2018

2018 Pesticide Safety - Insect Update and Growing More for Less

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PESTICIDE SAFETY

Insect Update

Growing More For Less

Martha Sylvia
April 25, 2018
Insect Update

- Winter Moth
- Gypsy Moth
- Scale
- Weevil
- CFW
- Spag Management

#2 8:40-9:00  Insect Update
Winter Moth and Cranberry!

Martha Sylvia
Entomology Lab
Cranberry Station
UMass Amherst

Thanks to
Bob Childs, Tawny Simisky ,
Joe Elkinton and Sonia Schloemann ,
UMass Amherst
And Heather Faubert at URI

Joe Elkinton
Dept. of Environmental Conservation,
University of Massachusetts, Amherst, MA
If you want to see if you have winter moth and what size they are...
Pick a coupla blueberry buds and throw them in your morning coffee cup (after you have downed the coffee)!!
So what is happening with winter moth eggs, besides driving me crazy? Winter moth eggs have been turning blue and then hatching very, very slowly since around April 4th. In some locations in RI and MA all eggs are still orange (so not ready to hatch) and in other areas 50% of eggs have advanced to the blue color and most of these eggs have hatched. At URI in Kingston and Warwick, RI about 50% of eggs are blue or have already hatched. In Charlestown, 8 miles away and no closer to the coast than URI, only 13% of eggs are blue or hatched. Other areas are similarly confusing.

At all locations, there is not much difference in plant development - forsythia and daffodils are at early bloom, red maples are blooming, McIntosh apple trees are at the green tip bud stage. Since egg hatch has been so staggered and the weather has been so bad, it has been impossible to apply an insecticide and control a large percentage of hatching caterpillars so far. Perhaps an insecticide application within the next couple of days will help control hatching winter moth caterpillars.

The good news is winter moth populations are greatly reduced from previous years so hopefully not spraying at egg hatch will not be a problem. For fruit growers (apples, pears, blueberry growers) perhaps the best strategy is to skip the early spray at egg hatch and concentrate on checking buds in a couple of weeks to see if an insecticide application is needed at that time. A Bt insecticide (DiPel, Biobit, Thuricide, and others) is a good insecticide to use in a couple of weeks because Bt kills only caterpillars. Other insecticide choices include, but aren't limited to, spinosad (Delegate, Entrust, Captain Jack's Deadbug Brew), Malathion, or Imidan.
Cape Cod Region
Winter moth egg hatch is likely to begin any day now, at this time no larvae have been detected in host plants.

Southeast Region (Hanson)
This is one of the coldest Aprils in years. The cold weather continues and plant and insect development remain behind schedule.

Winter moth caterpillars should be at an all-time low in most areas this year. However, continue to monitor susceptible plants like blueberry, apple, maples, oaks and crabapples and manage if found.
Winter Moth: (Operophtera brumata) The winter moth population is at a record low! The 2018 outlook concerning winter moth caterpillar population numbers in Massachusetts is very positive for those of you in the eastern areas of the state accustomed to dealing with damaging populations of this insect. Dr. Joseph Elkinton, Professor of Environmental Conservation at UMass has excellent news: data from his lab’s research locations in eastern Massachusetts suggest that this invasive pest’s population size is at an all-time low. In fact, the 2017 winter moth population was the lowest they have seen since studying and working toward the biological control of this insect for the past 13 years. The populations of winter moth are so low in MA at this time, that Dr. Elkinton’s lab and scouts for UMass Extension’s Landscape Message are having a very difficult (to impossible) time locating winter moth eggs to monitor egg color change, development, and hatch for the 2018 season.
Outbreak populations in SE CT and coastal ME in 2014

You are here!
Life Cycle

Eggs over-winter, larvae hatch early spring - April

Adults emerge November-December, mate, lay eggs and die

Pupae in soil all summer and fall until adult emergence

Larvae feed all spring and pupate in late May

Slide courtesy of Dr. Joseph Elkinton
Life Cycle

Eggs over-winter, larvae hatch early spring - April

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Winter moths fly in the fall – Nov and Dec

Slide courtesy of Dr. Joseph Elkinton
BB and Apple

- Bud looks clean
- Winter moth and frass inside
Scout Advanced Growth
WINTER MOTH Management

All effective:

- Intrepid
- Delegate
- Avaunt
- Sevin

May be effective:

- Lorsban?
- Diazinon?
Winter Moth ≠ Gypsy Moth ≠ Tent Caterpillar
Winter Moth ≠ Gypsy Moth ≠ Tent Caterpillar
GYPSY MOTH EGG MASSES
Dead Gypsy Moth end of last June!
Just as we may be able to credit (mostly) the drought conditions experienced in 2015 and 2016 with the recent increase in the gypsy moth population (through the impediment of *Entomophaga maimaiga* activity), we can credit the more normal rainfall events seen in May and June of 2017 for the success of the fungus at the end of June 2017. Cape Cod had particular success!
GYPSY MOTH

NOT Hatching very soon!!

UGA1507053
Tent Caterpillar

DO NOT EAT CRANBERRY
Winter Moth → -→ -→ Scale
New infestations of scale continue to be reported on cranberry in SE MA. Nearly a dozen new or repeat sites were confirmed last summer and fall in Rochester, Wareham, Middleboro and Carver. All were Putnam Scale, the small darker species, and two were detected by seeing scale on the berries!
Since 2010, reports of infestations of scale have been growing with 10-20 confirmed infestations and damage in each of the last few years.
• *Scale* are tiny parasitic *insects* that adhere to plants and live off the plant's sap
• They look like bumps on the plant's stem and are often mistaken for a disease
• Adult female scale are immobile and permanently attach to the plant
• They secrete a waxy coating for defense that looks like a fish scale, thus the name
Crawlers, newly hatched and mobile immatures of the scale, active mid-June

Stagger emergence to late June

Tiny orange/yellow crawlers disperse

Settles, begins feeding, produces new shell in 2-4 days
If you hold late water or spray Diazinon in mid-June targeting crawlers, it will wipe out the population. However, many growers have had new populations turn up on adjacent fields.
Management

• Target first-instar nymph crawler stage

• Organophosphates at bloom
  – Diazinon, Sevin, Lorsban

• Other pesticides for crawlers?
Scale insects' waxy covering makes them quite resistant to pesticides.
Putnam Scale

• The grand majority of infestation we see
• Putnam scale (*Diaspidiotus ancylius*)
Dearness Scale

- Occurs a few weeks earlier than Putnam
- Causes bigger dead areas
- Easier to see
LECANIUM SCALE

• The third species found
• A soft scale
• Only found at one bog along with the other species
Scale → -> -> Weevil
Cranberry Weevil

- Last year was another tough cranberry weevil year
  - counts of spring weevil remained low right into June, then populations were high
- Avaunt works in May but is not always effective going into June resulting in damage and multiple sites with summer weevil

- Resistance
  OR

- Weevil hatching off of blueberry

June 19th
Avaunt (indoxacarbox)

**Spring population**

Superb! weevil control!
May have to retreat as more weevils come in from woods

**Summer population**

**NOT EFFECTIVE**
Do not use Avaunt
New generation can metabolize the pesticide
Cranberry Weevil Lifecycle

SPRING

Avaunt works

Overwintering weevil

SUMMER

Avaunt doesn’t work

Newly hatched weevil
Cranberry Weevil Lifecycle

**SPRING**

Starting in mid-May, some adults may move onto the bog where they mate and feed on the new foliage. By the end of June, weevils have moved onto the bog where they feed on new foliage and buds, mate, and lay eggs into the blossom buds.

**SUMMER**

Some buds containing eggs are cut off the vine or remain attached. The larva completes development inside the pod. The new adult generation appears in mid-July.

**Avaunt works**

**Used up fat stores**

**preening**

**Avaunt doesn’t work**

**SUMMER**
Weevil

- Long cool spring resulted in no big numbers until June as we were going into bloom
- Summer populations very high
- Worries of Avaunt not working as well as past
- Actara/Belay
  - Evil neonicotinoid
  - Prefer summer use only
Eggs hatch in 3-9 days
Larvae develop 10-14 days
Pupae hatch out after 1 more week

1926 data had weevil hatching 6/26-7/10
Cranberry Weevil Compounds

- **Avaunt** 2007 SPRING
  - Indoxacarb

- **Actara** 2005 SPRING OR SUMMER
  - Thiamethoxam
    - (also known as Helix, Cruiser, Vigor)
  - neonicotinoid, high bee toxicity
  - Zone II Restricted thus state restricted

- **Belay** 2010 SUMMER
  - Clothianidin
    - (also known as Clutch, Arena)
  - neonicotinoid, high bee toxicity
  - Company pulled cranberry from label
    - Use old product
  - Handlers require harvest testing!
Avaunt (indoxacarbox)

**Spring population**

Superb! weevil control!
May have to retreat as more weevil come in from woods

**Summer population**

NOT EFFECTIVE
Do not use Avaunt
Summer Population

Spring population

Avaunt

Actara (allowed but not best choice)

Summer population

Actara or Belay

4.5 weevil/25 sweeps

ACTION THRESHOLD 9 weevil/25 sweeps
OTHER INSECT NEWS

Tipworm

2 eggs

Cranberry Tipworm eggs

2 eggs

2 eggs (closer view)

© C D Armstrong
Movento labeled for cranberry

- **Spirotetramat** is the active ingredient
- Canada has had for several years
  - Canada and WI use because of shorter growing season and no time to recover from tipworm damage
- Tipworm only target
- Label allows only post-bloom apps
- MRL’s 0.3 ppm for US, 0.2 ppm Codex and EU
- LPC and OS had 40 or 50 day PHI in 2017
- Window to apply July 20 - July 30

- **PRICE** - $7.70 - $8.65/oz
  - **$77-$87/Acre**
- 8-10 oz/app
Weevil (tipworm) → -→ -→ CFW
CRANBERRY FRUITWORM Review

- Change in **timing**
  - 2010, 1st 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
Changes in Cranberry Fruitworm Recommendations

- Removal of Sevin, Lorsban, and Diazinon (Assail and Imidan) for first and second fruitworm applications (during bloom)

- Can use Sevin and Diazinon after bloom is complete
  - 7-10 days after 50% out of bloom

- Altacor, Intrepid, and Delegate are choices during bloom.

- Why move to Altacor
  - Last longer, 3 days vs. 10 days
  - Doesn’t wipe out your bees
  - Legal not illegal
TINY LARVAE DEAD AS IT HATCHES FROM ALTACOR
Why Altacor?  Why not Altacor?

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

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

- 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 not allowed

Why not Delegate?

- Hard on your bees
- Not as long lived as Altacor
  - Better later, as a cleanup spray on larvae
  - Save for chasing Spag or cfw if they get through
Plot assessment 8/21 (over a month from first check)

2 sprays a week apart, then checked a week later

Average plot rating

0 = No control
5 = Best control

2008

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

Best!
Why not Diazinon or Sevin?

- Ya cheaper, but shorter lived, 3 days not 10 days
- 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 Diaz for chasing flea beetle or later cfw sprays
New IPM recommendations

Estimate when crop is at 50% OOB or when there are any berries to lay eggs on.

- Stevens: spray Altacor!
- Ben Lears: spray Altacor!
- EB: spray Altacor!
- Howes: spray 7-9 days after 50% OOB

- 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!
Time fruitworm spray for berries just starting to size up
New Varieties Attractive to Cranberry Fruitworm!

- Newer varieties have berries that size up faster for fruitworm moths to lay eggs on!
  - Mullica Queen, Crimson Queen, Demoranville
- Steven and Ben Lears size pretty fast too!
- Every year is different, you need to watch

- Most growers report success with well-timed Altacor applications for cranberry fruitworm
- Data continue to support that cranberry fruitworm females prefer to lay their eggs in the large-fruited varieties
- Eggs are detected early and sprays need to go out at 50% out of bloom
CRANBERRY FRUITWORM

- Altacor targeting peak egglaying
- Not many growers scouting for eggs after 2 sprays
- Harvest Howes in late Sept. for a residue study
  - Found many larvae still in berry
- Selecting for late season survival??

Late season damage??

Pushing sprays earlier and earlier

photos by C. Armstrong
CFW → -→ -→ Spag
Sparganothis fruitworm

Comes in many different styles— the wriggler
SPAG 2016
Sparganothis Fruitworm

- Irrigation
- Overgrown vine
- Less sweeping
- More Altacor
Some reports of substantial damage with summer generation of Spag

Some reports of MASSIVE flight of Spag moths in September
• Review lifecycle
• Review moth flight
• Review available pesticides
Sparganothis fruitworm

- 2 generations
  - Early-season foliage feeder
  - Overwinters as tiny larvae
  - Appears again at fruit set

- Lays egg in masses
  - Take nearly 2 weeks to hatch
  - Leads to localized infestation
SPRING

The moths emerge and mate in late June and early July. Females deposit egg masses on the foliage and perhaps, on developing fruit.

By mid-June, the larvae have completed feeding. They web together the uprights to form a pupation site.

In early spring, as it warms up, the larvae become active and move onto the foliage to feed. The eggs hatch in the fall and the tiny first instar larvae spend the winter either in the trash layer or webbed into the uprights.

SUMMER

After 10-14 days, the tiny larvae of the 2nd generation emerge and start feeding on foliage and fruit.

July

In most years, the second generation moths fly during early harvest in September and lay eggs.

August
Sparganothis management
80 bog sites monitored (10 years ago)

• **All** sites had some Sparganothis flight

• 32 of 80 had peak flight of 50-100 moths
• 40 of 80 had peak flight of 100-200 moths
• 8 of 80 had peak flight of 200 moths

• **Peak** moth flight was 1\textsuperscript{st} or 2\textsuperscript{nd} week of July
  – But varied from bog to bog from June 19 to July 24

• Revel Gilmore, IPM Scouting, all growing areas in SE MA
Sparganothis over the season (total of 80 bogs in 2006 R. Gilmore)

- Peak Moths
- Peak Eggs
- Hatching

- Moths
- Eggs

Intrepid

Delegate
Set out pheromone traps in June

SFW
Sparganothis resistance to organophosphates

• Began ca. 20 years ago in Carver area
• Spread throughout MA cranberry industry
• Diazinon, Lorsban, Orthene not effective on most populations
• Delegate and Intrepid (or Confirm) best/only choices for spring management
• Med-large larvae—Delegate
SPAG Spring Spray Options

• Altacor
• Assail
• Avaunt

• **Intrepid**, Confirm
  – Invertid (Loveland)

• **Delegate**
  • Diazinon
  • Imidan
  • Lorsban
  • Orthene
  • Sevin

• Best management approach is to focus on the spring

• Summer populations much harder to monitor and manage

• Delegate and Intrepid best (only) choices for spring management

• Med-large larvae – Delegate?

• Some growers have better luck with Intrepid even on larger larvae!
My complaints

• Intrepid not being used
  – And if you do use it, use it in May not June

• You say “Delegate doesn’t work”
  – Spray goes on when larvae are big – much harder to kill
  – When larvae are big, they have nice condo’s
  – When they have condoo’s they are protected
Sparganothis spotting

- See what larva looks like by looking at easily found retreats in patches of loosestrife on bed
- Look for larvae in May
- Watch out—will wriggle away
Sparganothis Spray Options

- Altacor
  - 2 shots, only eggs and tiny larvae
  - May not work against spag!

- Assail

- Avaunt
  - Likely only hit 50% or less

- Intrepid
- Confirm
- Delegate

- Diazinon
- Imidan
- Lorsban
- Orthene
- Sevin

- Best management approach is to focus on the spring

- Summer populations harder to monitor and manage
Sparganothis Spray Options

- Altacor
  - 2 shots, target eggs and tiny larvae only
  - May not work against spag!
- Assail
- Avaunt
  - Likely only hit 50% or less
- Intrepid
- Confirm
- Delegate
- Diazinon
- Imidan
- Orthene
- Sevin

- Intrepid and Confirm will work best on small larvae
- Delegate is the only thing that will have any hope of working on big larvae
Spag vs YHF

• Many bogs not flooded at all for winter
Sparganothis sweep recommendations

- Believe you will find a larva -- keep looking
- 1 sweep set/acre (reduce for larger beds)
- Larger larvae are readily picked up in net
  - numbers reflect infestation
  - But too late to manage well with Intrepid
- Threshold is very low
  - average 1-2 larvae/sweep set
  - Low efficiency of sweeping

OR JUST SPRAY MAY 15, 20, or 25 with Intrepid
Hybrids – larger fruited cultivars

• Spag develops faster on larger fruited cultivars
• Spag is more protected from pesticides and parasites in summer in large fruited cultivars
• Hybrids - now commonly see internal feeding and even pupate inside fruit
Growing More For Less

- Pesticide Companies
- Restrictions
- Different compounds
- Incentives, color, firmness,
  - Electronic filing $500
- Bogs Program
- Chlorothalonil
- Fungicide Timing
- Cultural Practices
- Phytophthora
- MDAR Free Food Safety Audit

Pruning may cost you but might result in cheaper management

- Cost of inputs
  - Pesticide chart
- Callisto vs. Sotrion
- Intrepid vs. Invertid

#3 9-9:20 Growing More For Less
Pesticide company shake ups

- Dow and Dupont have merged into Dow/Dupont, now called Corteva (representing like > 10 of our compounds!!)
- They rolled out Avaunt and Altacor to FMC
- Now Bayer is acquiring Monsanto
- Loveland is packaging many compounds separately for CPS
  - Carbaryl, Acephate, Initiate
  - Rampart, Wrangler, Makaze, Satori
- Even Progressive is packaging their own “Progressive NIS”
Restrictions by Handlers cont.  
BE CAREFUL

<table>
<thead>
<tr>
<th>NO USE ALLOWED (OS EXPORT)</th>
<th>NO USE ALLOWED (LPC)</th>
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<tbody>
<tr>
<td>Quinclorac</td>
<td>Dinotefuran (Scorpion)</td>
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<tr>
<td>Simazine (Princep)</td>
<td>Novaluron (Rimon)</td>
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<td>Novaluron (Rimon)</td>
<td>Spiromesifen (Oberon)</td>
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<td>Fluoxastrobin (Evito)</td>
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<td>Flonicamide (Beleaf)</td>
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<tr>
<td>Cyazypyr (Exirel)</td>
<td>EDBC’s (Dithane)</td>
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Restrictions by Handlers cont.
BE CAREFUL

NO USE ALLOWED (OS EXPORT)
- Quinclorac
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NO USE ALLOWED (LPC)
- Dinotefuran (Scorpion)
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- EDBC’s (Dithane)

Many compounds are restricted, and some require mandatory testing.
<table>
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<tr>
<th>Closer</th>
<th>Scorpion</th>
<th>Rimon</th>
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<td>Sulfoxaflor</td>
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<td>Dow AgroScience</td>
<td>Gowan</td>
<td>Arysta</td>
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<td>Like a neonic</td>
<td>Venom, Safari (not labeled)</td>
<td>IGR</td>
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<td>Leafhoppers and thrips?</td>
<td>neonicotinoid</td>
<td>BHF, CFW, Gypsy, Spag, Span, blossomworm, Flea beetle, tipworm</td>
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<td>Maybe Scale</td>
<td>Bee tox</td>
<td>After bloom app only</td>
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<td>After bloom app only</td>
<td>Zone II state restricted for groundwater</td>
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<td>Ground, chemigation or air</td>
<td>BHF, CFW, Weevil, Spag, Flea beetle, leafhoppers, span, tipworm</td>
<td>LPC, OS - no use allowed</td>
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<td>LPC no use allowed , OS 30 day phi</td>
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</table>
**Intrepid (methoxyfenozone) off patent**

- Methoxyfenozone is off patent and hoped to be cheaper
- Different names, exact same AI and % AI
  - Intrepid - DOW
  - Invertid - Loveland (with adjuvant in it)
  - Turnstyle - UPI
  - Troubadour - Helena
- Best option for spag
  - Apply May 15 and 25
- Use Delegate only after trouble
- Altacor may not be hitting spag
- Intrepid is Zone II
  - talk to me before the problem not after!
Sparganothis management

Methoxyfenozide

- Intrepid $30 + adjuvant cost
- Invertid with adjuvant $33

- Delegate (spinetoram) $45-50 + consider adjuvant
- Entrust (spinosad) $110
Lorsban
chlorpyrifos

- chlorpyrifos AI
- Many labels now
- LORSBAN
- WARHAWK (Loveland)
- NUFOS
- HATCHET
- Restricted Use (except advanced formulation)
- Hold water 5 days
- No use after 6/22

Sevin
Carbaryl

- Carbaryl AI
- Metabolite is likely endocrine disruptor
- Dropped pursuit of trying to increase EU MRL above 0.01
- Restriction of no use after August 1 will continue
- Mancozeb also on endocrine disruptor list for EU issues
Venerate

- Burkholderia - biological insecticide
  - Enzymatic degradation of exoskeletal structures and interference with the molting process leading to mortality through contact and/or ingestion

- Caterpillars

- Ground or air only, no chemigation
Mestrione, different names

- Callisto vs Sotrion
- Price must be less
Nexter
pyridaben

- Pyridaben Al
- Gowan
- Like a neonic
- mites
- Ground or chemigation only
- Hold water 3 days
- No flow through bogs

Oberon
spiromefesin

- Spiromefesin AI
- Bayer
- mites
- Ground or chemigation only
- Hold water 1 day
- CPC no use allowed, OS 30 day PHI

Agri-mek
abamectin

- Abamectin Al
- Syngenta
- mites
- After bloom app only
- Ground only
- Restricted Use

MITICIDES
Go after the incentives

- 1.00 incentive for firm fruit at OS
- 451-549 .01-99 cents
- 555 and up get 1.00

- Color incentive

Get the bogs program in order to get the electronic submission incentive!
BOGS ONLINE GROWER SERVICE
a record-keeping and pest management tool

New Sliding Scale
► Up to 25 acres $95.00/year
► 25-50 acres $125.00/year
► 50-200 acres $150.00/year
► > 200 acres $200.00/year

OS: An incentive of $500 per CMA will be paid for Pesticide Use Reports submitted via a Cooperative approved electronic pesticide use reporting tool. The electronic pesticide use reporting tools approved for 2018 include CranTrak, BOGS, Ag Connections and Agrian.
BOGS ONLINE GROWER SERVICE
a record-keeping and pest management tool

New Sliding Scale

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CHLOROTHALONIL

- PRICE ~$40/acre
- Restricted use due to groundwater concerns
- All formulations, you should hold your water 3 days

- Get some now
- **ALL** have eye toxicity
- Bravo Ultrex and all Echo formulations require respirator

- Bravo, Chloronil, Chlorothalonil, Echo, Equus, Initiate
Indar and Abound cost $50 together

Proline is $22/acre if you can make initial investment in giant jug that will treat 64 acres!
Time your fungicide applications!!

First fungicide application: *Enough open bloom to make it cost effective!*

Most fungi infect during this stage.
• **Efficacy** – The overall effect of a particular fungicide on the level of fruit rot disease

In order of efficacy (best to worst):

- Chlorothalonil - Bravo, Equus, Echo, Initiate $40? (Broad Spectrum)
- EBDC’s – Manzate, Dithane, Roper $20-$40? (Not Broad Spectrum)
- Prothioconazole – Proline $22 (Broad Spectrum)
- Fenbuconazole - Indar $50
- Azoxystrobin – Abound, Satori, A-frame
- Azoxystrobin
- Ferbam
- Coppers – Champ, Kocide, Badge, Nu-Cop $20-$30?
Where are the pathogens hiding?

**Where are the pathogens hiding?**

- **Phyllosticta elongata**
- **Coleophoma empetri**
- **Colletotrichum acutatum**

**Phyllosticta elongata**
- (Current-year leaves)
  - *Phyllosticta vaccinii*
  - *Phyllosticta elongata*
  - *Physalospora vaccinii*

**Colletotrichum acutatum**
- (Sound, red fruit)
  - *Physalospora vaccinii*
  - *Phyllosticta elongata*

**Physalospora vaccinii**
- (Green fruit)
  - *Phyllosticta vaccinii*

**Phyllosticta vaccinii**
- (Flowers)
  - *Fusicoccum putrefaciens*

**Fusicoccum putrefaciens**
- (Current-year pedicel)
  - *Physalospora vaccinii*
  - *Phomopsis vaccinii*

**Phomopsis vaccinii**
- (Green fruit)
  - *Phyllosticta vaccinii*

**Phyllosticta elongata**
- (Stems)
  - *Colletotrichum gloeosporioides*

**Colletotrichum gloeosporioides**
- (1-year pedicel)
  - *Fusicoccum putrefaciens*
  - *Phomopsis vaccinii*

**Fusicoccum putrefaciens**
- (1- and 2-year leaves)
  - *Phyllosticta vaccinii*
  - *Phyllosticta elongata*
  - *Physalospora vaccinii*

**Physalospora vaccinii**
- (Duff--leaves)
  - *Phyllosticta elongata*
  - *Coleophoma empetri*

**Coleophoma empetri**
- (Duff--fruit)
  - *Phomopsis vaccinii*

**Phomopsis vaccinii**
- (Rotten fruit)
  - *Physalospora vaccinii*

**Physalospora vaccinii**
- (Rotten fruit)
  - *Coleophoma empetri*

**Coleophoma empetri**
- (Stems)
  - *Colletotrichum gloeosporioides*
TRASH FLOW, PRUNE, SAND
Use your cultural controls

- Removes inoculum that is on leaves and old berries
- Prune or mow to reduce thickness of vine where rot and rot inoculum can do well
- Sand anyway you can
  - Ice
  - Barge
  - Terragator
  - On the vine

Late Water, god forbid!
Use your cultural controls
Phytophthora root rot

- Disease is prominently present, especially in poorly-drained beds
- Many renovated beds have quickly developed the disease
- You must improve the drainage before using any of the “very effective fungicides”
  - Ridomil, Metastar, Ultra Flourish $200/A
  - Aliette WDG $20/A
  - Phostrol, ProPhyt, Fungi-phite, Fosphite, K-phite, Rampart, Alude, Oxiphos, Confine Extra, Reliant, Reveille
### FUNGICIDE RESISTANCE

#### All phosphites

<table>
<thead>
<tr>
<th>fungicide</th>
<th>classification</th>
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<tbody>
<tr>
<td>Aliente</td>
<td>fosetyl-Al</td>
</tr>
<tr>
<td>Legion</td>
<td>aluminum-tris</td>
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<tr>
<td>Alude, Confi</td>
<td>phosphorous acids and salts</td>
</tr>
<tr>
<td>Fosphite, Fungi-Phite, K-Phite, Oxiphos, Phiticide, Phostrol, ProPhyt, Rampart, Reliant, Reveille</td>
<td>Unknown phosphonates</td>
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<tr>
<td>33</td>
<td>Low Risk</td>
</tr>
<tr>
<td></td>
<td>Multi-site fungicide</td>
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#### All copper hydroxide

<table>
<thead>
<tr>
<th>fungicide</th>
<th>classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Badge, Champ, Copper, Kentan, Kocide, MasterCop, Nordox, NuCop, Top Cop</td>
<td>copper (salts) M1: Multi-site contact activity inorganic inorganic</td>
</tr>
</tbody>
</table>

| 88        | Low Risk       |
|           | Multi-site fungicide |
MDAR Free Food Safety Audit

Attention Fresh Fruit Growers

The Massachusetts Department of Agricultural Resources Produce Safety, Market Access and Certification Program, in cooperation with the UMass Cranberry Station and the Cape Cod Cranberry Growers’ Association, is extending its outreach to the cranberry industry by creating a new market access certification program specific to cranberries. This is designed to assist growers by having a unified certification program that will satisfy buyer and/or handler requirements. This certification program is for Dry Harvest Fruit only and it is at no cost to the grower. Please note that this program is optional, although some handlers or fresh fruit buyers may require it this season or in the future.

If you would like to learn more about the program please attend the following informational session being held at the UMass Cranberry Station Library:

Tuesday, May 8, 2018
4:00 pm – 5:30 pm

“A new market access certification program specific to cranberries”

“Dry Harvest Fruit only and it is at no cost to the grower”