CRANBERRY STATION NEWSLETTER

March 15, 2022 Vol. 23:2

New building rendition

UMass Amherst

The Center for Agriculture, Food and the Environment

UMass Cranberry Station
Research & Extension

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

IN THIS ISSUE:

News from the Entomology Lab

By Anne Averill and Martha Sylvia

SELECTED HIGHLIGHTS OF THE 2021 ENTOMOLOGY PROGRAM

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, and we have not discovered an effective non-insecticidal management strategy.

Insecticide screening trial for cranberry weevil control: We completed a large lab trial evaluating a novel bio-insecticide, Spear-T (Vestaron). Spear-T showed no efficacy.

Registration of Fanfare (bifenthrin, a pyrethroid). We have provided efficacy data and a support letter for ADAMA to move the compound through EPA registration. EPA approved the supplemental label in November 2021. This alternative will be critical to the industry when cranberry weevil inevitably becomes resistant to Actara.

Outbreaking Insect Pests: Biology and Management

Scale Insects - Putnam scale is in outbreak populations and substantial vine die-off occurs across the industry.

- **Outreach to growers**: We visited many beds and inspected them for scale infestation. We microscopically analyzed dozens of samples, reported infestation levels to growers, and provided management recommendations.
- **Management evaluation**: Because of risk to pollinators in spring, we 1) looked at an earlier pattern of spray timing, and 2) in conjunction with Ocean Spray, evaluated management with a post-bloom

application of Movento (spirotetramat, a systemic insecticide active against other sucking insects.) Both questions need more careful evaluation.

- **Biological control levels and impact of injury on yield**: At treated and untreated plots/beds, we are comparing levels of an abundant parasitic wasp as well as impact of varying scale density on vine growth and fruit production. We are analyzing the data this month.

Golden Casebearer - *Triachus vacuus*

- **Outreach to growers**: The outbreak continues to move across the industry. We confirmed and quantified infestations at 12 sites and evaluated management success.
- **Studies of biology**: Information on this species on cranberry is totally lacking. We collected beetles and held them in the lab, allowed egg laying and larval hatch and development. The eggs hatched in ca. 2 weeks. Surprisingly, only the adult stage feeds and injures the cranberry vines. Larvae, within a fecal case, fed only on detritus on the bog floor.

Green spanworm vs Winter moth - Which species is in outbreak?

- **Studies of biology**: In spring, we assessed 12 sites with reported high numbers of 'green larvae.' All infestations proved to be green spanworm; we established that completion of larval development has advanced in comparison to historic records.
- **Management evaluation**: A lab bioassay of Avaunt (indoxacarb) efficacy against green spanworm revealed no evidence of resistance, which is an explanation advanced to explain the outbreak. Winter moth, previously in outbreak, was rare, perhaps owing to biological control by an introduced natural enemy.

News from the IPM/Weed Lab

By Hilary Sandler and Katherine Ghantous

KERB, ZEUS, DODDER CONTROL AND ZONE II

We have received a Section 18 Emergency Exemption to use Kerb for dodder control. The permit is active from April 15 through June 30, 2022. Many handlers are restricting its use; contact your handler before applying. Copies of the label are available on our web site at: https://ag.umass.edu/cranberry/services/special-pesticide-labels and from wherever you buy your product. You will need to report your use of Kerb to MDAR by November 30, 2022. Forms will be available on our web site or where you buy your product. If you are in a Zone II and want to use Kerb, please follow steps below.

Most handlers are NOT restricting Zeus, but you should double check with your handler before using this herbicide. It is Zone II restricted, so if you want to apply in a Zone II, follow steps below. Zeus may control dodder and other weeds and it is okay to use the herbicide to target weeds other than moss. Keep in mind that Zeus is NOT fast-acting. It could take several weeks or more before you notice damage on moss.

If you want to apply Kerb or Zeus, and you are in a Zone II, email me (hsandler@umass.edu) with your request and include your bog's address (and GPS coordinates, if you have them).

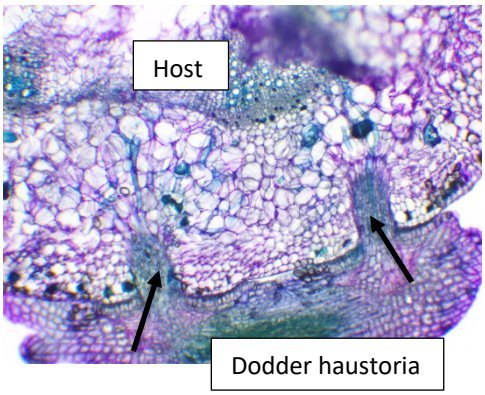
SELECTED HIGHLIGHTS OF THE 2021 IPM/WEED PROGRAM

Program Highlights:

Impact of application method on herbicide crop safety. In collaboration with our colleague in New Jersey, we initiated a study on the effects of application methods of herbicides on cranberry crop safety. MA cranberry growers primarily apply pesticides by chemigation (through the irrigation systems; delivered in approximately 400 gallons of water per acre), while growers in some regions apply pesticides via boom sprayers (delivered in 20-30 gallons of

water per acre). Comparison of effects of water volume and application method is a little-researched topic. Research in 2021 focused on a single herbicide applied at two rates, by either simulated chemigation or boom sprayer, and either followed by a wash-off or not.

Screened herbicides for use in cranberry. Cranberry growers need more tools to control problem weeds, and screening novel products for use in cranberry is a top-tier research priority. New tools will allow growers access to more chemical mode of actions (MoA) to enable them to rotate chemicals and practice Resistance Management. Our program screened two preemergence herbicides and four postemergence herbicides at two different timings in field trials.



Promoting better understanding of dodder biology (with Dr. A. Caicedo 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. Though Covid continued to limit efforts in 2021, we were able to collect samples from growers' farms and have been successful at rearing dodder on *Impatiens* spp. in the greenhouse. Microscopy work was initiated to better understand haustorial attachment to different hosts and various cranberry cultivars. This technique will also be used to help us understand if, when, and where dodder overwinters as haustoria.

Perennial weed management. Yellow loosestrife (*Lysimachia terrestris*; YLS) is a widespread and difficult perennial weed. In recent years, growers reported increasing prevalence in production areas. In 2020, we collected 175 live YLS plants and cultivated them until spring 2021 for preemergence herbicides screening trials. We tested six registered herbicides and two novel compounds for efficacy against YLS. In addition, red sorrel (*Rumex acetosella*) was grown in the greenhouse for similar trials in spring 2022.

Extension Highlights:

- Updated and published the UMass 2021–2023 Cranberry Chart Book.
- We obtained a renewal of our Emergency Exemption permit from the U.S. EPA for the use of Kerb (pronamide) for dodder control on cranberries in MA and RI.
- We participated in virtual extension meetings for MA cranberry growers and were invited to speak at multiple workshops for cranberry growers across North America. We presented at the International Vaccinium symposium and the Pacific Northwest Cranberry Congress.
- We collaborate with MA-DEP and SMAST to provide water sampling services for a cranberry growerunder an Administrative Consent Order (ACO).
- We participated in Maximum Residue Limit (MRL) discussions with other scientists and industry representatives to review export issues and prioritize pesticides slated for review.
- Published a fact sheet on Aquatic Weeds in concert with REEU IPM Fellow, Emma Wick and another with EIP partner E. Garofalo, on Mile-a-Minute. Wrote two fact sheets (Phragmites and Japanese Knotweed) with REEU IPM Fellow, Phoebe Antonio.
- **ScholarWorks (digital repository)**. Cranberry Station documents were downloaded by people from 111 different countries (total downloads=>4,790 last year). China was the second most popular country for downloads and the Russian Federation came in third. Cranberry Chart book: 2,277 downloads with 106 downloads of 2018-2020 version (410 >last year); Cranberry Production CP-08 Manuals: 548 copies (similar to last year); BMPs: 644 copies (200 >last year); Extension meeting presentations had 5,759 downloads (2,810 >last year); Jar test was downloaded most frequently, 412 times; Fact sheets:963 copies (83 >last year); Physiology of cranberry yield, 231 downloads (<35 last year).

- **UMass Cranberry Web Site (Oct 1, 2020-Sept 30, 2021)**: 18,759 entrances/users (+>100% from last year); 34,143 page views (+50%). Top 5: How Cranberries Grow, IPM Message Alerts, Faculty/Staff page, Cranberry Chart Book, Frost Tolerance Reports (same ranking as 2019 and 2020).

News from the Pathology Lab

By Leela Saisree Uppala

SELECTED HIGHLIGHTS OF THE 2021 PATHOLOGY PROGRAM

Research Highlights:

In collaboration with Cape Cod Cranberry Growers' Association (CCCGA) and the other researchers at the Cranberry Station, initiated two new studies in 39 (***Figure 1***) southeastern Massachusetts cranberry grower bogs to:

- Understand the role of the bog microclimate on fruit quality.
- Identify critical criteria that impact the outcome of late water floods in cranberry production and develop a decision-making model.

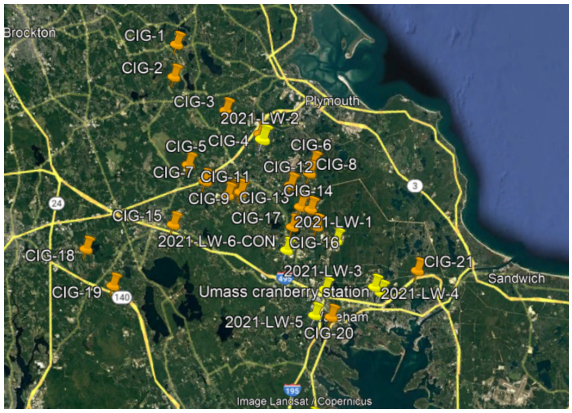


Figure 1

In collaboration with the researchers at the University of Wisconsin, USDA-Wisconsin, University of Massachusetts-Dartmouth, and Rutgers University:

- Studying the diversity, abundance and impact of fruit rot pathogens and total microbiome on cranberry production.
- Evaluating novel disease control options with goals to diversify disease management tool kit with sustainable, environmentally friendly options; and develop integrated disease management strategies for conventional and organic cranberry productions systems.
- Fungicides (from FRAC groups 3, 11, 7, 7&12, 9&12, 19, M1, M5 and biocontrol agents) were evaluated in comparison with grower standards and non-sprayed control for their efficacy in managing fruit rot and enhancing fruit quality.

Extension Highlights:

- Disease Diagnosis: 23 bog visits for *in situ* diagnostics & lab diagnostic service for 52 samples. Cranberry Station's Annual Research and Extension Update Meeting: presented on " Optimizing Current Cultural Practices & Evaluation of Novel Fungicides for Fruit Rot Management", January 26 and 27, 2021 each attended by over 170 people.
- UMass Cranberry Pesticide Safety Meeting: presented on "Cranberry Fungicide Options: a review" on April 27, 2021, attended by 51 people.
- Keeping Quality Forecast (KQF): In collaboration with Dr. Peter Jeranyama provided growers with "Preliminary KQF" in April 2021 and "Final KQF" in June 2021 to assist growers with late water and fruit rot management decisions.
- Provided consistent disease management updates to cranberry growers through 2 virtual bogside meetings (May 12 and June 9, 2021) hosted by the Cranberry Station, 3 Newsletters and 14 weekly IPM messages.

Service Activities:

- August 2019 to August 2021: Chair of American Phytopathological Society's "Plant Pathogens and Disease Detection Committee".

- 2019 to present: "My IPM" smartphone App: A collaborative effort with Guido Schnabel (Clemson University) and several Extension Specialists from Cornell University, University of Massachusetts, Pennsylvania State University, University of Maryland, North Carolina State University, and the University of Georgia in updating the content of the App. My role specifically was updating Cranberry Disease Management Content for this smartphone App.
- 2019- 2022 Member of UMass-Plant Biology Graduate Admission committee.
- Presented two invited presentations for "Plant Research Series" organized by Bioingene.com and "UMass-Amherst Stockbridge School of Agriculture Seminar Series".

News from the Physiology/Fruit Quality Lab

By Giverson Mupambi

SELECTED HIGHLIGHTS OF THE 2021 PHYSIOLOGY/FRUIT QUALITY PROGRAM

Research Highlights:

Evaluation of new hybrid varieties with improved disease resistance, fruit quality, and yield. We started a new variety screening trial aimed at increasing the profitability and sustainability of the Massachusetts (MA) cranberry industry. The project will benefit cranberry growers by providing reliable data under MA growing conditions. Twelve new hybrid cultivars from New Jersey and Wisconsin breeding programs are being evaluated under rigorous scientific conditions for:

- Ease of establishment, time to reach full productivity and yield.
- Fruit quality (fruit color, firmness, internal quality, berry size, and storage potential).
- Fruit rot resistance.
- Susceptibility to damage from herbicides and ability to outcompete weed species that are predominant in newly renovated cranberry bogs
- Susceptibility to insect pests and attractiveness to pollinators.
- Susceptibility to frost damage.

Section 1 of State Bog at the Cranberry Station was renovated for this project starting in March. Propagation of the rooted cuttings began in early March in the greenhouse and continued until April (***Figure 1***).

Figure 1: Propagation of rooted cuttings of the new cultivars in the greenhouse (left) and rooted plugs ready for planting(right).

The planting of the new cultivars started at the beginning of June and was finished by the end of June. The rooted plugs were planted at the industry standard 1-foot spacing. The vines are performing well with high colonization rates. Differences in colonization rates can already be seen amongst the different cultivars (***Figure 2***).

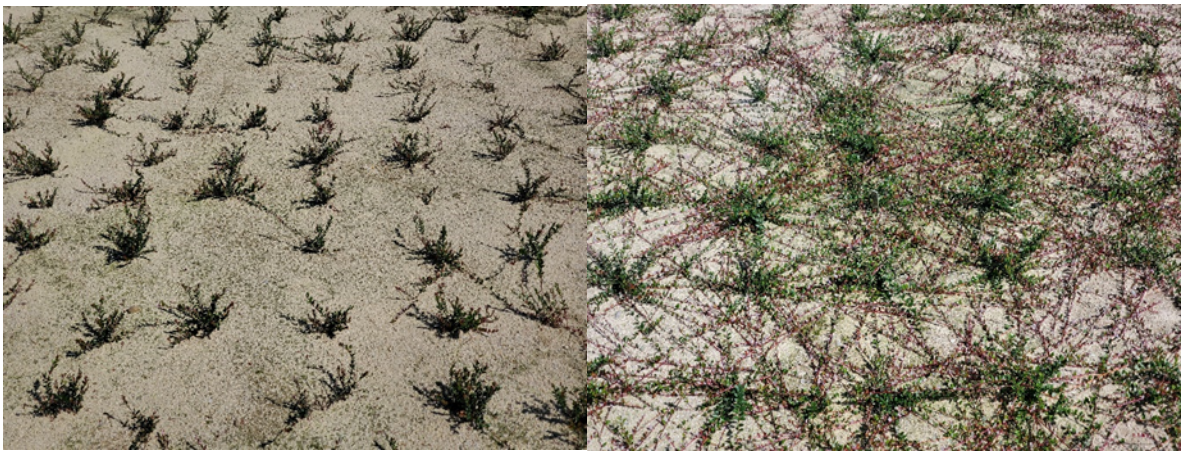


Figure 2: Difference in colonization rates between the new hybrid cultivars planted in June 2021.

We want to acknowledge the great industry support for this project from the following individuals and entities: Don Badeau, John Mason, Steve Ward, Van Johnson, Keith Mann, AD Makepeace, Sure-Cran, and Oiva Hannula Cranberry Company.

This summary is based upon work supported by the National Institute of Food and Agriculture, US Department of Agriculture, the Center for Agriculture, Food and the Environment, the Cranberry Station at the University of Massachusetts Amherst, under project number MAS00566. The contents are solely the responsibility of the authors and do not necessarily represent the official views of the USDA or NIFA.

This summary is based upon work supported by the National Institute of Food and Agriculture, US Department of Agriculture, through the Northeast Sustainable Agriculture Research and Education program under sub-award number ONE20-374.

Figure 3. High fruit rot incidence in 'Stevens' cranberry collected from a square foot sampling area at harvest.

Use plant growth regulators to improve fruit color. We continued evaluating new plant growth regulators to improve fruit color. Three studies were conducted on 'Stevens,' 'Howes,' and 'Mullica Queen.' Two different formulations of ethephon were applied as single or double sprays with Herbimax® as an adjuvant. Spray applications were made at 4 and 2 weeks before harvest. Results from the study are still outstanding. The wet, humid conditions and high ambient temperatures experienced during the past growing season resulted in increased fruit rot incidence. The high incidence of fruit rot will potentially influence the results (***Figure 3***).

News from the Plant Nutrition/Physiology Lab

SELECTED HIGHLIGHTS OF THE 2021 PLANT NUTRITION/PHYSIOLOGY PROGRAM

Using Thermal Models for Spring Frost Management. Overwintering buds must acquire adequate winter hardening for protection against frost damage in the spring. Once buds have broken dormancy, the plant requires protection from cold temperatures and desiccating winds. In this study, we evaluated three thermal time models, or growing degree day (GDD) models, as decision tools for initiating spring frost protection, and two methods for applying irrigation for spring frost protection (conventional vs. cycling). We found that the WI (30-5) thermal time model provided the most accurate estimates of the phenology of buds in both normal and abnormal spring temperature years. Results are in ***Tables 1 and 2*** and ***Figures 1 and 2***.

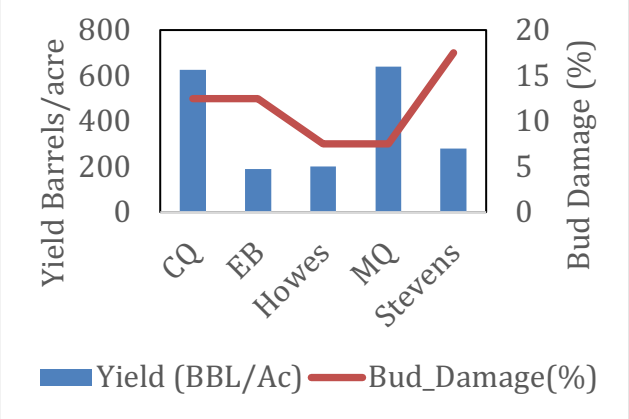


Figure 1: Cranberry fruiy yield contrasted with spring frost bud damage in Middleborough, MA

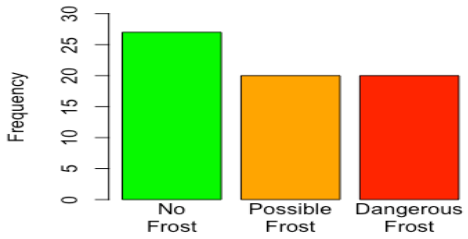


Figure 2. The three classifications of spring frost and their frequency of occurrence from April 16, 2020, for a frost season of 67 days in Wareham, MA. Each phenological stage of development has a critical temperature at which buds are damaged. Data to determine a frost night was obtained from the University of Massachusetts Cranberry Station, East Wareham, 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.

Year	Dee Model 100 GDD °C	WI (5) Model 90-100 GDD °C	WI (30-5) Model 90 GDD °C
2017	Apr 14	Apr 16	Apr 16
2018	Apr 27	Apr 26	Apr 24
2019	Apr 19	Apr 19	Apr 18
2020	May 1	May 2	Apr 21
2021	Apr 20	Apr 21	Apr 20

Source(Jeranyama & Kennedy (2021) https://acsess.onlinelibrary.wiley.com/doi/10.1002/agj2.20928

Table 2. A five-year comparison of three thermal time models on predicting when to start monitoring cranberry buds for possible spring frost damage. Air temperature data obtained from the University of Massachusetts Cranberry Station, East Wareham, MA.

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. 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'). Results for fruit rot are presented in ***Figure 3***.

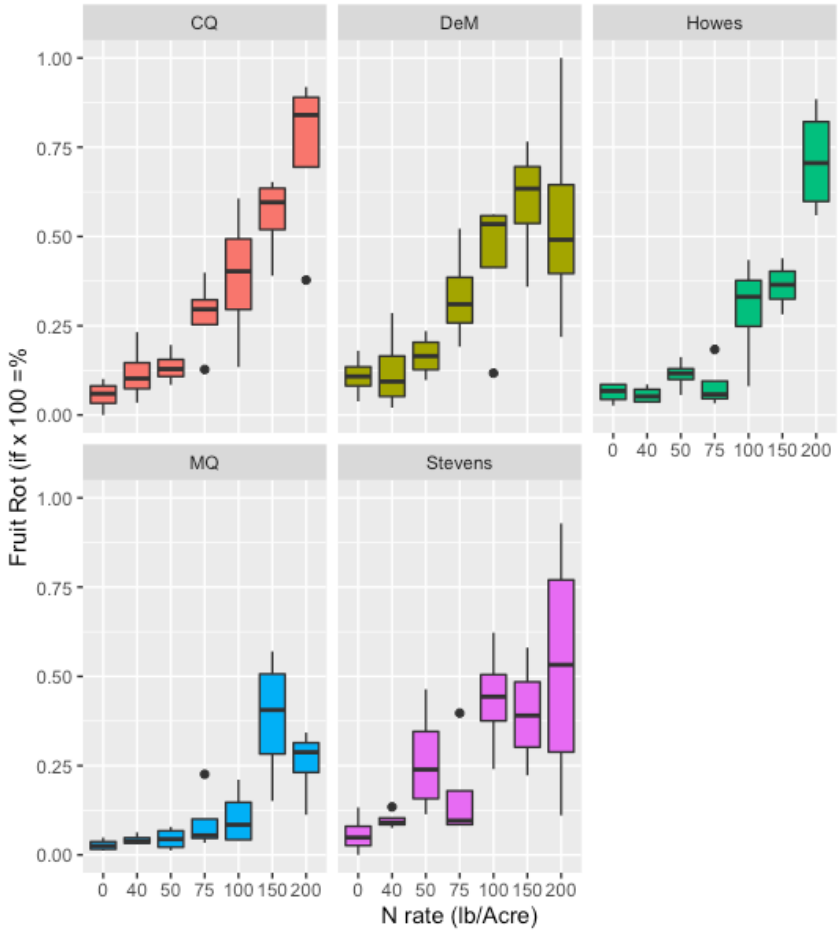


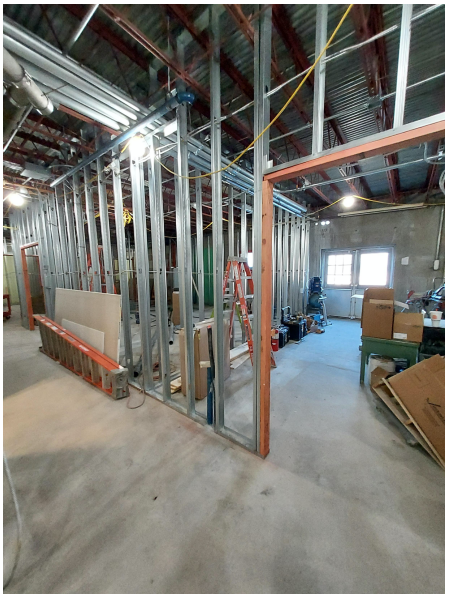
Figure 3. Fruit rot in cranberry cultivars as influenced by fertilizer nitrogen rate in 2020.

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.

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 collected 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.

Station News

By Hilary Sandler, Director



CONSTRUCTION UPDATE

The framing is up for the basement labs (see photo) and for the corridor and new autoclave room upstairs. Electrical and plumbing upgrades are proceeding in the lab building. Since work is progressing more slowly than planned, we will have temporary workspace for the scientists in a trailer on-site (between the tin building and the bog) starting April 1st and continuing until we can move back into the lab building.

The Admin Building is open during construction with a core group present every day. If you do visit, please park outside of the fenced area. There could be active machinery driving around, so please be careful. The best way to reach us is through email or by cell phones. You can reach Hilary at 413-800-6531 or Robyn at 413-800-7470.

NAMING OPPORTUNITIES TO SUPPORT CRANBERRY RESEARCH

Central Advancement at the University has approved a pathway to provide financial support the Station. A gift to name a bench, tree, room or building floor will directly support our research efforts to meet the current and future needs of the cranberry industry. There are many levels of giving and gifts can be a one-time gift, or a pledge made over a 5-year period. Please see the Naming Opportunities Document on our website (https://ag.umass.edu/cranberry) and/or contact Hilary for more information at 413-800-6531.

CHART BOOK UPDATE 2022

The 2022 update to the 2021-2023 Chart Book will be available by April 1st. You will receive this 2-sided sheet either by mail or email depending on how you get your newsletter. For those of you who receive your newsletter by email, you can request a hard copy be mailed to you. Please contact Robyn Hardy at rmhardy@umass.edu or 413-800-7470.

If you need a Chart Book, please contact Robyn Hardy (413-800-7470 or rmhardy@umass.edu) regarding availability.

News Regarding Pesticide Credits

By Marty Sylvia

RESPIRATOR TRAINING SESSION

On **Thursday March 24, 2022, from 5:30-7:30 PM** the Cranberry Station is offering a respirator training via Zoom. This session is $25 per person, and you will earn 2 pesticide credits. **To register** please contact Marty Sylvia 508-265-6921 or martys@umass.edu.

WPS TRAINING FOR HANDLERS

Anyone working on the cranberry bogs (bogs that have been treated within 30 days) that does not have a Massachusetts Pesticide Certification needs to have worker protection training each year. I am offering a few dates on ZOOM that your workers could attend to cover this requirement. This will be a handler training and will allow workers to help applying general use pesticide and apply Roundup (glyphosate) or spot treat with Intensity or Stinger. This training can be done with each person on a smartphone or computer, or in a group setting around a screen – but I need verification of each person attending. Paperwork will be completed that can cover EPA WPS requirements. Cost is **$5 per person**. **To attend a training** or for more information please contact **Marty** at **508-265-6921** or **martys@umass.edu**. Training dates are listed below:

Wednesday, March 30, 2022, 7:30-9:00 AM
Wednesday, April 13, 2022, 7:30-9:00 AM
Friday April 29, 2022, 7:30-9:00 AM
Friday May 13, 2022, 7:30-9:00 AM

UMASS CRANBERRY PESTICIDE SAFETY MEETING

The UMass Cranberry Pesticide Safety Meeting has been scheduled for **Tuesday, April 26, 2022, from 7:30-NOON** via Zoom. You will need to register online, and poll questions must be answered between 8:00 AM and 12:00 PM to be awarded pesticide credits. Payment will be processed separately- registration fee is **$50 per person**, and you will earn 4 pesticide credits. **To attend, see page 11** for meeting payment form.

TENTATIVE AGENDA

Tuesday April 26, 2022, 7:30-NOON
7:30 Online Check-In Begins
7:40 Zoom Know How Review - Marty Sylvia
7:50 Station Update – Hilary Sandler
8:00 WPS and Pesticide Safety Update – Marty Sylvia
8:30 Insects of the Day – Anne Averill
9:00 Using Patterns and Herbicide Reminders – Hilary Sandler
9:30 Pesticide Restrictions and MRL's – Marty and Katie
10:00 ***STRETCH BREAK***
10:05 KQF and Frost – Peter Jeranyama
10:20 Pesticide Resistance and Modes of Action - Marty and Katie
10:45 Pathology Review – Leela Uppala
11:10 Herbicide and Weed Research Update – Katie Ghantous
11:35 Chemigation Review – Gavin Bartlett, ADM

Meeting Payment Form

TO ATTEND THE 2022 UMASS CRANBERRY PESTICIDE SAFETY MEETING:

Please complete the information below. Once your form and payment are received, a confirmation email will be sent to each person with a link to register online. **All** meeting attendees **MUST** pay to attend whether receiving credits or not. If you have any questions, contact Robyn Hardy at 413-800-7470 or rmhardy@umass.edu.

NAME:_____

COMPANY:_____

PHONE:_____EMAIL(required):_____

ADDITIONAL ATTENDEES:

NAME:_____

PHONE:_____EMAIL(required):_____

NAME:_____

PHONE:_____EMAIL(required):_____

NAME:_____

PHONE:_____EMAIL(required):_____

NAME:_____

PHONE:_____EMAIL(required):_____

PLEASE CHECK:

Tuesday, April 26, 2022 ($50) _____ number attending

Please make checks payable to **UMass** and return payment by **4/21/22** to:

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

UMass Cranberry Station
Research & Extension

CRANBERRY STATION NEWSLETTER

IN THIS ISSUE:

UMass Cranberry Station
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