UMass Cranberry Station
Research & Extension

Cranberry Station Newsletter

February 22, 2021

1 State Bog Road
East Wareham, MA 02538
508-295-2212
ag.umass.edu/cranberry

Vol. 22:2

SAVE THE DATES

Mark your calendars! The 2021 Pesticide Safety Meeting has been scheduled for Tuesday, April 27th and Wednesday, April 28th via Zoom from 7:30-11 AM (8:00 - 10:00 AM for credit) both days (2 contact hours for each). You will need to register online for each, and you will need to answer poll questions during the 8:00-10:00 AM sessions to be awarded pesticide credits. Payment will be processed separately-Cost will be$20/each day, or discount of $30 for both days. Stay tuned, the agenda and additional information on how to register will be in the March newsletter.

2021-2023 UMass Cranberry Chart Book

You are now able to order your 2021-2023 Chart Book! You can choose to have your copy mailed to you, **$6 mailing fee (per book),** or we are offering contactless drive-thru pickup times available in April.

Friday, April 2 from 8-10 AM **Wednesday, April 7 from 11-1:00 PM**
Friday, April 9 from 8-10 AM **Wednesday, April 14 from 11-1:00 PM**

ORDER FORM is on page 9. Contact Robyn Hardy at rmhardy@umass.edu or 508-295-2212x10 if you have any questions.

Selected Highlights of the 2020 CRANBERRY ENTOMOLOGY PROGRAM

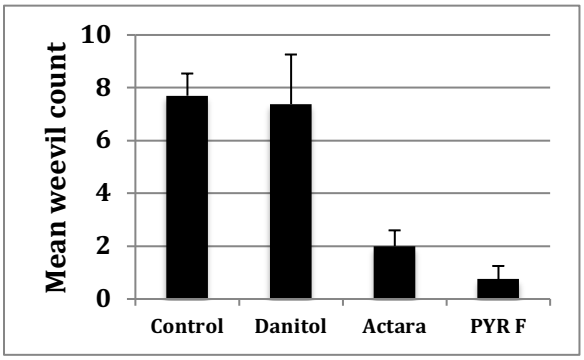
Anne L. Averill and Martha M. Sylvia

MANAGEMENT OPTIONS FOR RESISTANT CRANBERRY WEEVIL

This is one of the most pressing pest challenges for the industry. Cranberry weevil populations have sequentially become resistant to each insecticide class. We have not discovered an effective non-insecticidal management strategy but have had made some progress towards a behavioral control option with Rutgers.

Refereed publication: C. Rodriguez-Saona, … M.M. Sylvia and A.L. Averill. 2020. Fine-tuning the composition of the cranberry weevil (Coleoptera: Curculionidae) aggregation pheromone. J. Applied Entomology 00:1-5.https://doi.org/10.1111/jen.12752

Insecticide screening trial for cranberry weevil control: Actara (a neonicotinoid), is currently used throughout the cranberry industry. Resistance is anticipated, so in 2020, we tested a new class of insecticides, the pyrethroids, which are used widely in other crops.



Large field plots (4 reps/treatment) on State Bog were treated with either Danitol (pyrethroid), PYR F (pyrethroid), or Actara (current industry standard). After 5 days, weevil counts were compared to untreated Control plots.
In sum, control was excellent in PYR F plots. Danitol was not effective, showing no difference from the untreated plots.

Residue analysis: To have PYR F registered and available for growers, we are working with ADAMA, the registrant. We are cooperating with Ocean Spray to collect residue data.

BUMBLE BEE COLONY HEALTH AT MANAGED BOGS

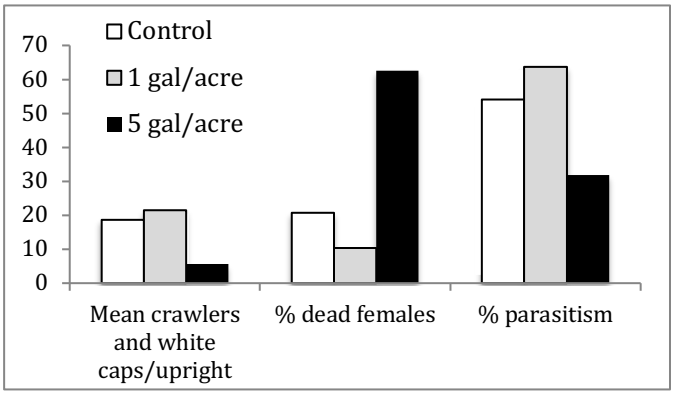
Bumble bees are the most important wild pollinators in cranberry. We worked to identify pesticide use that may impact these wild bees by deploying sentinel commercially available bumble bee colonies at 7 commercial cranberry bogs (4 colonies/site). Colonies performed poorly at 4/7 of the sites. Chemical analysis of pesticides in pollen is pending. Initial analysis suggests that at least four different spring insecticides applied pre-bloom are being taken up by the cranberry plant and may be at toxic/sublethal levels in pollen weeks later.

SPATIAL ANALYSIS OF LANDSCAPE COMPOSITION FOR BUMBLE BEE SPECIES DIVERSITY AND PATHOGEN LOAD

Michael Nelson's group in the UMASS Environmental Conservation Dept is utilizing our data sets to investigate if surrounding land-use and land cover (e.g., cranberry farms vs other landscapes) affect bumble bee community diversity and health.

EMERGING INSECT PESTS: SAMPLING AND MANAGEMENT

Scale insects continue to form outbreak populations across the industry and are difficult to assess and manage. Putnam scale (*Diaspidiotus ancylus*) is the causal agent for many vine die-off areas.



Outreach to growers: We microscopically inspected vines that we collected (18 samples) or were provided by growers (23 samples). A broad-spectrum conventional insecticide or late-water management were successfully recommended.

Crop oil screening trial for scale control. We evaluated an environmentally sound spray option**.** While the vines were dormant, replicated field plots were treated with 1 gal/acre crop oil or 5 gal/acre crop oil. In June, immature scale abundance, adult female mortality and percent of scales parasitized by a black wasp were compared to control plot populations. The 5 gal/acre treatment showed strong promise. Parasitism rates were surprisingly high.

To have crop oil registered and available for growers, work continues with Drexel to develop a Special Local Needs label for use on cranberry.

A NEW LEAF BEETLE – *TRIACHUS VACUUS* This tiny beetle (1-2 mm) has been building up in numbers, with the first infestation identified in 2015. Now there are many sites, ranging across Carver, Plympton, Taunton to RI. Infestations cause substantial vine injury owing to impressive, localized outbreaks.
Outreach to growers: We confirmed infestations at 10 sites. A fact sheet was sent to growers; M.M. Sylvia and A.L. Averill. Pest alert - July 2020. New leaf beetle "The Golden

Casebearer".

Identification: We sent the beetles to the USDA for identification. It is *Triachus vacuus*, with a range across the eastern US. It is a native species but is poorly studied. It is not identified as a pest elsewhere. Interestingly, specimens had been submitted to USDA for MA cranberry in the 1960s. It is in the 'casebearer' beetle group, which has an odd biology - females encase eggs with excrement. The developing larva then carries around a fecal case that it adds to as it grows.

WINTER MOTH – GREEN CRANBERRY SPANWORM

These spring species are very hard to tell apart, but proper ID is required since anticipated damage, assessment, and management are different. We observed that green spanworm is increasing while winter moth has sharply declined. Many green spanworm moth flights were observed in June.

Outreach to growers: 12 sites were visited, and growers made aware of evolving pest status

Selected Highlights of the 2020 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 been adopted by CCCGA for cranberry frost predictions. My program developed frost prediction formulas for April 1-14 (early spring) and November 1-15 (late fall). The fall formulas were used this fall to predict frost events.

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').

Cranberry Productivity Project. This is a collaborative project with Dr. Giverson Mupambi (UMass Cranberry), Dr. Casey Kennedy (ARS-USDA) and Dr. David Millar (ARS-USDA). We are monitoring 12 cranberry beds; half are low productivity, and the other half are high productivity bogs. We are collecting fruit yield data, fruit rot, fruit quality, DNA analysis, delta ^{13}C, ^{15}N, soil Carbon, Soil P and soil N of at least 12 preselected coordinates. We are evaluating variables that are closely associated with crop productivity. This is part of large project on food quality with ARS-USDA.

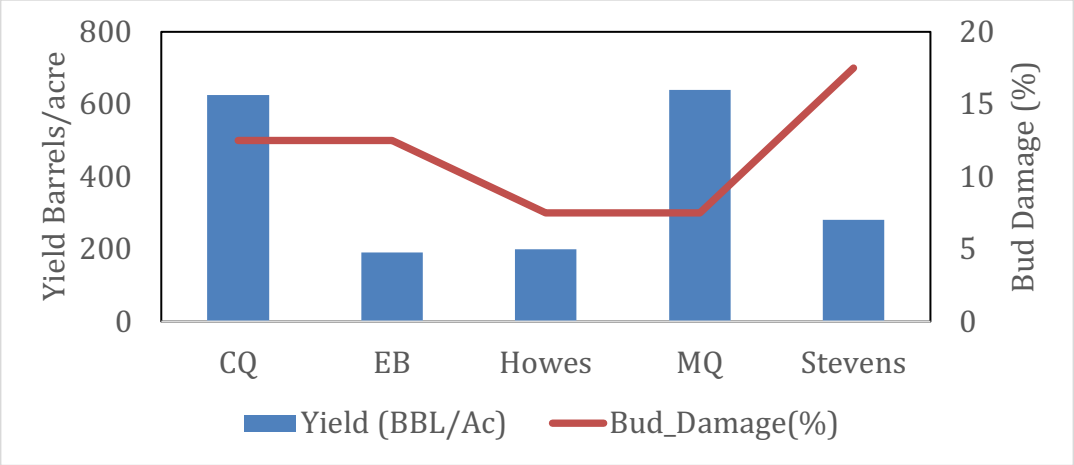


Figure 1: Cranberry fruit yield contrasted with spring frost bud damage in Middleborough, MA.

Parameter	Dee Model	WI(41)	WI(86-41)
Base	44°F	41°F	≤41°F
Count Start	Jan 1st	Apr 7th	Apr 7th
100 °F GDD	May 1st (protect = 20 °F)	May 2nd (90-100 °F) (protect = 23 °F)	April 21st (90 °F)
GDD (May 5)	138.8 °F	131.1 °F	200.4 °F

Table 1. Model for Frost Monitoring compared and contrasted

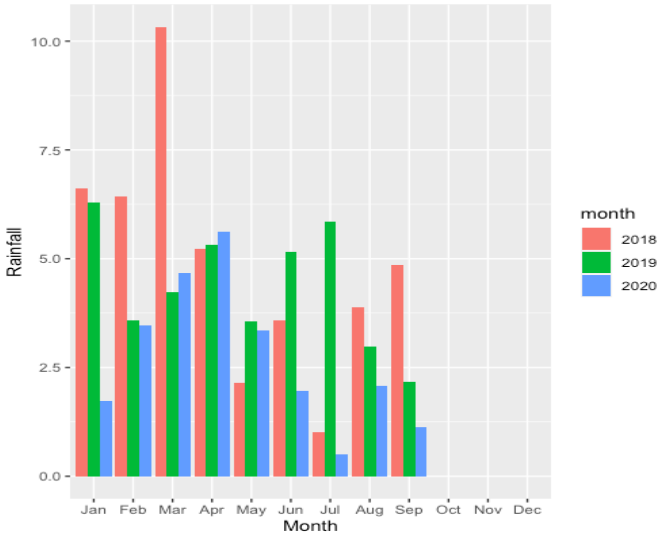


Figure 2: Rainfall precipitation patterns (Jan-Sep) in the past three years at East Wareham, MA (2018-2020)

Selected Highlights of the 2020 CRANBERRY PHYSIOLOGY/FRUIT QUALITY PROGRAM

Giverson Mupambi
with support from K. DeMoranville

RESEARCH HIGHLIGHTS:

Use of plant growth regulators to improve fruit quality: We continued evaluating new plant growth regulators (PGR) to improve fruit quality. Several PGR formulations and adjuvant combinations were tested for improving red coloration. Fruit was treated with ethylene (E1 and E2 at 4 & pints/A), jasmonic acid (J1 at 280 & 480 ppm), oxylipin biostimulant (B1 at 65 & 130 fl. Oz/A), and s-abscisic acid (S-ABA at 1000 ppm). Treatments were applied with supplier recommended adjuvants as well as Herbimax®, MSO® Concentrate, and Vader®. The combination of ethylene with Herbimax® were the most effective at improving fruit color in 'Stevens' (Figure 1).

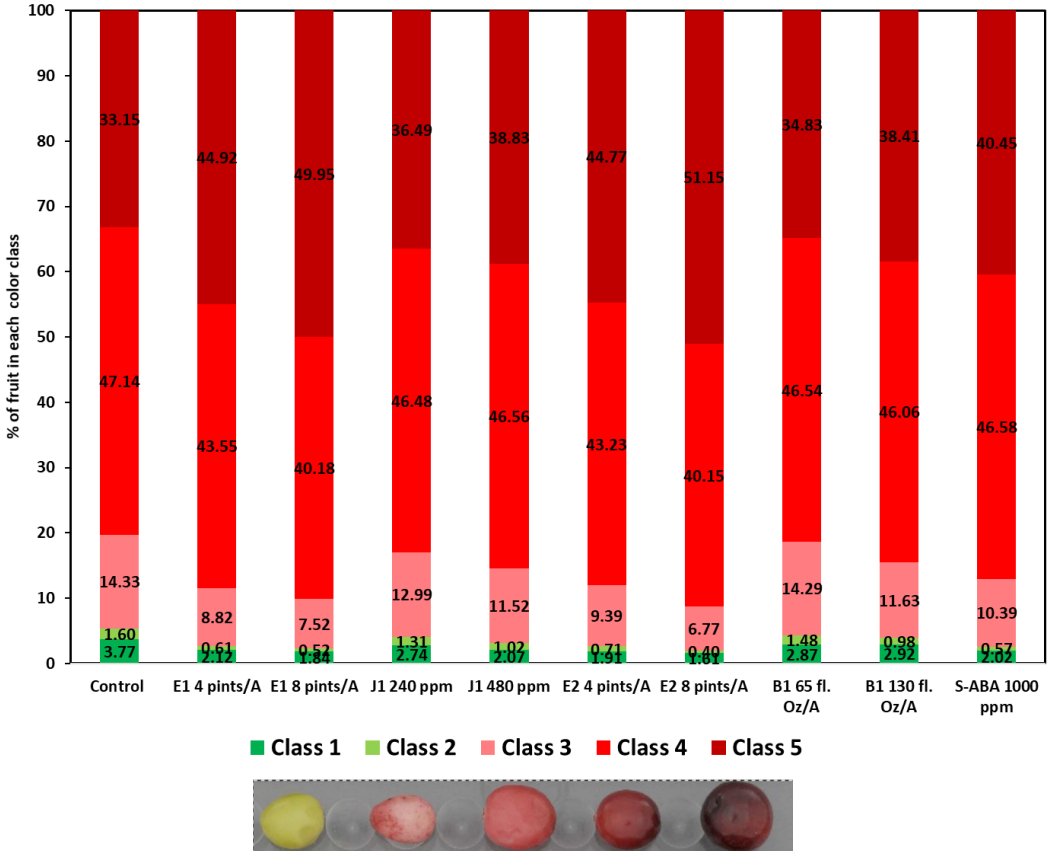


Figure 1: Effect of different plant growth regulators applied with Herbimax® on fruit color of 'Stevens' assessed machine vision technology.

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

Use of PGR's to improve fruit set: Our aim was to enhance fruit set in cranberry through the use of PGR's. We evaluated a cytokinin and gibberellic acid (GA). The GA improved fruit set, however, the plants were not able to support the higher number of berries resulting in a smaller fruit size (Figure 2).

Figure 2: Effect of GA on fruit set in 'Stevens'

Canopy management to improve fruit quality: We continued our investigation into the effect of mowing, pruning, and sanding to improve light penetration into the canopy and improve fruit quality in 'Mullica Queen' and 'Stevens'. Results from Year 1 showed mowing and pruning improved fruit quality through increased fruit color and reduced fruit rot incidence. For Year 2, we focused on the recovery of the canopy, fruit quality, and yield recovery. Results from the study are still outstanding.

Solar research (blueberry): 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. The results of this study are still being processed.

Selected Highlights of the 2020 CRANBERRY IPM/WEED PROGRAM

Hilary Sandler and Katherine Ghantous
with support from K. DeMoranville

PROGRAM HIGHLIGHTS:

Moss in cranberry bogs. Moss continued to be a prevalent weed issue that is not controlled by currently available herbicides. We worked with FMC and MDAR to obtain a Special Local Needs label for Zeus XC (sulfentrazone) in April 2020. We generated research data showing efficacy for moss control and safety for application to dormant cranberry. Over 30 growers took advantage of this label to apply Zeus for moss control in the spring. We are currently surveying growers who applied Zeus to collect information on use patters, efficacy, and overall satisfaction with the product. In collaboration with our colleague in New Jersey and IR-4, we are working towards a full Section 3 label for this product. Some of this work has led to a collaborative manuscript currently under review for publication in Weed Technology.

Screened herbicides for use in cranberry. Novel herbicides are needed to control problem weeds and allow growers access to more chemical mode of actions (MoA) to enable them to rotate chemicals and practice Resistance Management. Our program screened five postemergence herbicides in field trials for crop safety and control against yellow loosestrife and moss. In addition, we collected 175 live yellow loosestrife plants and are cultivating them until spring 2021 for preemergence herbicides screening trials.

Crop safety studies with Kerb SC on new plantings. Kerb has been demonstrated to be safe on established cranberry plants, for application to new cranberry plantings established from plugs (rooted cuttings), and for one year old plantings established from disked in cuttings. The effects of Kerb on cuttings during initial rooting has not been previously evaluated. We conducted greenhouse trials to study the effect of single and multiple applications of different rates of Kerb to newly planted cranberry cuttings.

Promoting better understanding of dodder biology (with Dr. A. Caicedo, Jacob Scott and Phoebe Antonio, UMass-Amherst Biology). To date we do not know the extent of dodder species infesting cultivated bogs nor the genetic diversity present in these infestations. In 2019, generation of high-resolution genetic data began, allowing us to explore: Which dodder species occur in commercial cranberry bogs? How much genetic diversity is present in dodder infestations, and how is this diversity structured? and What is the relationship between weedy and wild dodders? Though Covid limited efforts in 2020, headway was made on rearing dodder on alfalfa in the greenhouse with greater attachment success with *C. campetris* compared to *C. gronovii*. We have identified two markers and are developing a PCR based way to distinguish *C. gronovii* and *C. campestris*. Sites on commercial farms have been identified to study overwintering of dodder haustoria.

Completed final year of long-term study on effects of herbicides on hybrid cranberry cultivars. Crop safety and current recommendations for registered herbicides have been largely based on older cultivars. Beginning in 2016, we evaluated herbicides (dichlobenil, clethodim, mesotrione (spot and chemigation application), napropamide, norflurazon (spring and fall applications), quinclorac) yearly for yield effects and injury on new hybrid cranberry varieties.

EXTENSION HIGHLIGHTS:

- We obtained a renewal of Emergency Exemption permit from the U.S. EPA for the use of Kerb (pronamide) for dodder control on cranberries in MA and RI
- We obtained a Special Local Needs (SLN or 24c) label to permit the use of Zeus XC for moss control MA cranberry farms and secured an SLN for Intensity and Intensity One for RI cranberry growers.
- We participated in 6 virtual extension meetings for MA cranberry growers and participated in 3 workshops for cranberry growers across North America.
- We collaborate with MA-DEP and SMAST to provide water sampling services for a cranberry grower under an Administrative Consent Order (ACO).
- 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 119 different countries (total downloads=8,149). China was the 2nd most popular country for downloads; Singapore was new, coming in 4th. Cranberry Chart book: 1,867 downloads with 180 downloads of 2018-2020 version (800 >last year); Cranberry Production CP-08 Manuals: 570 copies (similar to last year); BMPs: 444 copies (56 >last year); Extension meeting presentations had 2,949 downloads (1,246 >last year); Jar test was downloaded most frequently, 398 times; Fact sheets: 880 copies (197 >last year); Physiology of cranberry yield, 266 downloads.

UMass Cranberry Web Site (Oct 1, 2019-Sept 30, 2020): 8,936 users (+9% from 2019); 22,639 page views (similar to 2019). Top 5: How Cranberries Grow, IPM Message Alerts, Faculty/Staff page, Cranberry Chart Book, Frost Tolerance Reports.

Selected Highlights of the 2020 CRANBERRY PATHOLOGY PROGRAM

Leela Saisree Uppala

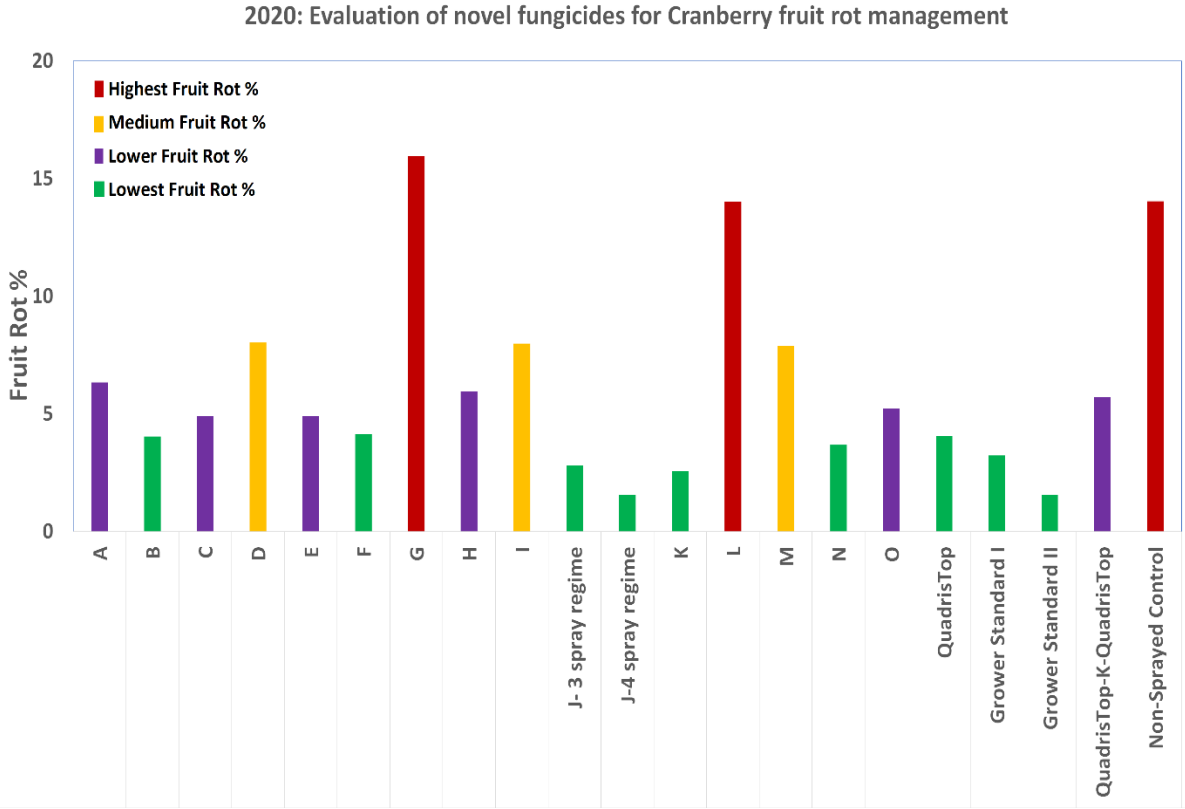
With technical support from Krystal DeMoranville and Rayann Jahrling

ONGOING RESEARCH PROJECTS:

1. Evaluation of Novel, Eco-Friendly Chemistries for Cranberry Fruit Rot Disease Management.
2. Investigation of Potential Sources of Overwintering Inoculum for Cranberry Fruit Rot.
3. Optimization of Current Cultural Practices Cranberry Fruit Rot Management.
4. Improving Cranberry Fruit Quality by Understanding the Microclimate of the Bog.
5. Cranberry Disease Management Section for "My IPM" smartphone app.

RESEARCH HIGHLIGHTS:

- A total of 15 new fungicides (from FRAC groups 2, 7, OMRI approved products (M1 and biological control agents) and pre-mix combinations 3&7, 3&9, 9&12, 7&12, 3&11) were evaluated in comparison with the typical grower standards and non-sprayed control for their efficacy in managing fruit rot and enhancing fruit quality.
- 6 treatments consisting of new compounds (from FRAC groups 7, 3&7, M1, two biological control agents) resulted in significantly lowest levels of fruit rot. All other treatments except G & L also resulted in significantly lower fruit rot compared to the non-sprayed control (Figure below). All of these treatments also resulted in optimum fruit quality.
- The best products from 2020 will be evaluated in 2021 as part of fungicide regimes along with the registered fungicides from Groups 3&11.



Cranberry Station News

- As we continue to navigate our way through the pandemic, we appreciate everyone's patience and cooperation. Due to University guidelines and directives, the Station is still closed to the public. If you email or call us, we will do our best to accommodate whatever needs you might have.
- Please note, our mailing address has changed. **We no longer have a Post Office Box**. Please mail all correspondence to:

UMass Cranberry Station
1 State Bog Road
East Wareham, MA 02538

Stay safe,

Hilary A. Sandler, Director

---detach here----------

2021-2023 UMass Cranberry Chart Book Order Form

Please fill out form completely so that we may notify you in case of delay, change in pickup times or if we have any additional questions and **return by 3/24/21**. Thank you.

NAME:

COMPANY:

ADDRESS:

TOWN, STATE and ZIP:

PHONE:

EMAIL:

_____ Number of Chart Books

Choose one:

_____ I would like to pick up my Chart Book at one of the contactless drive-thru pickup times available at the Station (dates and times on page 1).

_____ I would like to have my Chart Book(s) **$6 mailing fee (per book)** mailed to me**.** Please include a check payable to **UMass** and return to: UMass Cranberry Station, 1 State Bog Road, East Wareham, MA 02538.

UMass Extension

CRANBERRY STATION NEWSLETTER

Inside this issue:

- Save the Dates April 2021 Pesticide Safety Meeting
- 2020 Program Highlights
- Station News
- 2021-2023 Chart Book Order Form

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OFFICIAL BUSINESS