

# Effective management strategies for weeds, insects and diseases.

Kim Patten

[pattenk@wsu.edu](mailto:pattenk@wsu.edu)



*World Class. Face to Face.*

# Weed Management

## Problematic Weeds

- Late germination species escaping pre-emergence and early post-emergence
  - Vetch, barnyard grass, lotus
- Weeds resistant to our current herbicides
  - Yellow loosestrife
- Weeds controlled with full rates of Casoron, but you'd rather not use
  - Sheep sorrel
- Weeds suppressed but not controlled with Callisto or Casoron
  - Silverleaf, buttercup
- Weeds suppressed/controlled with wiping – but not always very practical
  - Blackberries/brambles

# Lotus management

- Long-lived (40 years) seeds with prolonged germination during summer
  - Prevent from seeding – or you'll be fighting its control for the next 40 years
- Not tolerant to overly acid soils
  - Spot treatment with elemental sulfur in summer can be a useful tool, but may backfire if not done correctly (multiple applications of low rates)
- Slow canopy development in spring makes it hard to find and successfully treat with Lontrel.
  - Post-harvest mapping /flagging
  - Multiple spots treatments of early spring Lontrel
  - 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) to get under canopy
  - Treat areas bigger than infested zone

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

# Vetch management

- Long-lived (40 years) seeds with late germination during summer
  - Prevent from seeding – or you'll be fighting its control for next 40 years
- Plant canopy develops too late to be easily treated with Callisto.
  - Map hotspots and treat with Callisto on spot basis when observed or treat hot spots proactively using high spray volumes to get germinating vetch under canopy

**Prevent from seeding; control with Callisto before canopy gets too big**

# Annual and perennial grass management

## Barn yard grass

- 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. Needs to be watered in ASAP. Ditto for Casoron, but maybe less control.
- Post-emergence control
  - Use Venture L on new plantings only
  - Poast Ultra (60 day PHI)
  - Callisto (control best on small plants, can be compromised on large plants)



**Prevent from seeding; control with grass herbicide if possible**



# Buttercup management

- Deep-rooted, spreads fast (one plant can cover 40ft<sup>2</sup> /year, long-lived (20 to 80 years) seeds
  - Difficult to hand pull
  - Abundant seed populations in sand piles, in beds, along dikes.
  - Treat roads, dikes (non-bed area) with selective herbicides to prevent spread.
  - Important to use herbicide (Callisto, Casoron and Devrinol ) to prevent new seedlings from becoming difficult to control adults
- Callisto and Devrinol at label rates only suppress mature plants
- New herbicide very effective
  - WA 3<sup>rd</sup> party 24C label ?2010?
  - BC needs to try to follow suit.

**Prevent new infestations; suppress with Callisto**

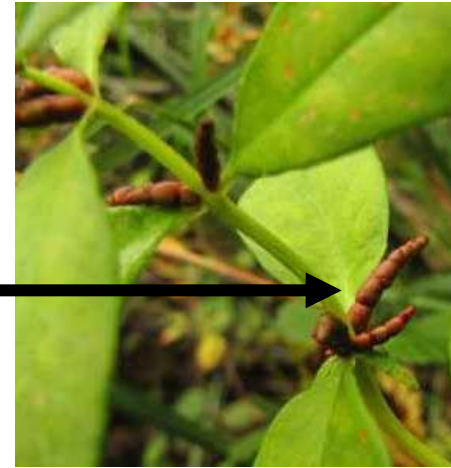
# Sheep sorrel management

- Extensive deep horizontal roots, creeping rhizomes and long-lived (10 to 20 years) seeds make management difficult
  - Prevent from seeding
  - Consider fumigation of new plantings if there is rich seed bank
  - Difficult to hand pull and not rip up cranberries
- Casoron effective as pre-emergent and partial post-emergent herbicide
  - Requires high rates
  - Effect might wear off by mid-season.
  - Use on established beds as last resort
- Not very susceptible to label rates of Callisto, unless new seedlings
  - Carefully monitor new plantings and treat when first observed.
- Partial control/suppression with Lontrel possible
  - Multiple treatments starting early post-harvest and again in early spring
  - Results have been mixed.
- New herbicides are looking promising.

**Prevent from seeding and establishment in new beds.  
Try Casoron, early post-emergent Callisto & winter Lontrel**

# 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
- Early Callisto will reduce height and prevent bulblets
  - Not really a viable option
- Wiping with Roundup
  - Difficult to do when height is suppressed with Casoron or Callisto
  - Only a few growers have been successful with this treatment
- New herbicides look promising



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



# Blackberries/brambles management

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

**Wiping and maybe Callisto**

# Silverleaf management

- Deed 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 fully developed, second when weed canopy regrowth has occurred.

**Callisto usually adequate, if not suppress with Casoron**

# Insect Management

## Problematic Insects

- Inadequate control by Diazinon
  - Tipworm
- Lack of good OP alternative
  - Tipworm, fireworm, girdler
- Lack of any cost-effective control
  - Weevil, girdler

# Blackvine weevil management

- All individuals are females and very are fecund; an overwintering adult lays 600-700 eggs, new adults lay 200 to 400 eggs
  - High fecundity requires >95% control for success
- Adulticides
  - Orthene – knockdown only
  - Several effective insecticides in US, label pending for some in Canada
- 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,
  - Flooding still best option if available

# Blackheaded 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 in Canada, but we don't know how to use it for this purpose or if it works.
- Larvicides – getting closer
  - Efficacy with broadcast
    - As: OK
    - Al: OK to good
    - Es: poor
    - Ve: OK
    - Be: OK
    - Av: good
    - Alv: OK
    - Ri: OK
    - Ov: OK
    - Success/Entrust: OK
    - Delegate: good
    - Ca: OK
    - Intrepid: OK
  - Efficacy with chemigation
    - As: poor
    - Al: poor
    - Be: poor
    - Av: poor
    - Alv: poor
    - Delegate: good at high rate
    - Intrepid: OK with early timing

# Blackhead fireworm management without diazinon

- Order of activity (rule of thumb)
  - Delegate > Success/Entrust =Intrepid >Confirm
- Activity on different larvae sizes
  - small (1<sup>st</sup> or 2<sup>nd</sup> instars): Confirm, Intrepid, Success, Delegate
  - Medium to large: high rate of Delegate
- Chemigation (rule of thumb)
  - Rinse off under 6 minutes: Confirm, Intrepid, Success, low rate Delegate
  - Rinse off under 8 minutes: high rate of Delegate
- Retreatment
  - 6 hours drying time following application is required; retreat if rain or frost protection interfered.
  - New growth is not protected.
  - Residual effect 7- 10 days, retreatment recommended
  - Asynchronous hatch, retreatment recommended
  - Previous history of infestation, retreatment required

# Blackhead fireworm management without diazinon

- First generation (good control critical to reduce population base and avoid damage from 2<sup>nd</sup> generation)
  - Sweep net in May, especially along warm edges
  - When small larvae are found on rim of net spray – Treat ASAP with Confirm, Intrepid, Success
  - Sweep again in a week to assess efficacy, and retreat
  - If large larvae found use Delegate
- Second generation
  - Pheromone trap for timing, but also consider using a sweep net
  - 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.
  - If larvae reached large size (sweep net sample), Delegate is a preferred choice.

# Tipworm 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 in Canada, but we don't know how to use it for this purpose or if it works.
- Larvicides – getting closer
  - Efficacy with chemigation (WSU data)
    - Alt: fair
    - Alv: poor
    - As: poor (has tipworm on label in US, grower reports mixed)
    - Av: poor
    - Be: poor
    - Delegate: poor
    - Diazinon: good
    - Est: fair
    - Gn: poor
    - Mov: good
    - Ri: poor
    - Te: poor



# Tipworm Management

- Regardless of control method it is still problematic
  - Overlapping generations
  - Difficult to monitor for
  - Timing of application
- Solution to above pending

# Insect management

- Regardless of insect or control method, precaution for pollinators is critical
  - Some new chemistries are not without risk
  - Follow label
  - Apply in evening

Insecticide	Bee Toxicity LD50 ( $\mu\text{g}/\text{bee}$ )	Rate used (lbs/ac)	Relative risk quotient (use rate/ toxicity)
Admire	0.0037	0.5	135
Success	0.003	0.15	50
Diazinon	0.09	2	22
Delegate	0.11	0.13	1
Ava	17.3	0.1	0.01
Intrepid	100	0.25	0.002