UMass Cranberry Station
Research & Extension

Cranberry Station Newsletter

February 18, 2020

1 State Bog Road
PO Box 569
East Wareham, MA 02538
508-295-2212
ag.umass.edu/cranberry
Vol. 21:1

UMass Pesticide Safety Training

Wednesday, April 15, 2020
8:00 AM – 12:00 PM
Rosebrook Event Center
TownePlace Suites Marriott
Wareham, MA

$50.00 per person: must be postmarked by 4/3/20
After 4/3/20 you are considered a "walk-in": **cost will be $75.00 per person**

Registration form is on page 13

Tentative Schedule of Events (*4 contact hours*)

7:30	**Registration (with coffee)**
8:00	Pesticide Restrictions in 2020 and Why? – Marty and Hilary
8:20	Insecticides Mode of Action – Marty Sylvia
8:40	Roundup, Callisto and Kerb, 2020 Weed Options – Hilary Sandler
9:00	WPS, Safety, and more – Marty Sylvia
9:20	IPM Tick Management – Blake Dinius, Plymouth County Extension
9:40	Chemigation Review – Steve Ward, SureCran
10:00	**COFFEE BREAK**
10:20	Moss and Herbicide Research Update – Katie Ghantous
10:40	Insects of the Day – Anne Averill
11:00	Iclicker – Compare Your Pesticide Usage? – Marty and Hilary
11:15	2020 Pathology Review – Leela Uppala
11:40	KQF and Frost – Peter Jeranyama
11:50	Solar Regulations – Giverson Mupambi

2019 Cranberry Pathology: First Year in Review

Leela (Sai Sree) Uppala

Ongoing Research Projects:

1. Current status of cranberry fruit rot fungi in Massachusetts
2. Multi-state evaluation of Chlorothalonil alternative fungicide regimes for their effect on fruit rot, firmness, fruit color, fruit size, and yield
3. Evaluation of 11 new chemistries and endophytes for fruit rot disease management
4. Evaluation of efficacy and residues of Bravo applied at different bloom/fruit developmental stages in Massachusetts
5. Investigation of potential sources of overwintering inoculum for cranberry fruit rot
6. Survey of plant parasitic nematodes in Massachusetts cranberry bogs
7. Optimization of current cultural practices for Cranberry disease management

Research Publications:

- **Uppala, S. 2019**. My first year as a Cranberry pathologist at UMass-Cranberry Station. North American Cranberry Research and Extension Working (NACREW) Conference, August 19-21st, Vancouver, BC, Canada
- **Uppala, S.**, Dimos, M., and DeMoranville, K., 2019. Current status of cranberry fruit rot fungi in Massachusetts. APS annual meeting, August 3-7. Cleveland, OH
- Shumila, J., Wang, X., Rojas, E., **Uppala, S.** and Neto, C. 2020. Quercetin and p-coumaric acid derivatives in cranberry (*Vaccinium macrocarpon)* fruit vary in response to growing conditions and fruit rot diseases. American Chemical Society national meeting. Orlando, FL
- **Uppala, S**., Liu, B., Wu, M. and Zhou, X. G. 2019. Plant-based culture media for improved growth and sporulation of *Cercospora janseana* Plant Disease. 103:504-508

Mentoring:

- Mentored 2 undergraduate students as part of CAFE (Center for Agriculture Food and Environment) Summer Scholar Research program
- Hosted a community outreach event for high school kids as part of the National Aquarium field trip on August 13, 2019

Service to American Phytopathological Society:

- Elected as Vice-chair of American Phytopathological Society Plant Pathogens and Disease Detection Committee
- Nominated to be a Senior Editor (2019-2021 term) for Plant Health Instructor
- Reviewed 13 research manuscripts for Plant Pathology journals

Grant Funding:

- In 2019, I obtained $30,000 in research funding
- Submitted 9 research proposals (4 growers' associations for applied research; 1 to a chemical company; 2 to USDA funded programs; 2 internal proposals to UMass for research seed funding)

Extension/Outreach Updates:

Lab Disease Diagnostic Service: In 2019, I provided plant disease diagnostic services to 46 growers by processing plant samples using microscopic, cultural and serological methods. Appropriate disease management guidelines were provided.

Cranberry Bog Visits for disease diagnostics: In 2019, upon farmer's request, I visited 17 cranberry bogs to provide diagnostic service and management guidelines.

Extension Presentations:

1. 17th Annual Cranberry Crop Summit Meeting: presented on New Plant Pathology Research and Extension Initiatives in Massachusetts
2. Cranberry Station's Annual Research and Extension Update Meeting: presented on "What is on the horizon for cranberry Pathology in MA"
3. 12th Annual Agricultural & Food Conference organized by Southeastern Massachusetts Agricultural Partnership: Presented on "Upscaling to growing rice: Is it a possibility?"
4. CCCGA (Cape Cod Cranberry Growers Association) Annual Meeting: "Cranberry Fruit Rot Management"
5. UMass Cranberry Station Pesticide Safety Meeting, April
6. Bogside Workshop: presented on "Cranberry Disease Management"
7. Bogside Workshop: presented on "Cranberry Fruit Rot and Phytophthora Root Rot Management"
8. 2019 New England Vegetable & Fruit Conference: will present on "Review and Update on blueberry diseases" in December 2019

Extension Publications:

- **Uppala, S. 2019**. Phytophthora root rot management update. September 2019 Newsletter
- **Uppala, S. 2019.** UMass 2018-2020 Cranberry Chart Book disease management update. Prepared in April 2019 as an addendum to the 2018-2020 Chart book

Social Media Educational Videos:

1. Cranberry Bog= 63 views
   https://www.youtube.com/watch?v=KAhRY6Uj3cc&t=122s&fbclid=IwAR0QBwKEoGzi3o7i5ZbKWsXGYdHbVGE47IDYGPyeInkLLH4r0C5NGGRBfjs
2. Cranberry Water Harvest = 72 views
   https://www.youtube.com/watch?v=HDyODZ0JIPc&feature=youtu.be&fbclid=IwAR32kbWq3ezU6G3m36SlU2llGO3zBlKXovBckpZ5QOZHPqlqlxDT6XstXHQ
3. Cranberry Dry Harvesting (by machine) in East Wareham = 25 views
   https://www.youtube.com/watch?v=dHN-o6gV_l0&fbclid=IwAR16Vc1Mqd_PNN3GLINl6HSxde0tIElYzjRmsRMT_uB10RQkXdOQ4VbldO0
4. Cranberry Dry harvesting (by machine) in Carver, MA = 22 views
   https://www.youtube.com/watch?v=Kvq3uRck9To
5. Cranberry Dry Harvest (by Wooden Scoop) = 63 views
   https://www.youtube.com/watch?v=EW3p7ZJd4ww&fbclid=IwAR2PJmsE2PAF-J7D0hZwGegZBIQK-wKYqVfoYifqRcBv6aCsxmRqjmgAqMU

CRANBERRY STATION NEWS

Hold on to your Chart Book! Your multiple year Chart Book is good for one more year. Update inserts will be available around April 1st. If you do need a Chart Book please contact Robyn Hardy, 508-295-2212 x10, for availability.

Hilary A. Sandler, Station Director

2019 Cranberry IPM/Weed Program

Hilary Sandler and Katherine Ghantous
with support from K. DeMoranville and N. Demoranville

Research Highlights:

Moss in cranberry bogs. Moss continues to be a prevalent weed issue that is not able to be controlled by currently available herbicides. Results from a 2018 weed competition study showed a significant correlation between lower cranberry yields with increasing moss density. This study was repeated in 2019, and data will be analyzed this winter.

Two herbicides have shown promise for controlling haircap moss in cranberry. A replicated field trial was conducted in 2018 testing two rates and two timings of each herbicide. This project was done in collaboration with WI and NJ researchers. Both demonstrated crop safety and good moss control in MA trials. However, other regions using different application methods had variable crop safety results. In 2019, a study was conducted looking at both herbicides applied as chemigation (chemicals applied through the irrigation systems in large volumes of water; prevailing application method in MA), boom sprayer (applied in low volumes of water; prevailing application method in WI), or as a boom application followed by sprinkler irrigation to rinse the products off the vines and into the soil where they are intended to be active. This study was conducted in collaboration with NJ, and data will be analyzed over the winter. The industry is actively seeking registration of both chemicals. We published a 4-page fact sheet on moss biology, diversity, and yield impacts (https://scholarworks.umass.edu/cranberry_facsheets/44).

Screened herbicides for use in cranberry. Novel herbicides are needed to control problem weeds and allow growers access to various mode of actions (MoA) and enable them to rotate chemicals and practice Resistance Management. Our program screened four preemergence herbicides and one postemergence herbicide registered for use in other food crops (but not cranberry) against perennial grasses greenhouse trials and for crop safety in field trials. We anticipate that one will be registered for cranberry use within the next year. We tested a single or double application of the herbicide at two different timings for efficacy against poverty grass; crop safety data look promising.

Crop safety and efficacy studies with Kerb SC on new plantings. Kerb has been shown to be safe on established cranberry plants but has not been previously studied on bogs during the establishment stage. We studied the effects of single and multiple applications of different rates of Kerb applied to new cranberry plantings (< 2 yrs) to test crop safety and efficacy, and to help us formulate grower recommendations in the future when the herbicide is registered. Our initial review of the data indicate that Kerb is both safe and efficacious on new plantings.

Promoting better understanding of dodder biology (with Dr. A. Caicedo and Mr. Jacob Scott, Biology). To date we do not know the extent of dodder species infesting cultivated bogs nor the genetic diversity present in these infestations. In 2018, we collected 426 dodder samples from 32 commercial bogs and six non-agricultural environments in MA. We observed variation in stem diameter and color. We also obtained 80 dodder samples from NJ (8 sites, 3 were native wetlands), and 16 samples from WI (8 commercial sites). We developed an in-house genotyping-by-sequencing (GBS) protocol to carry out genome-wide

characterization of single nucleotide polymorphism (SNPs). In 2019, generation of high-resolution genetic data began, allowing us to further probe into questions such as: Which dodder species occur in commercial cranberry bogs? How much genetic diversity is present in infestations and how is this diversity structured? and What is the relationship between weedy and wild dodders?

Extension Highlights:

- We obtained an Emergency Exemption permit from the U.S. EPA for the use of Kerb (herbicide) for dodder control on cranberries
- We obtained a Special Local Needs (SLN or 24c) label to permit the chemigation of the postemergence grass herbicide, Intensity/IntensityOne on MA cranberry farms
- We collaborated with MA-DEP and SMAST to provide water sampling services for a cranberry grower under an Administrative Consent Order (ACO) and developed a streamlined protocol for 2020
- We participate in Maximum Residue Limit (MRL) discussions with other scientists and industry representatives to review export issues and prioritize pesticides slated for review
- **ScholarWorks** (digital repository). Station documents were downloaded by people from 102 different countries. China was the 3rd most popular country for downloads. Cranberry Chart book: 683 copies (-35% from last year); Cranberry Production CP-08 Manuals: 565 copies (+42% from last year); BMPs: 388 copies (-49% from last year; jar test was downloaded most frequently, 357 times); Fact sheets: 683 copies (same as last year; Physiology of cranberry yield, 242 downloads)
- **UMass Cranberry Web Site**: 8,216 users (-5% from 2018); 22,349 page views (-5% from 2018). Top 5: How Cranberries Grow, Cranberry Chart Book, Faculty/Staff page, IPM Message Alerts, Frost Tolerance Reports

Other Program Highlights:

- Published 1 journal article (with another under review), 3 fact sheets (moss, dodder, solar panels), and 5 abstracts (meeting presentations)
- **Sandler, H.A**. 2018. Weed management in cranberries: A historical perspective and a look to the future. *Agriculture* Special Issue: *Recent Advances in Horticultural Practices for Berry Crops*, 8(9), 138. DOI: 10.3390/agriculture8090138
- Giorgio, T., L.S. Adler, and **H.A. Sandler**. Differential response to azoxystrobin by *Colletotrichum* species isolated from Massachusetts cranberries. *Plant Health Progress* (under review).
- Led and administrated EIP grant program for UMass Extension small fruit, tree fruit, vegetable, and cranberry teams. Year 2 (of 3-year grant) monies from USDA-NIFA: $297,999

UMASS CRANBERRY STATION
WORKER PROTECTION STANDARD (WPS) HANDLER TRAININGS

Worker Protection Training using the new materials from the EPA for cranberry workers in the handler category for Spring 2020 will be held on the following Wednesdays, **April 29th, May 27th, and June 24th,** here at the Cranberry Station Library from **2:00-4:00 PM.**

$10/per person. If you have a pesticide license, you do not need this training. If you have workers, they do need this training!

To sign up or for more information, please contact **Marty Sylvia: 508-295-2212 x20**

2019 Cranberry Physiology/Fruit Quality Program

Giverson Mupambi
with support from K. DeMoranville

Research Highlights:

Canopy management to improve fruit quality: We investigated the effect of mowing, pruning and sanding to improve light penetration into the canopy and improve fruit quality in 'Mullica Queen' and 'Stevens'. Results showed mowing and pruning improved fruit quality through increased fruit color and reduced fruit rot incidence in 'Mullica Queen' (Figures 1 & 2). Canopy management has the potential to improve fruit quality in overgrown cranberry bogs that have poor color development and high incidence of fruit rot. The results from 'Stevens' have yet to be completed.

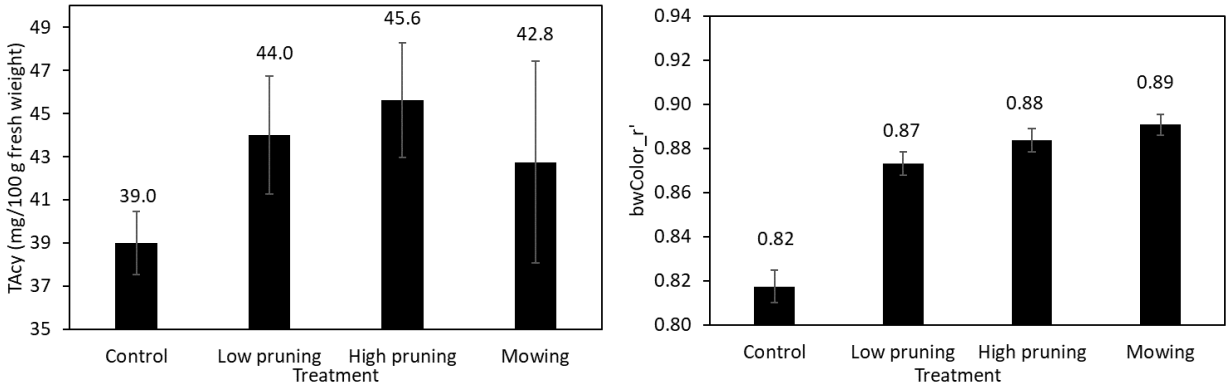


Figure 1: Effect of canopy management on fruit color of 'Mullica Queen' assessed using biochemical method (right) and high-throughput phenotyping machine vision technology.

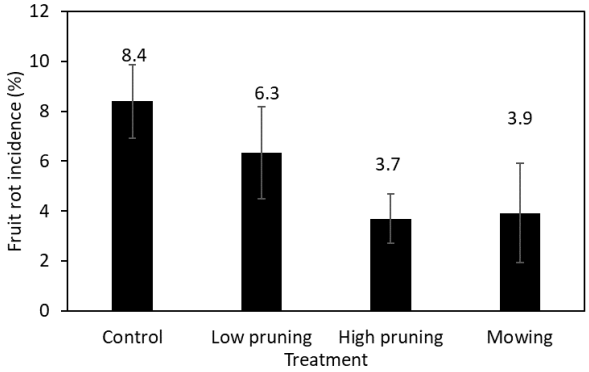


Figure 2: Effect of canopy management on fruit rot incidence in 'Mullica Queen'.

Solar research: Recently, there has been an increase in interest by cranberry growers in agrivoltaic systems that are designed for the continuation of productive agricultural activities under solar (photovoltaic) panels in order to diversify revenue streams. Agrivoltaic systems utilize the same area for both solar power generation and agricultural use. We conducted a preliminary study to look at the changes in microclimatic conditions, soil moisture, leaf gas exchange, vegetative growth and yield under solar panels. Solar panels reduced photosynthetically active radiation by 41% under the solar panels and 29% between solar arrays compared to the control. The amount of shading on a cloudy day was reduced due to an increase in the amount of diffuse solar radiation. Net carbon assimilation (photosynthesis) was reduced between arrays at midmorning and midafternoon, whilst under the solar panels, it was reduced at midday. Net carbon assimilation recovered after the shade from the solar panels passed through. Canopy temperature was reduced by ≈7°F beneath solar panels (midday) and ≈6°F between solar arrays (mid-afternoon). This corresponds to the hottest part of the day where the risk of sunscald is high. Canopy temperature was

higher under the solar panels at night compared to the control, this could have potential beneficial effect for frost protection. There was increased soil moisture underneath the solar panels and between solar arrays compared to the control. This could be potential irrigation savings for growers. We observed reduced leaf wetness beneath solar panels and between solar arrays which has potential implications for frost damage. Additional data to be analyzed from this project includes leaf chlorophyll and area index, yield, fruit rot and quality.

Use of plant growth regulators to improve fruit quality: Our aim was to improve fruit quality in cranberry through the use of plant growth regulators. The fruit quality parameters of interest were fruit color and firmness. The fruit color improvement component was focused on increasing anthocyanin biosynthesis using s-abscisic acid (S-ABA). The aim of the fruit firmness research was to manipulate the ripening process by slowing down ethylene production using aminoethoyxvinylglycine (AVG). S-ABA had no effect on fruit color development in 'Stevens' (results from Howes' have yet to be completed). Similarly, AVG had no effect on fruit firmness in 'Stevens' and 'Howes'.

Use of biostimulants to improve fruit quality: We evaluated four different plant biostimulants to enhance nutrition efficiency, abiotic stress tolerance and improve fruit quality in 'Stevens'. The results of this study are still being processed.

Extension Highlights:

- Presented at the January update meeting (180 participants), pesticide safety meeting in April (68 participants) and Bogside workshop in June (18 participants)
- Produced and posted a video on 'Barge Sanding' on the UMass Cranberry Station Facebook website. The video reached 886 People and had 172 Engagements. The same video was posted on LinkedIn with 541 views
- Produced and posted a video on 'Canopy Management' on the UMass Cranberry Station Facebook website. The video reached 350 people and had 104 engagements

Public Outreach Highlights:

- I was interviewed by Associated Press (AP) as part of a story on solar energy and cranberry production. The story came out on 29 October 2019 and 128 national and international news outlets used the story amongst them Fox Business, ABC News, USA Today, Bloomberg, MSN News, and Washington Post. The story had 3,200 "engagements" on Facebook by 8 November 2019. The video version of had 1116 views on the AP YouTube page and 10,156 on the Russia Today YouTube page
- I participated in a TV program for Wareham Community Television titled "UMASS Cranberry Station". The video has also been posted on Youtube with 80 views and Facebook with 853 views

Other Highlights:

- My research program brought on $80,338 dollars in funding for applied research projects
- Obtained $3,475 in CAFE funds towards the purchase of new lab equipment
- Published 1 peer-reviewed technical bulletin, 1 fact sheet, and 1 abstract (meeting presentation)
- Mentored a CAFE summer scholar undergraduate
-

2019 Plant Nutrition – Physiology Program

Peter Jeranyama

Irrigation water management. Irrigation scheduling continues to be a major challenge in cranberry production. Many growers tend to rely on the 1 inch per week "rule" from rain and irrigation despite evidence that in most years, this results in some weeks with inadequate water and others with excess. It is highly likely that irrigation based on detecting available moisture in the soil and irrigating only when the moisture is inadequate to support plant growth results in better cranberry yield and less fruit rot. Values of soil water tension between -4.5 to -6 kPa seem to be adequate**.** The results showed that the grower practice had tension readings of -2 kPa or less and consistently wetter than the tensiometer method. Fruit rot was 7% higher and yield was 24% lower under the grower practice relative to the tensiometer method.

Developing New Frost Prediction Models: The cranberry industry has been well served through the diligent work of Dr. Franklin from the 1940s when he formulated predictive formulas for cranberry frost. The Franklin formulas cover the periods from April 20 to the end of June (spring frost) and from late August to the end of October (fall frost). Recently, climate patterns and grower winter management practices have changed and in several of the last few years, there was a need for frost prediction as early as the last week of March. Likewise, in the fall, late harvesting has become a more regular practice so that prediction for the first two weeks of November is also needed. Because Franklin formulas were developed for specific time periods, their use outside the period has yielded unreliable results. To try to mitigate against unreliable predictions outside the time period of Franklin, we are developing some formulas which have not yet been adopted by CCCGA for cranberry frost predictions.

Optimal Nitrogen Fertilizer Rates in Second-Generation Hybrid Cranberry Cultivars. Nitrogen is the most important element in cranberry production that impacts both vegetative growth and fruiting. Nitrogen fertilizer rates have been determined for native cultivars ('Early Black' and 'Howes') and for the first-generation hybrids such as 'Stevens', but field data to support N fertilizer recommendations for the second-generation "super" cultivars such as 'Mullica Queen', 'Crimson Queen' and 'Demoranville' are lacking. Because responses to N fertilizers are almost undetectable in the first year after application but are clearly evident after the second and third years, it is critical to conduct fertilizer experiments over multiple years. In this study, we will refine N fertilizer recommendations for one native cultivar ('Howes'), one first-generation hybrid cultivar ('Stevens'), and all second-generation cultivars planted in Massachusetts ('Crimson Queen', 'Mullica Queen', and 'Demoranville').

All the four cultivars tested in this experiment responded to increasing rate of fertilizer N. In most cases the yield increased with N rate up to 100 lb. N acre^{-1} (Figure 1) and after that was a decline indicating diminishing returns. Howes did not show any positive yield gains beyond the recommended 40 lb. N acre^{-1}. Fruit rot increased with a N rate increase. In particular, 'Crimson Queen' and 'Stevens' were associated with a high percentage of fruit rot at higher N rates. Cultivars 'Demoranville' and 'Howes' kept fruit rot below 20% even at high N rates.

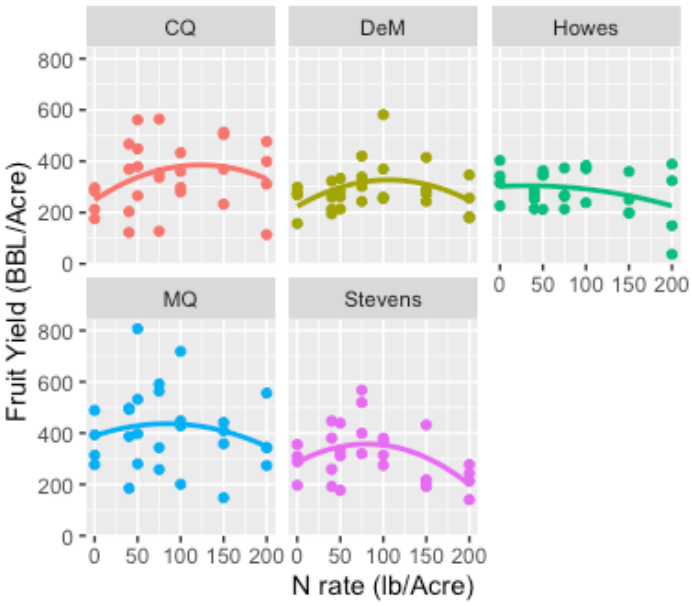


Figure 1. Fertilizer nitrogen effects on fruit yield in five cultivars.

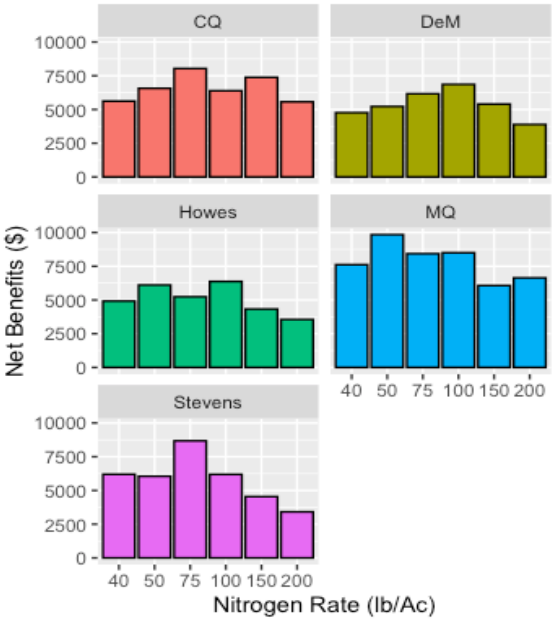


Figure 2. The net benefits are calculated from partial budget and considering only the costs that vary between treatments and the selling price for a barrel of cranberry.

The results show that the maximum net benefits in 'Crimson Queen' and 'Stevens' were obtained with 75 lb. N acre^{-1}, and 50 lb. N acre^{-1} with 'Howes' and 'Mullica Queen' while at 100 lb. N acre^{-1} with 'Demoranville' (Figure 2).

Net benefits are calculated as follows: **NB = GB -TCV**
Where, NB = Net Benefits, GB = Gross Benefits (Yield in barrels/acre x Selling Price of barrel), TCV = Total Costs that Vary (in this case is the cost of fertilizer plus helicopter application costs)

Sun scald Research. High summer temperatures (> 95°F) could potentially cause physiological stresses on cranberry vines. If these high temperatures occur during fruit set, sun scalding could result and further weaken the immunity of the fruit/vines so that they become more susceptible to fruit rot. Plants in general have a cooling mechanism of hydrating themselves through a process called transpiration. Could it be possible that the transpiration process is inadequate to cool the berries? If so, can in-day brief irrigation sprinkling be a solution? This project seeks to compare a pre-dawn irrigation event in anticipation of a hot summer day versus in-day brief sprinkling of the vines to avoid sun scald on developing fruit. Plants can cope with heat stress much like we do; they avoid it, or they tolerate it. Avoidance involves maintaining hydration and internal temperature as water is moved from the soil, through the roots and shoots and out through pores (stomata) in the leaves.

Refereed Journals:

1. Casey Kennedy, Nickolas Alverson, *Peter Jeranyama* and Carolyn DeMoranville. 2018. Seasonal dynamics of water and nutrient fluxes in an agricultural peatland. *Hydrological Processes: Volume 32, Issue 6, 1–15.*
2. *Peter Jeranyama*, Anil Shrestha and Nilhari Neupane.2020. Sustainable food systems: diversity, scope and challenges, In *the Role of Ecosystem Services in Sustainable Food Systems* (Rusinamodzi, L. Ed), Elsevier (in print) Chapter 1.

2019 Cranberry Entomology Program

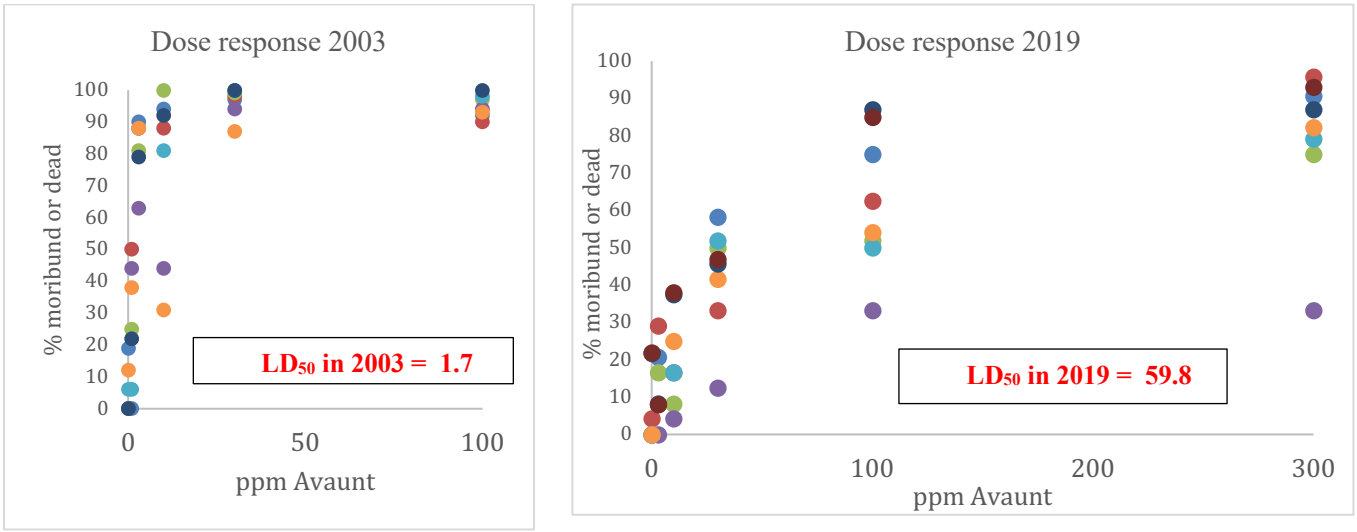
Anne L. Averill and Martha M. Sylvia

CRANBERRY SCALE OUTBREAK CONTINUES - Outbreak of scale insects (*Diaspidotus* and *Hemiberlesia)* (a sap-sucking pest that kills the vines) across the industry is one of the most challenging entomology problems again this season.

- ***Extent of Putnam scale outbreak***: We worked with 28 growers and evaluated 218 vine samples from possibly affected bogs to quantify Putnam scale levels. Samples without scale were rare
    - We expected a new species, Latania scale, to outbreak across sites, but it was found in high numbers at one new site. This is a tropical species that feeds on 100s of woody plants
- ***Systematics and mechanisms of scale insect host use***: Visiting scale experts, led by Ben Normark (UMass-Amherst Biology Dept), intensively sampled a dozen bog habitats. They found that the common Putnam scale on cranberry was also on surrounding vegetation and surprisingly, also in wild cranberry bogs. Molecular analysis will confirm species ID or determine if we are observing a species complex. Partial funding to BN from UMASS-CAFE-IRE program
- ***Management of scale insects*:** We sampled populations before and after our recommended insecticide regime, and determined that it was highly successful; also, we confirmed that a non-chemical approach, holding a flood, was an excellent management option. Funded by Cranberry commodity

CRANBERRY WEEVIL (*Anthonomus muscuus*)

- ***Oviposition behavior***: Females lay eggs and feed on developing cranberry flower buds. Do they prefer new hybrids over heirloom cultivars? Yes, shown in lab-choice tests
- ***Cranberry weevil populations appear resistant to Avaunt***: For cranberry weevil, Avaunt (indoxacarb) insecticide was the preferred option for almost 15 years. It is environmentally friendly but reports of resistance have accumulated. Variable 2018 field results may have been impacted by rainy, cool spring conditions
    - 2019 dose-response bioassays were compared to 2003. The LD_{50} (lethal dose for 50% of tested individuals) was 35X higher in 2019



Dose-response mortality to Avaunt of cranberry weevil carried out in 2003 (left) and 2019 (right). Within a year, same-color dots represent response of weevils from the same bog site. In both years, weevils collected from seven different sites were evaluated.

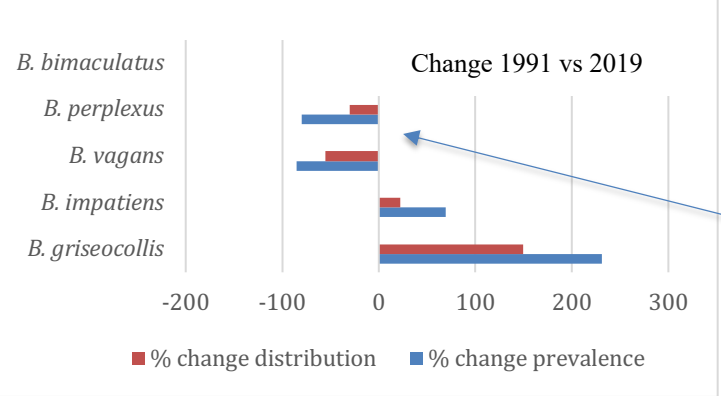
- ***Alternatives to Avaunt are suboptimal***. Lab and field tests confirmed that an option, thiamethoxam-Actara is still highly effective, but it is taken up by the cranberry plant and appears in the pollen and nectar at levels detrimental to bees. Cyantraniliprole-Exirel is a new environmentally friendly chemistry, but high field efficacy against cranberry weevil was not confirmed. Funded by Cranberry commodity

CRANBERRY FRUITWORM STATUS- Most growers spray bogs multiple times for this moth pest; the immature stage tunnels through berries. In 2019, we sampled adult moths and egg infestation over the entire season at 6 sites and on four cultivars. Big files--results pending.

- ***Has cranberry fruitworm pressure abated owing to our better-timed, bee-safe management recommendations***? We are comparing 2009 vs 2019 (pre- and post our new recommendations)
- ***How does fruitworm infestation compare on a high-yield hybrid vs heirloom cultivars?*** Funding by USDA-UMASS-Cranberry Station Hatch 488

BEE DIVERSITY AND ABUNDANCE IN CRANBERRY - Bumble bees are the most effective and common pollinators on many small-medium size bogs. 10 species were common in the old days, now there are 5.

- ***Museum archive project:*** 2019 curation of our cranberry bee and insect collection into drawers within an airtight cabinet system was begun. Funding provided by a UMASS-CAFE Equipment request
- ***Drastic shift in bumble bee diversity is ongoing***



Long-term monitoring: change (negative or positive) in the # of sites where a bumble bee species was collected (distribution) plus the relative abundance (prevalence) within the bee community.

The figure shows that two different species of bumble bee are in sharp decline (Bombus vagans and Bombus perplexus). The project, including the abundance assessment described below, was led in 2019 by a UMASS-CAFE Scholar.

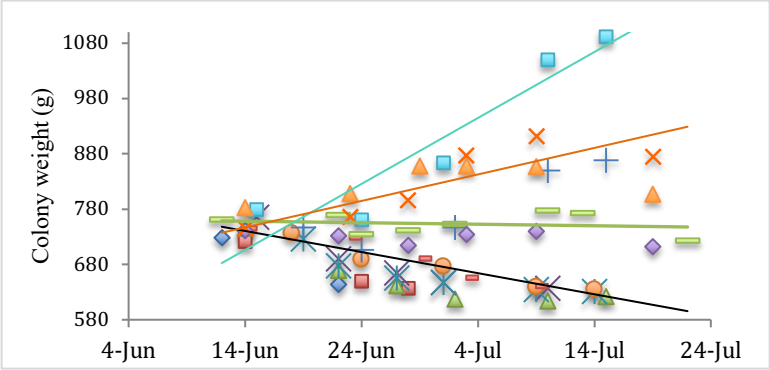
- ***Bee abundance is steady***: Repeated counts in1990-92, 2007-2008, and 2016-19 show no change. For honey bees, beekeepers apparently have kept up with colony declines. For bumble bees, this suggests that as species are lost, other species are rapidly backfilling the vacated niche space.

	1990-91	2007-08	2016-2019
Honey bees	0.25 ± 0.21	0. 17 ± 0.18	0.23 ± 0.14
Bumble bees	0.21 ± 0.14	0. 21 ± 0.11	0.29 ± 0.21
Small natives	0.02 ± 0.03	0.013 ± 0.01	0.04 ± 0.02
Total bees	0.48	0.39	0.56

Bee visits/min to cranberry within a m^2 template. Individuals were counted at six locations on three different observation dates. Abundances within a bee type were statistically similar across the three points in time

BUMBLE BEE COLONY HEALTH AT MANAGED BOGS - Commercially-available bumble bee colonies were deployed at cranberry bogs to identify local factors affecting hive performance during bloom.

- ***Significant differences in bumble bee colony growth were observed among commercial cranberry sites.*** Colony outcomes could be characterized as thriving, growing, steady, or collapsing.



Weight gain of bumble bee colonies deployed at 13 different managed bogs just prior to bloom, and then weighed weekly to measure performance (colony growth). Each point is the average of 4 colonies. Other data collected included worker, queen, and male production.

Initial analysis suggests that the most critical factors affecting outcome are size of treated bog area relative to untreated area and fungicide choice. Funding by USDA-Multistate 1173.

IR-4 REGULATORY PROGRAM – residue program for minor crops, allows new chemicals to be labeled for cranberry. In 2019, 2 projects were funded and completed: Quinclorac-herbicide and Tebuconazole – fungicide residues, including a decline study, which required 5 harvest dates.

EPA approves re-certification for use of Kerb for dodder control in 2020

Kerb is a state-restricted use compound! The PHI is 75 days and the REI is 24 hours. Be sure to check with your handler for any restrictions PRIOR to use!! All applicable directions for use, restrictions, and precautions on the EPA-registered product label including Worker Protection Standards must be followed, as well as those outlined in the Section 18 use directions. The time-limited emergency exemption begins April 15, 2020 and expires June 30, 2020.

A maximum of two pre-emergence broadcast applications per acre per season of Kerb® SC may be made through irrigation systems (chemigation) or boom-sprayer only. One application may be made at use rates of 2.5-5.0 pints of product (1.0-2.0 lb. a.i.) per broad cast acre. Alternatively, two split applications may be made at a rate of 2.5 pints of product (1.0 lb. a.i.) per acre. Total product applied must not exceed 5.0 pints of product (2.0 lb. pronamide) per acre per season, whether resulting from a single or split application. Boom applications should be followed by 0.1-0.2 inches of irrigation. No aerial applications permitted.

Applicators and other handlers must wear the following Personal Protective Equipment (PPE); (1) coveralls over short-sleeved shirt and short pants, (2) chemical-resistant gloves, (3) chemical-resistant footwear plus socks, (4) chemical-resistant headgear for overhead exposure, and (5) chemical-resistant apron when cleaning equipment, mixing or loading.

Thanks to CCCGA and CI for their support and to MDAR for approving and working with the EPA to secure this recertification. If you use Kerb, I would be grateful to hear the control (or not) that you see. Hilary 508-292-2212 x21.

RESPIRATOR TRAINING

Respirator Requirements, Training, Medical Evaluation and How to Fit Test- Review of the requirements for using a respirator, choosing the correct respirator, required training with paperwork, Medical Evaluation reviewed, handed out, where you can have it completed, and the information, technique and tools of how to run a respirator fit test. Two classes will be offered:

Monday, April 6, 2020
Monday, May 4, 2020

Cranberry Station Library
8:00-10:00 AM

$25/per person
Please register, space is limited to 25 seats
Bring your respirator!

Contact **Marty Sylvia: 508-295-2212 x20**

UMass Pesticide Safety Training Registration Form

Wednesday, April 15, 2020
7:30 AM – 12:00 PM
Rosebrook Event Center
50 Rosebrook Place, Wareham, MA

$50.00 per person
Must be postmarked by 4/3/20

After 4/3/20 you are considered a "walk-in": cost will be **$75.00 per person.** Please contact the Robyn Hardy to be added to the "walk-in" list.

Please make checks payable to **UMass** and return payment to:

UMass Cranberry Station
PO Box 569
East Wareham, MA 02538

***Remember to bring your**
Photo ID and Pesticide Number

PLEASE PRINT
ALL meeting attendees **MUST** register and pay (whether receiving credits or not)

Registration Fee is non-refundable after 4/3/20

NAME: _____

COMPANY: _____

EMAIL: _____

PHONE: _____

ADDITIONAL ATTENDEES:

_____ _____

_____ _____

_____ _____

_____ _____

UMass Extension

CRANBERRY STATION NEWSLETTER

Inside this issue:

UMass Cranberry Station
PO Box 569
East Wareham, MA 02358

OFFICIAL BUSINESS