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We're Checking the Yield on Our Trials! Here's What To Look Forward To at Cranberry School 2021

As we put on our waders to analyze yields our trials, we wanted to let you start building excitement to discover what we've learned this year. Some quantitative studies, some qualitative studies—some foundational and some immediately actionable—we're excited to share our work with you and hope you'll come with questions about how to improve your marsh for 2021.

Variety Trials from Juan Zalapa, Research Geneticist, USDA-ARS

After a productive year of planting hundreds of varieties at the Wisconsin Cranberry Research Station, Juan's team harvested their research plots at Cranberry Creek Cranberries on September 18. Following covid safety constraints (like the team driving up in eight separate vehicles), it was a harvest season to remember. Look forward to discussion of trait data and variety development from Juan this winter!

Pollinator Gardens with Christelle Guédot, Fruit Crop Entomologist and Extension Specialist, University of Wisconsin - Madison Department of Entomology

You've hopefully become familiar with the work of Christelle and her student Nolan Amon on pollinator gardens. This project will be completed this year, and Nolan will graduate in May 2021. Be sure to catch their presentation, "Impact of pollinator gardens on wild bee communities in cranberry" at Cranberry School.

Fungicide, Insecticide, and Herbicide Trials with Jack Perry, Senior Research Specialist, Dept of Horticulture, University of Wisconsin - Madison

Jack Perry is running trials galore in 2020, including 3 trials at the Wisconsin Cranberry Research Station and the balance at commercial marshes.



A not-yet-named variety from Juan Zalapa's work displays deep color.

In Fungicides, Jack has run trials on registered and candidate control methods for fruit rots, for cottonball, and for the outcomes of surfactants on fungicide applications.

Against insects, both registered and candidate insecticides have been trialed against cranberry fruitworm, against sparganothis fruitworm, against the bluntnose leafhopper, against tipworm, against fireworm, and against flea beetles. Trials testing the impact of surfactants on insecticide efficacy have been done as well.

Against weed pests, trials of pre-applied registered and candidate herbicides against problem weeds can be compared with trials of post-applied registered and candidate herbicides against a variety of problem weeds. One trial at two locations was also performed investigating a candidate post-applied herbicide against mosses.

Other trials sponsored by others that Jack was involved with include an insecticide residue sample collection with Ocean Spray, trials to investigate two moss control products with Gowan Co, and the analysis a surfactants and crop softener with Winfield and Provision Partners Co-op.

Phenotyping with Jyostna Devi Mura, Research Molecular Biologist, USDA-ARS

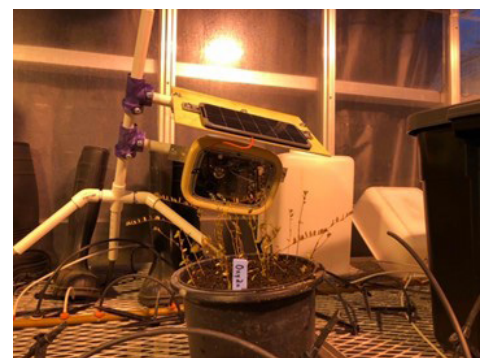
Jyostna was hired just as covid restrictions were being implemented, but she didn't let that stand in the way of beginning good research. She has 3 major projects ongoing:

Phenocams are going to be an important foundational piece of research. Jyostna's team will mount cameras to take photos of many varieties throughout the growing season, which in the future will enable determination of variety-specific developmental differences. (I'm hopeful this will be a key to sharpening our understanding of across-variety frost tolerances—it should also educate us about bud development, flowering time, fruit set, color development, and new plant growth.

To better understand how these traits differ from cultivar to cultivar, we have collaborated with Andrew Maule, a Ph.D. student from the Zalapa lab, to develop a phenotyping tool that will allow us to develop a time-lapse analysis from plants growing in the field. We are developing a prototype camera using a Raspberry Pi computer set up in the field in spring 2021. The Raspberry Pi computers are tiny and low cost; they allow different add-on equipment such as cameras and sensors.

The goal is that these cameras will take multiple pictures a day from spring to harvest that will allow us to gain a better insight into how different cultivars develop. Currently, we are in the process of testing the camera prototype at UW Madison Walnut Street Greenhouses.

We are also using Brinno time-lapse cameras to compare which systems provide better information, which we tested late-summer to fall. In Stevens, we were able to see fruit and color development as well as new plant growth. We will have 4 raspberry pi cameras that will be tested during the fall-winter period so that we are ready to set them up this spring at a commercial marsh.



We hope to use this information to provide a more detailed description of each cultivar to facilitate cultivar selection when choosing different/new varieties for planting, as well as to improve management of cultivars already planted.

Studying the effect of pH: We collected soil samples from high pH beds and control beds to study the effect of pH on nutrient uptake, phenology, fruit size, and quality. We are analyzing leaf, stem, and fruit samples for mineral nutrients, amino acids, organic acids, and carbohydrates. We are also analyzing soil samples for nutrients and microbiome. We would like to understand the microbiome (both bacteria and fungi) of these two soils and their role in maintaining pH.

Finally, a plan is made to study genotypic variation for photosynthesis across cranberry varieties at different growth stages: We are working on measuring photosynthesis and Rubisco in cranberries. We are planning to measure in Zalapa's cranberry mapping population in the spring.

Fall Nitrogen Fertilizer with Amaya Atucha, Fruit Crop Specialist, University of Wisconsin-Madison

Dr. Atucha's cranberry physiology lab has been working for the last three years on evaluating the effect of Fall Nitrogen Fertilization on yield and fruit quality. This season they have completed the last year of data collection and will be presenting the summary of the project's results at Cranberry School. In addition, the Atucha has continue working on understanding cranberry vines adaptations to freezing conditions, in particular exploring the relationship between damage (i.e., browning) of bud structures and its consequence on upright growth and fruit production during the following growing season. Dr. Atucha will also be presenting the results of the plant growth regulator study completed last year, in which the effect of gibberellins and anti-gibberellins on flower induction was evaluated.



Yield data collection for the fall N fertilization trial

We've been asking and answering big questions.

And when you finish harvest, catch your breath, and get the vines protected for the winter, we'll be ready to share them with you! Both the University of Wisconsin-Madison Division of Extension and the Wisconsin State Cranberry Growers' Association will follow up with information on registration.

Novel Bio-Insecticide Demonstrations and Advances in Spray Timing

By Shawn A. Steffan

Flea beetles remain a major problem for Wisconsin cranberries, and 2020 brought together a team of cranberry growers and researchers who were working on ways to mass propagate insect-killing nematodes. There were many set-backs and some learning experiences, but also some significant successes. We generated some of the best data yet on flea beetle control—nearly 95% control in a bed that had major flea beetle issues. Other cranberry beds had modest but solid control, ranging from 50-60% control. One grower manufactured his own gravity-fed nematode spraying mechanism, allowing for low-trauma applications of the nematodes.



Figure 1. Gravity-fed nematode application system, designed by WI cranberry grower, Steven Bartling. In the photo, the nematode ‘slurry’ can be seen dripping from the boom-arm onto the cranberry canoopy. Nematodes should be applied at dusk and watered in immediately to protect them from UV light and desiccation (photo courtesy Steven Bartling).

Studies of degree-day (DD) ‘benchmarks’ suggest that the use of such benchmarks for spray timing can significantly improve spray efficacy. Results from 2019 show that insecticide sprays timed for either the 10% or 25% egg-hatch benchmarks represent the best timings for *Sparganothis* fruitworm control. In effect, the 10% and 25% spray timings represent a window in time. When Sparg is targeted within this window, current evidence suggests that insecticides are most effective.

The degree-day accumulations are easily tracked using the temperature readings on any given marsh. When growers reach the 10% benchmark at their marsh, they will have entered the ideal spray window. Growers simply continue keeping a running total of DDs on their marsh, so they will know when the end of the ideal spray window (the 25% benchmark) is reached.



Figure 2. New lab technician, Brandon Gominho, with Ellen Koch, setting up field cages in a commercial cranberry bed.

Sprinkling, Flooding, and Harvest Logistics Into Dormancy

By Amaya Atucha and Allison Jonjak

When should I sprinkle, and when should I flood?

This will depend if you have harvested and removed the irrigation pipes or not. If you have not harvested yet and there is a potential frost, I would use the sprinklers over flooding. Right before harvest, flooding the entire bed might affect fruit quality to a greater extent than sprinkler irrigation.

If you have already harvested and returned pipes to the bed, then it will depend on how low temperatures will drop. From our cold-hardiness studies (done on Stevens and HyRed), by early October, buds are hardy to about 10° to 5° F, by early November from -5° to -10° F and by December -15° to -20° F. This is a generalization and it will depend on the temperatures experienced during the fall—the warmer the fall, the longer it will take for those buds to gain cold hardiness, and the opposite is also true. So, going back to the question of using sprinklers versus flooding after harvest, I would say flooding is safer as it will provide better protection.

If I have damaged vines from last winter (or any other damage), should I encourage that bed to go dormant faster? Should I harvest it earlier than I otherwise might have?

Always try to harvest as early as possible, as fruit quality only declines once the fruit has achieved the color needed for harvest. In terms of the relationship between harvest and entering dormancy, I don't think we have a good understanding how the timing of harvest will affect the vines entering dormancy. In other fruit crops, such as grapes, we know that buds can gain cold hardiness even when they still have fruit hanging from the vines, and I would expect something similar to happen in cranberries. Most probably, one of the cues for the vine to enter dormancy has to do with photoperiod. Shortening of daylight is a key for the vines to enter dormancy, as well as colder temperatures (close to freezing) during night time. If you have vines that experienced damage last winter and you are encouraging recovery, I would definitely harvest as soon as the fruit has gained the required color and then make sure you are irrigating the beds if the need it during fall. I would also recommend a very low doses of nitrogen fertilization (not more than 5 units of N) that will encourage new growth the following spring. This low rate of fall fertilization will not affect the vines entering dormancy or their cold hardiness levels



A Quick Trip Behind the Scenes

By Josie Russo

Hey everyone, I'm Josie. You may have seen my name next to the editors list in your CCMJ emails, and we wanted to take a moment with the last issue for 2020 to introduce you to a critical part of our team. I work behind the scenes to help bring you the latest news and resources for a successful growing season—assembling and sending out the newsletter with MailChimp, running the Twitter, uploading our exclusive videos to YouTube.

I grew up in Jupiter, Florida—yes, that is a real place—where I thought sixty degrees was heavy coat weather and had never experienced the joy of eating a cheese curd. While Florida has an abundance of agriculture, I did not get exposed to it in suburban South Florida. My passion for agriculture took wing when I moved up here to attend UW-Madison for Life Sciences Communication. I have always loved communications and science, so I decided to combine the two to become a science writer. After taking a “Dairying in Mexico” class for fun, I went down the agriculture rabbit hole and never looked back.

My first couple years out of college I was a market analyst in the dairy industry. While I loved learning the intricacies of things like international trade and weather impact on dairy markets, I missed getting to interview researchers about their projects, communicating with growers, and the university setting. That is why I am so excited to be a part of the Wisconsin Fruit Team bringing this newsletter to you.



Here are some quick, fun facts about me:

- I'm a major foodie. Cooking is one of my biggest passions next to agriculture, so moving to Wisconsin and having access to so much locally grown food has made it even better.
- I love to travel! My favorite place to visit is the Scottish Highlands. My mom is from the Edinburgh area and most of her family is still in the UK, so we often go home for visits.
- I'm a huge space nerd. The Kennedy Space Center was one of my favorite places growing up, and going to see night launches of the space shuttles were incredible experiences. That also made me a science fiction nerd. “Doctor Who” and “Star Wars” (my cat's name is Rey). On the flip side, I'm an avid reader of Regency, Gothic, and Victorian literature. My favorites are “Pride and Prejudice”, “Jane Eyre”, “Frankenstein”, and “Rebecca”.
- Cranberries and chocolate are my favorite cranberry combinations. But seasonal wild rice and cranberry breads from local Madison bakeries are a close second.

Thank you all for another great year!

Thank You To Our Updating Growers

By Allison Jonjak

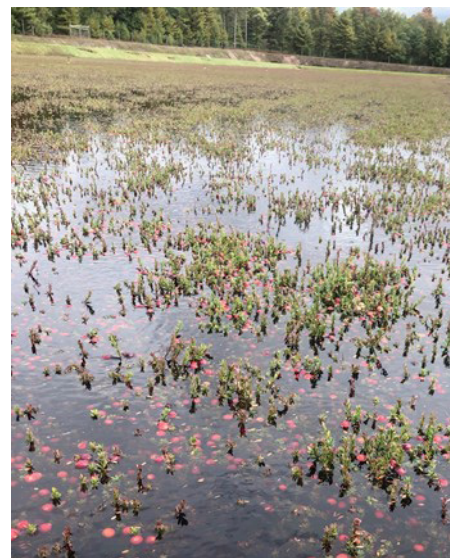
From April through October, three helpful growers have been sharing their 2020 cranberry story with us. Specialists, scientists and crop consultants have updated us when their research hit milestones, when lots of growers were voicing similar questions, or when new information was discovered. Our 2020 growers have been pitching in for every single issue, and we're sure grateful!

Seth M. Rice, with Flying Dollar Cranberry, is an all-star photographer, sharing photos of wildlife, vines, and berries on the central WI marsh all season long.

Willow Eastling, with Gardner Cranberry, has given reports on both central and northern marshes that she works with—educating us on the phenological development of several varieties across the regions.

And Wade Brockman—tireless with plantings, assisting research, and property improvements all year long—still always found a way to tell us about the latest developments at the Wisconsin Cranberry Research Station. Wade handles all the day to day marsh operations, AND all of the additional requests and communication the researchers think up, and still had time to share. This photo is of the lined beds—look how well they've filled in!

Thank you to each of the three of you for sharing snapshots of your season with us!



Wisconsin Cranberry Research Station, Wade Brockman

Flying Dollar Cranberry, Seth Rice (Top two images). Gardner Cranberry, Willow Eastling.

