Cranberry Fruitworm: What to use and when?
2016: What's Legal?

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Cranberry fruitworm: What to use and when?!?

2016: what’s legal
Changes in **Cranberry Fruitworm** Recommendations

- Removal of Sevin, Lorsban, and Diazinon (Assail and Imidan) for first and second fruitworm applications
- Can use Sevin and Diazinon after bloom is complete  
  - 7-10 days after 50% out of bloom
- Likely loss of Lorsban
- Altacor, Intrepid, and Delegate are choices during bloom.
- Why move to Altacor
  - lasts longer, 3 days vs 10 days
  - Covers cfw and spag
  - Doesn’t wipe out your bees
  - Legal not illegal
CFW Review

• Change in timing
  – 2010, 1\textsuperscript{st} CFW spray at 50% out of bloom

• Change in varieties
  – Trending to larger varieties, over 10 years

• Change in compounds

• Change in mode of action
  – OP’s phasing out, new chemistries different
<table>
<thead>
<tr>
<th>Formulation</th>
<th>RATE</th>
<th>active ingredient</th>
<th>EFFICACY</th>
<th>BEE TOX</th>
<th>COST</th>
<th>Residual for CFW control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Altacor</td>
<td>4.5 oz</td>
<td>chlorantraniliprole</td>
<td>XXX</td>
<td>non-toxic</td>
<td>$50-57</td>
<td>7-14 days</td>
</tr>
<tr>
<td>Intrepid 2F</td>
<td>16 fl oz</td>
<td>methoxyfenozide</td>
<td>XX</td>
<td>non-toxic</td>
<td>$27-30</td>
<td>3-7 days</td>
</tr>
<tr>
<td>Delegate WG</td>
<td>6 oz</td>
<td>spinetoram</td>
<td>XXX</td>
<td>toxic until dry</td>
<td>$45-47</td>
<td>7-10 days</td>
</tr>
<tr>
<td>Diazinon AG 500</td>
<td>3 qt</td>
<td>diazinon</td>
<td>XX</td>
<td>Highly toxic</td>
<td>$33</td>
<td>3-5 days</td>
</tr>
<tr>
<td>Diazinon AG600 WBC</td>
<td>76.5 oz</td>
<td>diazinon</td>
<td>XX</td>
<td>Highly toxic</td>
<td>$36</td>
<td>3-5 days</td>
</tr>
<tr>
<td>Assail 30 SG</td>
<td>6.9 oz</td>
<td>acetamiprid</td>
<td>XX</td>
<td>toxic</td>
<td>$37</td>
<td>3-5 days</td>
</tr>
<tr>
<td>Lorsban Advanced</td>
<td>3 pts</td>
<td>chlorpyrifos</td>
<td>XX</td>
<td>Highly toxic</td>
<td>$16</td>
<td>3-5 days</td>
</tr>
<tr>
<td>Sevin XLR Plus</td>
<td>2 qt</td>
<td>carbaryl</td>
<td>XX</td>
<td>Highly toxic</td>
<td>$27</td>
<td>3-5 days</td>
</tr>
<tr>
<td>Sevin 4F, Carbaryl 4L</td>
<td>2 qt</td>
<td>carbaryl</td>
<td>XX</td>
<td>Highly toxic</td>
<td>$25</td>
<td>3-5 days</td>
</tr>
</tbody>
</table>

Highly recommended for first fruitworm at 50% out of bloom.
This compound will work OK on fruitworm eggs as they hatch.
Excellent compound but doesn’t last as long as Altacor. Effective for both egg and larvae management. Better choice for later applications.
Handler restrictions after 6/22.
Handler restrictions after 8/1.
Handler restrictions after 8/1.
Why Altacor?

- Last longer – 7-14 days
- Doesn’t kill bees or fish
- It’s legal
- Works great!
- Target eggs as they are hatching

Why not Altacor?

- $$$ too expensive
- Crappy chemigation system
Why not Intrepid?  Why not Delegate?

- Ya cheaper, but shorter lived
- Simply not as active
- Watered down through chemigation
- Larvae don’t usually die until they get into berry
- Zone II
- Show graph from Agawam

- Hard on your bees
- Not as long lived as Altacor
- Better as a cleanup spray, on larvae
- Save for chasing Spag or cfw if they get through
**Why not Diazinon or Sevin?**

- Ya cheaper, but shorter lived, 3 days not 10
- It is **NOT** legal during bloom, must wait until 7-10 days after 50% out of bloom
- Simply not as active
- It kills your bees
- It kills all your beneficials
  - Trichogramma
  - P. franklini
  - Lady bugs
- DOES not work as well

DIAZ AG500 - This pesticide is highly toxic to bees exposed to direct treatment or to residues on blooming crops or weeds. Do not apply this pesticide or allow it to drift to blooming crops or weeds if bees are visiting the treatment area.

- Save for chasing flea beetle or later cfw sprays
2008

2 sprays a week apart, then checked a week later

% CFW infestation

A graph showing the percentage of CFW infestation for different treatments. The treatments are Diamide 4oz, Diamide 2oz, Assail, Delegate, Intrepid, Diazinon, Neo 2, Neo 1, and Control. The graph indicates that the best choice is Neo 1, followed by Diazinon, Neo 2, Delegate, and Intrepid, with the others having lower effectiveness.
Plot assessment 8/21 (over a month from first check)

0 = No control
5 = Best control

Average plot rating

Control, Neo 1, Neo 2, Assail, Diazinon, Intrepid, Delegate, Diamide 2 oz, Diamide 4 oz

Best residual

2008
Results 2009 trial:
28 Days after Treatment

% infested berries

CONTROL
CFW Crisps

• When egg hatches, larvae walk up surface of berry to top of the stem where they align with stem to drill in.

• Exposed to enough pesticide to be toxic, or take one bite at top
  – Intrepid
  – Altacor
  – Delegate
Viable Eggs

Green Egg – just laid
Viable Eggs

Orange-lined Egg (blood stage)
Hatched Eggs

CFW egg stages
Parasitized egg

Black egg - trichogramma

CFW egg stages
Dead Eggs

Dried up – shrivelled up

CFW egg stages

moldy
Hatched Eggs

Hatched egg and dead larvae

Hatched egg and dead egg
Hatched egg
deaf larvae in calyx
Hatched egg, larvae at pedicel end hole started but never finished
Hole but never made it in at pedicel end
This is the number one pest on cranberry and is present on all bogs. Moths are flying in June just waiting for any pinheads to start sizing up. For most bogs, a properly timed first cranberry fruitworm spray is the most important one of the season.

**Bolded selections are the best choices for management. All rates are per acre.**

<table>
<thead>
<tr>
<th>Late Water</th>
<th>Holding late water is an excellent cultural practice that severely reduces fruitworm. However, moths may move into late water-treated beds from other areas of infestation, so it is advisable to spot check for eggs. Refer to Late Water Practice for fruitworm on next page.</th>
</tr>
</thead>
</table>

**Early fruitworm spray options, when bloom is present (6/20-7/10):**

<table>
<thead>
<tr>
<th>Altacor chlorantraniliprole</th>
<th>Highly recommended for first fruitworm at 50% out of bloom. This compound is superior to all others and targets the eggs as they hatch. Timing is end of June, early July. This compound should NOT be used as a “clean-up” spray after mid-July, it does not work well on larger larvae. 2 applications are allowed but they should be spaced at least 7 days apart while spacing at 10-14 is better as it has very long residual. Low rinse time required for efficacy. Do not exceed 9 oz/season. Bee safe!</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Intrepid 2F methoxyfenozide</th>
<th>This compound will work OK on fruitworm eggs as they hatch. It allows some larvae to get into fruit before dying. It does not harm bees. FIFRA 2EE recommendation. Zone II restricted. Ground applications only are highly effective. Chemigation gives moderate to good level of control in well-timed systems. Safe for bees and natural enemies! 4 applications allowed at the 16 oz. rate. Medium lived residual.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Delegate WG spinetoram</th>
<th>Excellent compound but doesn’t last as long as Altacor. Effective for both egg and larvae management. Better choice for later applications after Altacor is used. Medium lived residual. FIFRA 2EE recommendation. 3 applications allowed at the 6 oz. rate. Do not exceed 19.5 oz/season. Highly toxic to bees, but thoroughly dried residues are safe. Thus, sprays must go on at night and dry by morning if sprayed during bloom.</th>
</tr>
</thead>
</table>
Anthranilic diamides

• Cause paralysis in insects by sustained contraction of muscles

Altacor

• Activates the calcium release channel of the muscle network

• Locks open the calcium channel
DEAD FROM
ALTACOR

CFW egg stages
Larvae contract to half the size of untreated larvae within 1-2 hours post application.
Made it thru spray

• Silk door protecting larvae inside

• Frass outside showing that larvae is eating your berry!

• If Intrepid, larvae will get into fruit, but usually die.
Made it thru spray
eat 2 to 4 berries
develop into next years problem

We feel, that we are seeing less large populations
year to year already because of Altacor!
Later fruitworm spray options, once bloom is gone (after 7/10):

<table>
<thead>
<tr>
<th>Product</th>
<th>Concentration</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assail 30 SG</strong></td>
<td>4.0-6.9 oz</td>
<td>Toxic to bees. 7 days between applications, 2 apps maximum, 1-day PHI. Only short lived residual.</td>
</tr>
<tr>
<td>acetamiprid</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Delegate WG</strong></td>
<td>3-6 oz</td>
<td>Highly toxic to bees. Effective for both egg and larvae management. Best choice for later applications after Altacor is used.</td>
</tr>
<tr>
<td>spinetoram</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Diazinon 50 W</strong></td>
<td>4-6 lb</td>
<td>Highly toxic to bees. It is advisable to hold water for at least 3 days. 5 day REI!! 3 applications/season, 7-day PHI, and 14 days between sprays, except AG500 which has a 7-day minimum. Only short lived residual.</td>
</tr>
<tr>
<td><strong>Diazinon AG 500</strong></td>
<td>2-3 qt</td>
<td></td>
</tr>
<tr>
<td><strong>Diazinon AG 600 WBC</strong></td>
<td>51-76.5 oz</td>
<td></td>
</tr>
<tr>
<td>Diazinon</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Imidan 70W</strong></td>
<td>1.33-4 lb</td>
<td>Highly toxic to bees. Efficacy results have been variable. If chosen, use higher rate. Efficacy may be reduced at pHs found in bog water (pH 6-7). REI of 3 days, 10-day spray interval, 14-day PHI.</td>
</tr>
<tr>
<td>phosmet</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Lorsban 4E, Nufos 4E</strong></td>
<td>1.5-3 pt</td>
<td>Highly toxic to bees. 2 apps/season. Handler restrictions, beware. Observe 60-day PHI. Impound water for 5 days, then release slowly. Note: 75 WG formulation is not restricted use. Only short lived residual.</td>
</tr>
<tr>
<td>Lorsban Advanced, Hatchet</td>
<td>3 pt</td>
<td></td>
</tr>
<tr>
<td>Lorsban 75 WG</td>
<td>2 lb</td>
<td></td>
</tr>
<tr>
<td>chlorpyrifos</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sevin XLR Plus</strong></td>
<td>1.5-2 qt</td>
<td>Highly toxic to bees. Limit of 5 applications/season. Most handlers restrict use after 8/1. 7-day spray interval, 7-day PHI. Only short lived residual.</td>
</tr>
<tr>
<td>Sevin 4F, Carbaryl 4L</td>
<td>1.5-2 qt</td>
<td></td>
</tr>
<tr>
<td>Sevin 80S (Solupak)</td>
<td>1.88-2.5 lb</td>
<td></td>
</tr>
</tbody>
</table>
Lorsban

- EPA Proposes Revoking ALL Tolerances for Chlorpyrifos
- MA only uses 100 acre, WI uses 10,000 acres
- Lorsban Advanced, cheapest option $16
- Restricted Use, except 75 WG
- Handler restriction, no use after 6/22
- 60 day PHI, regardless
- Hold water 5 days!
Later fruitworm spray options, once bloom is gone (after 7/10):

<table>
<thead>
<tr>
<th>Insecticide</th>
<th>Concentration</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assail 30 SG acetamiprid</td>
<td>4.0-6.9 oz</td>
<td>Toxic to bees. 7 days between applications, 2 apps maximum, 1-day PHI. Only short lived residual.</td>
</tr>
<tr>
<td>Delegate WG spinetoram</td>
<td>3-6 oz</td>
<td>Highly toxic to bees. Effective for both egg and larvae management. Best choice for later applications after Altacor is used.</td>
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<tr>
<td>Diazinon 50 W</td>
<td>4-6 lb</td>
<td>Highly toxic to bees. It is advisable to hold water for at least 3 days. 5 day REI!! 3 applications/season, 7-day PHI, and 14 days between sprays, except AG500 which has a 7-day minimum. Only short lived residual.</td>
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<tr>
<td>Diazinon AG 500</td>
<td>2-3 qt</td>
<td>Diazinon AG 600 WBC diazinon</td>
</tr>
<tr>
<td>Lorsban 4E, Nufos 4E</td>
<td>1.5-3 pt</td>
<td>Highly toxic to bees. 2 apps/season. Handler restrictions, beware. Observe 60-day PHI. Impound water for 5 days, then release slowly. Note: 75 WG formulation is not restricted use. Only short lived residual.</td>
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<td>Lorsban Advanced, Hatchet</td>
<td>3 pt</td>
<td>chlorpyrifos</td>
</tr>
<tr>
<td>Sevin XLR Plus</td>
<td>1.5-2 qt</td>
<td>Chlorpyrifos later fruitworm spray options cont.</td>
</tr>
<tr>
<td>Sevin 4F, Carbaryl 4L</td>
<td>1.5-2 qt</td>
<td>Highly toxic to bees. Limit of 5 applications/season. Most handlers restrict use after 8/1. 7-day spray interval, 7-day PHI. Only short lived residual.</td>
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<tr>
<td>Sevin 80S (Solupak)</td>
<td>1.88-2.5 lb</td>
<td>carbaryl</td>
</tr>
</tbody>
</table>

= Most handlers restrict sprays to before 6/22 or start of bloom!
New IPM recommendations  
Estimate when crop is at 50% OOB

- Stevens: spray Altacor!  
- Ben Lears: spray Altacor!  
- EB: spray Altacor!  
- Howes: spray 7-9 days later

- Altacor or Intrepid are top choices since pollinators are still active on flowers  
- Delegate is OK but spray must dry  
- Do NOT use Diaz or Sevin at this point!
New IPM recommendations
Estimate when crop is at 50% OOB

• Pick or look at 10 uprights
• RANDOMLY
• How many are
  – Pods (unopened flowers)
  – Flowers
  – Pinheads
  – Fruit

pinhead/fruit
total number of pods, flowers, pinheads, fruit
Newer varieties have berries that size up faster for fruitworm moths to lay eggs on! Steven and Ben Lears were bad enough, but now we have Crimson Queens and Mullica Queens. These pinheads size up even faster. Spray for what you want to protect the most!
New Varieties Attractive to Fruitworm!

• Newer varieties have berries that size up faster for fruitworm moths to lay eggs on!
• Steven and Ben Lears were bad enough!
• Now Crimson Queens Demoranvilles and Mullica Queens are even worse!
• These pinheads size up even faster. Spray for what you want to protect the most!