Integrated Cranberry Crop Management for Wisconsin

Cranberry
Crop Management Newsletter

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This Issue:

2011 Bug Floods

Shawn Steffan, Research Entomologist, USDA-ARS

For over 100 years, Wisconsin cranberry growers have used flooding to control insects. Then, as much as now, flooding was known to kill bugs, but prolonged submergence of the cranberry plant could hurt yields. So, flooding for pest control has occasionally been met with a healthy dose of skepticism. Our 2011 "bug flood" research was initiated to better understand how Wisconsin growers can strike a balance between sound pest management and plant health. The main questions we're trying to answer are: What flood duration is long enough? What is too much? What factors govern this balance?

To-date, 46 beds have been involved in the study (23 pairs of flooded and unflooded beds). We have 11 growers participating, most of which are from Wood and Monroe counties. At every site, we closely paired flooded and unflooded beds for a given variety, so that at each site we had a control bed and a flooded bed for the variety being observed. We confined our varieties to *Ben Lear*, *Stevens*, and *GH1*.

Flood durations ranged from 31 to 48 hours and averaged 37.5 hours. Growers flooded in late-May to early June. On average, Growing Degree-Days (DDs) for the plant was about 580 DDs, although we did have an early group of flooders who flooded at about 515 DDs, and a later group that flooded around 670-760 DD. The DD totals may not mean much now, but in the coming years this value will tell us how far out of dormancy the plants and insects are. The further from dormancy they are, the more they become susceptible to drowning.

To better understand the factors that shape a flood's effectiveness, we measured characteristics of the floodwaters at the beginning and end of the flood. We also looked at plant characteristics immediately following the flood, and then weekly for four weeks thereafter. Insect densities were investigated during the flood (sampling of the "trash" coming off the bed) and then weekly for eight weeks. Most of the insect samples are still being processed, and harvest data will obviously be forthcoming. Here, we present our preliminary findings from the data we currently have available.

Floodwaters

Dissolved oxygen in the floodwaters, in parts per million (ppm), averaged **8.19 ppm** at the start of the floods, and when the waters were drawn down, the average was **7.70 ppm**. This difference was significant and likely represents evidence that the plants were respiring underwater.

*See **2011 Bug Floods** p. 3*

OBSERVATIONS FROM THE FIELD

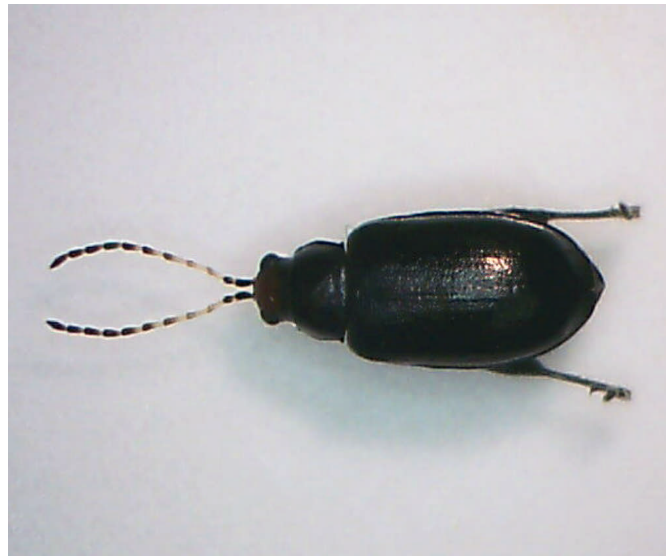
Jane Sojka, Lady Bug IPM, LLC

Let's talk about Flea Beetle. This pest started around July 22, 2011 in Wisconsin this year and has been going strong ever since.

It seems that in a few short days the populations can go from 5 to 7 in a series of 20 sweeps to 23 to 26 in a series of 20 sweeps. The beetles feed mostly on the upper surface of the cranberry leaves thus making the brown burn/coloration that some of you see with high populations of pests. I have observed crop reduction in areas with heavy infestations of flea beetle. (It is tough for some uprights to re-bud after such injury) In those same areas, I have also observed feeding on fruit. They do prefer the tender new growth of lush vines, so if you are searching for this pest go to those areas first.

Flea beatle, view 1

Thank goodness there is only one generation of this pest. Eggs overwinter and hatch in early spring. I understand that the larvae can/will feed on our tender roots in the soil. One may see some bronzed uprights in the spring and wonder why. Perhaps it is in an area of heavy flea beetle feeding from the fall before. Please make a mental note or jot it down as to where your heavy areas are now and see what happens in the spring.



Flea beatle, view 2

The adult is the easiest to control. Most of us agree that they are rather wimpy to control but the thing is that the hatch continues F O R E V E R! - So it seems! Remember they started on July 22nd and we are still finding hatching beetles across Wisconsin today August 15, 2011!

Remember, when you are controlling this adult pest, you MUST check with your markets as some products just are NOT acceptable at this late date.

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2011 Bug Floods *(continued from page 1)*

To put these numbers in perspective, the average *percent saturation* (that is, the amount of oxygen the water could hold, given its temperature) was **86.2%** when the water was flowing into the bed, and about **81.8%** when it was coming off. This was well-oxygenated water.

The average temperature of the rising water was **64.2° F** (ranging from 57° to 66° F), while the draining water averaged **65.5° F** (60° to 68° F). The difference between initial and final floodwater was not significant.

Among the three varieties, there was moderate evidence of significant differences in terms of **final % saturation**. *Stevens* beds averaged **81.7 %,** *GH1* beds averaged **90.92%,** and *Ben Lear* averaged **71.05%**. Final dissolved oxygen levels would have been driven by many factors, such as initial O_2, water temperature, the photosynthetic activity of the plants, the O_2 demands of the plants, and microbial O_2 demand. Since initial oxygen levels and final temperatures were very similar among the beds, these two factors were unlikely strong determinants of final dissolved O_2. This would leave us with various biological oxygen demands as the governing factors. (I suspect that microbial activity in the *Ben Lear* beds was elevated, owing to the age of the beds and thus the greater source of decaying material. Future work should resolve this question.)

Basic take-homes on floodwater: temperatures were often between 57° and 66° to start, and when drained, 60° to 68°. So, the floodwaters were generally cold and well-oxygenated.

Plant metrics

The plant characteristics presented here are leaf chlorophyll, upright length, hooks per upright, and flowers per upright.

Chlorophyll: Immediately following the flooding, leaves were sampled in flooded and unflooded beds for their chlorophyll levels. Across all varieties, **leaf chlorophyll was significantly reduced** in the leaves of flooded plants. This suggests that the floods imposed some degree of stress on the plant. Looking at specific varieties, *Stevens* in unflooded beds (controls) had the most chlorophyll present, followed by *Ben Lear*, and then *GH1*.

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Flooded *Stevens* leaves saw the greatest drop in chlorophyll, although even this reduced chlorophyll level was greater than unstressed (control) *Ben Lear* and *GH1*. Changes in chlorophyll are not necessarily indicative of photosynthetic activity, and as we will see below, the plants' growth was largely unaffected by the stress of flooding.

Checking cranberry bed

Upright length, Hooks, Flowers: After 2 weeks, we saw very weak evidence of any flooding stress, measured in terms of the lengths of uprights. After 3 weeks, we looked specifically at hooks/upright, and again, we saw little evidence of any flood effects. But, at 4 weeks, we found a consistent reduction in the number of flowers per upright in the flooded beds. Across all varieties, the unflooded beds averaged **4.16 flowers/upright**, while the flooded beds averaged **3.82 flowers/upright**. That's an **8.2% reduction**. At some marshes, the reduction was more substantial, but the main question here is: How many flowers are enough? If the plant is only going to set and fill 2-3 berries/upright, does it matter whether there are 3, 4, or 5 flowers? We should have the answers to these questions by harvest. For now, it looks like the flooding may have slowed the plants down a little, then shaved off a flower here and there.

Continued at ***2011 Bug Floods****, p. 5*

OBSERVATIONS FROM THE FIELD

Theresa Cira, Lady Bug IPM LLC

In the morning when the dew is still glistening in the rising sunlight, you can often see ghostly white spots dotting the cranberry beds. Inspecting them closer you will find an individual spider in or near each misty spider web. Some of the most abundant and helpful predators lurking in cranberry beds are spiders and their close relatives the daddy longlegs (sometimes known as a harvestman). These two arthropods are the chief hunters and trappers in the cranberry ecosystem. While they aren't only targeting cranberry pests, they certainly do help decrease pest numbers. The most common entomological misnomer is calling a spider or daddy longlegs an insect. Spiders and daddy longlegs are **not** insects; they belong to the orders Araneae and Opilionies respectively. They have **eight** legs and **two** body segments, insects have **six** legs and **three** body segments.

Spiders usually use one of two basic methods of predation. Some spin webs to ensnare prey and others actively seek out and hunt prey. Whichever way they catch their prey, spiders can only handle liquid foods, so many species inject a digestive juice into the victim, then suck up the slushy innards leaving the hard empty shell behind. Their ability to produce venom is perhaps why so many people fear spiders. The vast majority of spiders, however, especially in Wisconsin, are harmless to humans. Their mouth parts are too weak to puncture skin or their venom so feeble that their bite irritates less than a mosquito bite. Spiders are really quite beneficial and having many webs in a bed is a good sign.

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Daddy longlegs are not able to produce silk so they must hunt and scavenge for prey. They also cannot produce venom; so after waiting sometimes hours on end for something tasty to walk past, they will pounce and subdue it with their legs and mouthparts eating it alive in small chunks. Your best chance to see a daddy longlegs would be to peek in a pheromone baited trap where they often get stuck. The majority of species are nocturnal, and so during the day, are not easy to find. All together, the order Opiliones has not been studied extensively and there are thought to be many yet undiscovered species.

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Address Correction

If you have any address corrections, additions, or deletions, please let us know. Please call 715-421-8440 or e-mail: mspencer@co.wood.wi.us

Thank you!

Cranberry Cultivar Genetic Survey

Juan Zalapa and Emily Gustin
USDA-ARS, VCRU

The USDA-ARS Cranberry Genetics and Genomics Lab is conducting a survey to assess the genetic purity of cranberry clonal cultivars in Wisconsin. Our aim is to reach a consensus of genetic purity for each variety. We want to sample every cultivar you grow, including any unique variety plantings. Your help is needed to sample as many cultivars as possible across cranberry marshes in the state. This work will be invaluable for the preservation and study of our cranberry genetic resources. Thank you in advance for your cooperation.

Instructions on sample collection:

1. Collect two samples from each variety that you grow (e.g., 'Stevens', 'Ben Lear', etc.)
2. The samples should be collected from your "best guess" pure cultivar beds
3. Each sample should include a 6-inch runner with at least one upright
4. Each sample must be packaged separately in a paper envelope (no plastic) such as standard letter envelope
5. Label each envelope with the variety name, marsh, and any bed identification codes you can provide (e.g., Stevens-1, Elm Lake Cranberry, Bed 7A)
6. Place all your cultivar samples in a larger paper envelope
7. Mail to:

   Juan Zalapa or Emily Gustin
   USDA-ARS, VCRU
   Department of Horticulture
   1575 Linden Drive
   Madison, WI 53706

8. For questions, please feel free to contact Emily Gustin at (608) 890-3998, or emily.gustin@ars.usda.gov

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2011 Bug Floods *Continued from p. 3*

Differences were evident between varieties—*Stevens* appeared to stretch out its uprights faster and push out more hooks than all the rest. But, when we look at the interaction between variety and flooding, no one variety benefitted or suffered more from the flooding than another.

Insects

Insects were sampled in the "trash" floating atop the floodwaters, in sweep samples, via Dvac-sampling during bloom, in pheromone traps, and then on/in berries in July. Currently, only the specimens from the sweep samples have been processed, identified, and tallied. (Pheromone, Dvac, and berry data will be coming soon.)

Based on sweep samples, we saw only weak evidence that arthropod densities were lower in the flooded beds. We specifically looked at differences in Sparg, BHFW, and spider densities at 1 and 2 weeks post-flood. It should be noted

here that every grower sprayed insecticide on the unflooded beds to control for emerging insect pests. Thus, our finding that flooded beds were very similar to unflooded sprayed beds suggests that the flood may serve as an effective replacement for a spray application.

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