

BROAD BASED ORGANIC CONTROL of CRANBERRY FRUITWORM

by Michael Macfarlane

1. Goals

This project is an attempt to control Cranberry Fruitworm (CFW) (*acrobasis vaccinii* Riley) with a variety of organic methods, cultural, biological and environmental. A wide assortment of strategies were trialed, the promising of which will continue to be employed.

2. Update

My wife and I continue to grow speciality crop on our one acre plot. Most of the hand work on our cranberry bog is done by ourselves and occasional labor. For the purposes of this grant, we hired a retired technical person to collect data and do the general hands on work of the grant. He was overseen by me, and we consulted regularly with each other in regards to progress, applications, release of parasitic wasps and all other matters pertinent to the grant. He was paid \$8.00/hr and spent approx. 200 hrs during the season

3. Cooperators

Don Mairs-Pest Management Specialist-Maine Dept of Agriculture

An accessible and enthusiastic ear, Don is fully open to innovative ideas, always ready to share his information, ideas and opinions with us and others. Don does numerous presentations to cranberry growers statewide and sends his "Bugflash" report to cranberry growers.

Anne Averill-Dept. of Entomology-University of Massachusetts

Dr Anne, probably the foremost authority on CFW has always been our reality check. She's the one who will say "I wouldn't accept that because you can't measure the results" or "I don't think that will work because". Hopefully we will have promising results on our bog, that she might confirm in a more scientific setting.

Dr. Dave Yarborough- University of Maine Extension

He's our valuable link between the academic and agricultural communities. His work in Maine blueberries has been invaluable to that industry and he continues in cranberries with equal voracity. Although not an ardent supporter of organic methods, his scrutiny is motivating. If we find something that works, he won't hesitate to share it with other growers.

James LaSelle- Cranberry grower

We bounce ideas off each other- cultural, insects, weed control etc. Economic benefits vs. cultural realities. As organic production becomes reality, his input and energy will be a source of information for both growers and potential growers.

4. What we did

a) Established habitat. We installed

1. bat houses (2)
2. held water in ditches for frogs
3. clay tiles for toads and salamanders (20)
4. sections of cattle fence for spiders (3)
5. dragonfly perches (12)

b) disrupted mating cycles

This was a tradeoff. Because we were unable to acquire the new CFW pheromone (held up in production by EPA), we used moth traps on the bog baited with vine, new berries and fresh ripe berry. Okayed by SARE.

c) disrupted emergence

20 feet od slitted plastic row cover was placed of a wild bog section w/3 sticky traps inside to force early emergence of CFW.

d) release of parasitic wasps

At two week intervals, starting June 15, we released 100,000 of both Tricogramma Bactrae and Tricogramma Minutum for 10 weeks ending August 30.

e) applied BT

a 10x10ft section of the bog was sprayed with Bacillus Thorengensis Kurstaki twice weekly from 6/15/96 until 8/30/96.

g) plant repellents

three 10x10ft sections of the bog were planted with dill, cilantro and garlic, as a companion type measure.

h) bug lamp

2 battery lit moth traps were employed at night for two weeks in July 15-30.

The final measure was a calculation of an overall percentage of loss (POL) for the entire bog and a comparison to the previous year.

5. Findings

A. Establish habitat. No actual measurments were made. This part was purely observational and estimated.

- 1) we had no takers in the bat houses
- 2) we had a healthy frog population, approx. 1frog/3ft of ditch.
- 3) no salamanders were seen, but a huge toad population was observed, approx. one small toad/25sq.ft. of bog.
- 4) Dragonfly perches were used regularly, but it became obvious to us early on that they were not nocturnal feeders.

B. Moth Traps

The results from this were dissappointing. We caught no CFW, and took them off the bog after 4 weeks because they were quite effective on insect varieties that we speculated were beneficial.

C. Disruption of Emergence

The results of this were delightful, although unexpected. We never caught a single CFW on the sticky traps. It seemed that this experiment was a failure until the end of the season (POL) percentage of loss count. Under the cover we had a 2% loss while outside the covered section we had a 12% loss. We can only speculate that while CFW may have passed quickly through the vents, it was reluctant to return to lay eggs. The vine bloomed one week earlier than its surrounds and pollination seemed unaffected. Next years grant application is designed to address this.

D. Release of Parasitic Wasps

No parasitized CFW eggs were found. In fact, no CFW eggs were found at all. We are speculating that either our samples were too small (50 berries twice a week) or we weren't really that good at spotting them. I will continue, however, to use *T. Minutum*, a variety isolated on a New Jersey bog, releasing them on the bog edges, where the damage seemed to be the heaviest.

E. Submergence of CFW Eggs

I must apologize, with no eggs found, this was not do-able.

F. Application of BT

POL for the BT section was 17%, above average and not very promising. Our rainy season may have contributed to this, washing off this biological often enough to skew results. I will try this again in the future if scouting reports a heavy egg set.

G. Plant Repellents

Again, our rainy season caused problems. I was unable, after three plantings, to establish any dill or cilantro stands. The garlic, planted from cloves, took well. The POL was 17.45%. This was above average, although it was planted at the bog edge, which suffered a generally higher POL.

H. Bug Lamp

These were very effective, but unfortunately not on CFW. We never caught a single CFW and took them off the bog after two weeks, feeling that too many beneficials were being caught.

I. Overall POL

This was calculated at harvest by picking 100 berries from three randomly selected sites as well as the BT section and garlic planted section. Care was taken to pick all the berries in an area, its size being determined by how large an area it took to gather the 100 berries

Summary

Because the grant employed such a variety of controls, we felt an overall POL for the entire bog for the season was, in effect, the only true measure of the effectiveness of any or all of our efforts. This is compared to last year's overall POL, and conclusions drawn taking into account the variables that are beyond our control. More on this later. By the numbers, so to speak, on face value, our efforts were successful. Our overall POL for 1996 was 14.9% as compared with 1995's Pol of 28%.

Now for the mixed news;

1. Insect pressure was high this year. An adjacent lake, which supports many wild cranberry stands, remained flooded this year until the middle of July. Consequently the wild stands did not bloom this year. CFW had no place to lay eggs except on our bog. We may have actually done better this year than we thought under the circumstances.

2. We had more berries than last year. Anne Averill says that the more berries, the less percentage of fruitworm damage. Our new bog is just 2 years old, and will take at least 4 years until we enjoy full harvests. This may have decreased our POL.

3. We suffer overly intense CFW pressure. Most new bogs in Maine get a few years grace before fruitworm even becomes a problem. Our close proximity to wild bogs give us an inordinately large population of CFW in wild settings, hence warranting our immediate attention.

So as you can see, we aren't operating in either a perfect world or a laboratory. The numbers point to a success, and yet uncontrollable circumstances could make good arguments either way. In any event, we are satisfied with the results, a good starting point, and continue to work for better controls of this pest.

7. Economic Findings

Fruitworm damage is still way too high. Combined with the loss from "other", the overall bog damage was 24.8%. We have yet to address the "other" causes of loss. Although an organic bog can operate profitably with these loss numbers, any decrease in POL translates directly into more profits from larger harvests and less culling labor.

In actual numbers, we retailed our cranberries in 12oz bags for \$3.50 or \$4.67lb. This compares with a retail conventional berry at \$2.50 or \$3.32lb. This 40% premium does not even take into account conventional losses or management costs.

8. New Ideas

This year's results have inspired next year's project. We will trial slitted row cover on our bog, and different covers, some put on only at night and some left permanently in place.

9. Continuing Practices

The toad, frog and bat habitat showed promise and takes no real effort to leave in place. The slitted row cover has real possibilities and demands a further look to determine its economic possibilities. Although we had no quantifiable results, *Tricogramma Minutum* will continue to be used, and the BT application will be considered in cases of scouted heavy egg-laying.

10. What I Tell

This project is by no means finished. As I get more information, I'll be happy to share what I know with any open ear. In fact I will be doing a presentation at the Maine Organic Farmers and Gardeners (MOFGA) this fall at their Farmer To Farmer Conference.

11. Outreach

Copies of this final report are sent to all my collaborators as well as the Maine Cranberry Growers Assoc. and the Massachusetts Cranberry Experiment Station. On request as I did last year, I will write articles for both MCGA & MCES.

12. Photos

Again, my apologies. We had photos that clearly showed the flooded ditches, bathouses, spiderfences, moth traps, clay tiles, dragonfly perches, companion planted and BT sections, sticky traps and parasitic wasp releases. They were destroyed in developing. The only ones that survived were the slitted row cover pics, which were on separate film.

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good	Fruit worm	(?) other	Total
(85) 85%	11 (12) 12%	(3) 3%	100 15%
(96) 95.049%	<u>2</u> (4) 3.96%	1 (1) 0.99%	101 4.95%
(66) 66%	<u>3</u> (24) 24%	(10) 10%	100 34%
73 70.873%	<u>Garlic</u> (8) 17.475%	11 (12) 11.65%	103 29.125%
64 64%	<u>B.T.</u> 11 (17) 17%	12 (19) 19%	100 36%

$$12 = \times 100$$

**FIELD
NOTES
SAMPLE**

Bog MAP.

9/11/96

FIELD
Notes

