only</td>
</tr>
</tbody>
</table>

## Deer Management - How

- Chemical – no repellents have approval for food use
- Frightening tactics for small acreage
  - Need two senses (sight and sound) to be effective
  - 24-hour talk radio, flash tape, and motion type devices, propane exploder.
- Fences.
  - poly or steel wire
  - A straight ten-foot fence provides poor barrier to a deer determined
  - A 7-foot fence inclined at a 25° angle out from the vertical – better.
- Electric fences (inclined better than straight up and down)
- Gun

## New Variety Trials

<table>
<thead>
<tr>
<th>Variety</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘Crimson Queen’</td>
<td>1.56</td>
<td>1.56</td>
<td>1.58</td>
<td>1.57</td>
</tr>
<tr>
<td>‘Mullica Queen’</td>
<td>1.52</td>
<td>1.42</td>
<td>1.38</td>
<td>1.44</td>
</tr>
<tr>
<td>‘Willapa Red’</td>
<td>1.11</td>
<td>1.00</td>
<td>1.13</td>
<td>1.08</td>
</tr>
<tr>
<td>‘Pilgrim’</td>
<td>1.48</td>
<td>1.31</td>
<td>1.38</td>
<td>1.39</td>
</tr>
<tr>
<td>‘Stevens’</td>
<td>1.09</td>
<td>1.10</td>
<td>1.16</td>
<td>1.12</td>
</tr>
</tbody>
</table>

## Fruit Size

<table>
<thead>
<tr>
<th>Variety</th>
<th>3 year average % Rot</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crimson Queen</td>
<td>Field</td>
</tr>
<tr>
<td>Mullica Queen</td>
<td>Field</td>
</tr>
<tr>
<td>Willapa Red</td>
<td>Field</td>
</tr>
<tr>
<td>‘AR2’</td>
<td>Field</td>
</tr>
<tr>
<td>‘Pilgrim’</td>
<td>Field</td>
</tr>
<tr>
<td>‘Stevens’</td>
<td>Field</td>
</tr>
<tr>
<td>Field</td>
<td>Storage</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variety</th>
<th>Field</th>
<th>Storage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crimson Queen</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mullica Queen</td>
<td></td>
<td></td>
</tr>
<tr>
<td>‘AR2’</td>
<td></td>
<td></td>
</tr>
<tr>
<td>‘Pilgrim’</td>
<td></td>
<td></td>
</tr>
<tr>
<td>‘Stevens’</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Winter Management

- Chemical – no repellents have approval for food use
- Frightening tactics for small acreage
  - Need two senses (sight and sound) to be effective
  - 24-hour talk radio, flash tape, and motion type devices, propane exploder.
- Fences.
  - poly or steel wire
  - A straight ten-foot fence provides poor barrier to a deer determined
  - A 7-foot fence inclined at a 25° angle out from the vertical – better.
- Electric fences (inclined better than straight up and down)
- Gun
Comparative Yields
Willapa Red vs. Pilgrim & Stevens

DNA purity of Pilgrims: Runner vs uprights

Trace change in DNA purity of Pilgrim over time when prunings are used for new plantings

Early color, disease resistance, & canopy characteristics

Comparative purity of Pilgrim uprights and runners off the same bed