2026 Annual Summer Meeting of the American Cranberry Growers Association

Rutgers University
P.E. Marucci Center

Chatsworth, NJ

Thursday
August 20, 2026

RUTGERS
New Jersey Agricultural Experiment Station

Presentation Summaries

American Cranberry Growers Association
2026 Summer Field Day

Thursday August 20, 2026
Rutgers University

P.E. Marucci Center for Blueberry & Cranberry Research & Extension,
Chatsworth, NJ

Parking will be available at the Center's shop (across cranberry bogs).
Transportation for tours will be provided at the Center.
Restrooms (porta-potty) located at the Center's Pole Barn.

CRANBERRY BOGS

8:00–8:30 **Refreshments**

8:30–8:40 **Opening Remarks**
Shawn Cutts, President, American Cranberry Growers Association

8:40–9:00 **Herbicide-assisted Pruning in New Cranberry Plantings (Bog 3)**
Thierry Besancon, Associate Professor, Department of Plant Biology, Rutgers University, and *Luke Mackara*, P.E. Marucci Center, Chatsworth, NJ

9:00–9:20 **Advanced Breeding Selections for Fruit Rot Resistance (Bog 4)**
Nicolas Jimènez, Research Associate, *Gina Sideli,* Assistant Professor, *Christopher Adams*, Field Technician *Vincenzo Averello*, Postdoctoral Researcher, Department of Plant Biology, Rutgers University, P.E. Marucci Center, Chatsworth, NJ

9:20–9:40 **HARV 2.0 - Inching Closer to Automated In-field Phenotyping (Bog 5)**
James Polashock, Research Plant Pathologist, *Joseph Kawash*, and *Jackson DiBease*, USDA-ARS, P.E. Marucci Center, Chatsworth, NJ

9:40–10:00 **Trait Discovery in USDA Cranberry Pre-breeding Germplasm (Bog 7)**
Jeffrey Neyhart, Research Geneticist, Taylor Bainbridge, Research Technician, Matthew Kist, Field Technician, USDA-ARS, P.E. Marucci Center, Chatsworth, NJ

10:00–10:20 **Field Evaluation of Nematodes Against Cranberry Rootworm (Bog 15)**
Lindsay Wells-Hansen, Senior Agricultural Scientist, Ocean Spray, Chatsworth, NJ, and *Plant Products*, Canton, MI USA

10:20–10:40 **Progress in Plant Pathology Research, 2026 (Bog 16)**

Peter Oudemans, Professor & Extension Specialist, Department of Plant Biology, Rutgers University, *Jonathan Santiago*, *Sage Gleason*, *Chris Drozd*, *Jaspreet Kaur*, *Aurora Gill*, *Ross Sousa*, and *Matt Hamilton*, P.E. Marucci Center, Chatsworth, NJ

10:40–11:00 **Summary of 2026 Entomological Research (Bog 19)**
Cesar Rodriguez-Saona, Professor & Extension Specialist, Department of Entomology, Rutgers University, *Hao-tian Liu*, and *Robert Holdcraft*, P.E. Marucci Center, Chatsworth, NJ

11:00–11:20 **Survey of Leafhoppers In and Around Cranberry Beds (Bog 19)**
Yahel Ben-Zvi, Post-doctoral Researcher, P.E. Marucci Center, Chatsworth, NJ

POLE BARN

11:40-12:00 **A Visit from the New UMASS Cranberry Station Director**
Luis Marquez, UMass Cranberry Station Director, East Wareham, MA

12:00–1:00 **LUNCH**

1:00-1:10 **Cranberry Statistics**
Bruce Eklund, National Agricultural Statistics Service, Trenton, NJ

1:10–1:40 **Pesticide Safety: Reading the Label and Selecting the Proper Product**
David Hlubik, County Agent III (Assistant Professor), Agriculture and Natural Resources Dept., New Jersey Agricultural Experiment Station, Rutgers University

Advanced Breeding Selections for Fruit Rot Resistance

Gina Sideli, *Nico Jimènez*, *Chris Adams*, *Vincenzo Averello*

Fruit rot remains one of the most important disease challenges in cranberry production, particularly in New Jersey and Massachusetts where disease pressure can be severe. Because cranberry fruit rot is caused by a complex of fungal pathogens, genetic resistance offers an important opportunity to reduce dependence on fungicide applications while maintaining productivity and fruit quality. Previous cranberry breeding research has demonstrated that field fruit rot resistance is heritable and that significant variation exists both among and within breeding families, supporting continued selection for improved resistance.

Crosses made between **2013 and 2015** were established as selections for **Bog 4** in 2024, with progeny and standards replicated three times to provide a field-based assessment of genetic performance under cranberry production conditions with no fungicide applications. The replicated design allows fruit rot resistance and important horticultural traits to be evaluated across multiple plants while accounting for field variation. Currently, we have a molecular marker to screen RU breeding material that can reduce fruit rot by 7.9% and has dominant gene action on chromosome 2 needing a C:C allelic variant (Fig.1A). To make additional progress, in this trial we will screen ripe fruit with a robot/camera each week to identify novel phenotypes. The objective is to identify IDs that consistently combine **low fruit rot with desirable yield and fruit characteristics**.

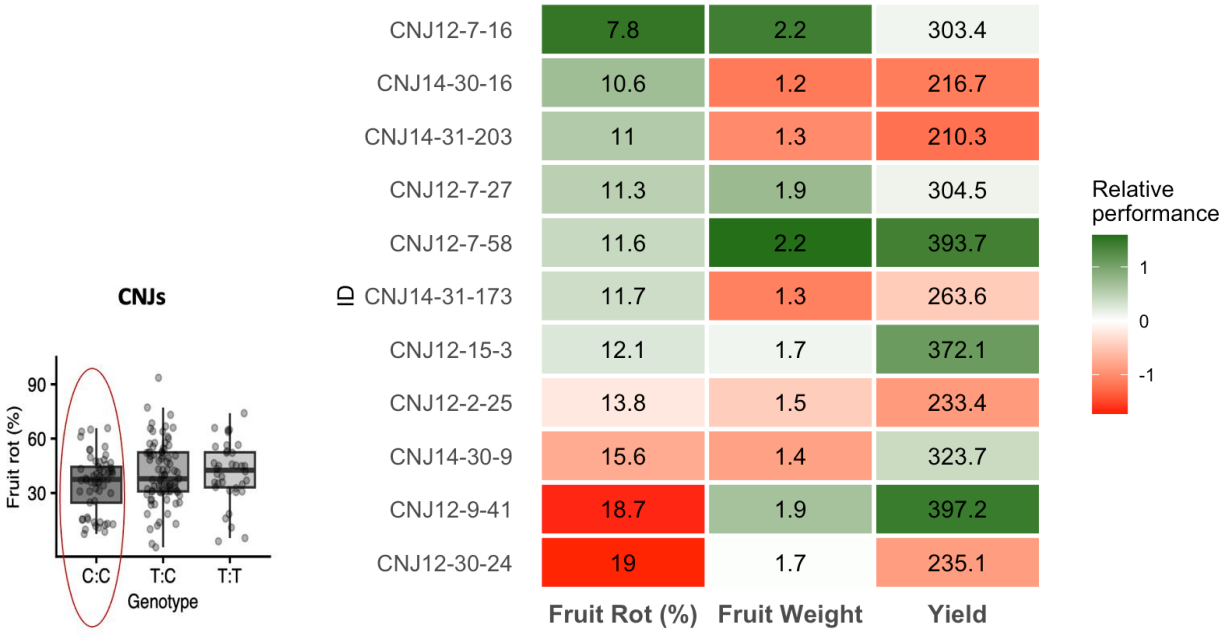


Figure 1. A. Fruit rot molecular marker genotypes. Cumberland and US89-3 possess the C:C genotype and have been used as parent lines. **B**. Top performing selections for fruit rot resistance. Identified using linear model adjusted means with ID, Bog and Harvest as fixed effects. Green = better relative performance; red = lower relative performance. Data evaluated in plots with two fungicide sprays.

HARV 2.0 - Inching Closer to Automated In-field Phenotyping

James Polashock, Research Plant Pathologist, *Joseph Kawash*, Bioinformaticist, and *Jackson DiBease*
USDA-ARS, P.E. Marucci Center, Chatsworth, NJ

Our Hyperspectral Agricultural Research Vehicle (HARV) has been updated to bring us closer to full automation.

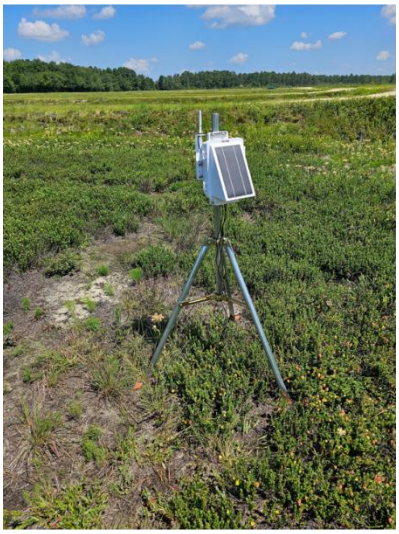
- An additional front-facing camera has been added to increase precision.
- A seat has been added for operator convenience.
- We are now connected to the Real-Time Kinematic (RTK) system. This system uses high-precision satellite positioning technology to boost standard GPS accuracy from a meter or more down to 1-2 centimeters.
- Current tracking will allow automated movement down a row with turning at the end and return up the next row.
- Stopping at each plot and data collection have not yet been perfected. A new computer is being purchased

Can CFBD be Treated in the Field?
An Update on Tarping and Solarization

James Polashock, Research Plant Pathologist, and *Joseph Kawash*, Bioinformaticist
USDA-ARS, P.E. Marucci Center, Chatsworth, NJ

We have continued testing of tarping and solarization in the field to determine if elevated heat treatment in the field can control CBFD in affected plants. We deployed automated monitoring stations with temperature and soil moisture sensors. Temperature sensors were set at canopy level, 1 inch below the soil, and 3 inches below the soil. Black plastic was used for the tarping treatment. The black plastic is expected to trap heat and moisture while reducing the light reaching the cranberries. Clear plastic was used for solarization. The clear plastic lets in solar energy while increasing moisture retention and heating well above ambient. We also tried mowing off most of the canopy vs. full canopy.

- The black plastic allowed a small elevation in surface temperature over air temperature. However, the difference was similar to the no-plastic control.
- In general, the temperature increase under the black plastic was limited to the soil surface (i.e. the probes at 1 inch and 3 inches below the soil surface remained relatively cool (high was about 74° F during the day).
- The clear plastic temperatures exceeded 105° F (about 40° C), which is hot enough to kill the pathogen.
- The mowed clear plastic site had the highest recorded temperatures. Temperatures at 3 inches below the soil surface were elevated (up to 80° F), but below the target temperature of 105° C.



Trait Discovery in USDA Cranberry Pre-breeding Germplasm

Jeffrey Neyhart, Research Geneticist, Taylor Bainbridge, Research Technician, Matthew Kist, Field Technician, USDA-ARS, P.E. Marucci Center, Chatsworth, NJ

Cranberry pre-breeding preliminary yield trial

We established the first field trial for the USDA-ARS cranberry pre-breeding program in 2024. The trial is completely **randomized** and partially **replicated**:

- **Randomization** eliminates local environmental effects that may mask the true genetic potential of clones, e.g. uneven soil.
- **Replication** allows us to separate environmental from genetic effects. Two plots of the same clone should appear the same; any differences are due to environment.

The trial includes 437 different clones: diverse germplasm, such as wild and landrace (native selection) clones; and offspring from crosses made in 2021 and 2022. The goal of the crosses was to combine high yields and potential disease resistance, stress tolerance, and superior fruit quality from wild or landrace clones. The cultivar Stevens is replicated as a check.

Clone type	Number of clones
Diversity panel	
Diverse germplasm	80
Cycle 1 offspring	
Elite x wild	59
Elite x landrace	19
Landrace x landrace	117
Landrace x wild	132
Wild x wild	30

Offspring clones are candidates for advancement to regional trials or for germplasm release. We will use the trial to test new phenotyping and breeding methods and for trait discovery.

Trait discovery

One goal of the pre-breeding program is **trait discovery**, which is the process of identifying novel characteristics that are valuable for developing new cranberry cultivars. These characteristics are expressed as **phenotypes,** which we record using traditional (e.g. visual ratings or bulk weighing) or high-throughput methods (e.g. sensors or image analysis). Traits may be discovered in two ways:

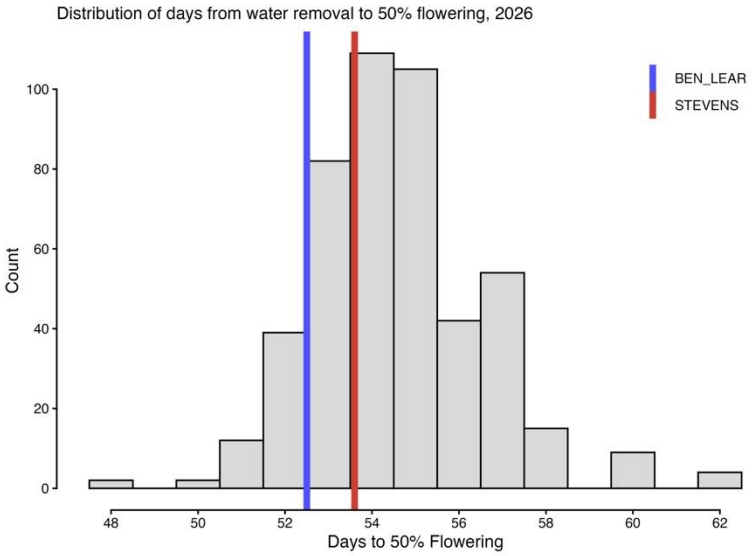
1. Identifying new sources of favorable genetics for a known trait (e.g. finding new genetic sources of fruit rot resistance)

2. Measuring the phenotypes of entirely new or less-emphasized traits (e.g. measuring heat stress tolerance using thermal imaging).

Below are examples of trait discovery in our pre-breeding preliminary yield trial:

Flowering (bloom) time

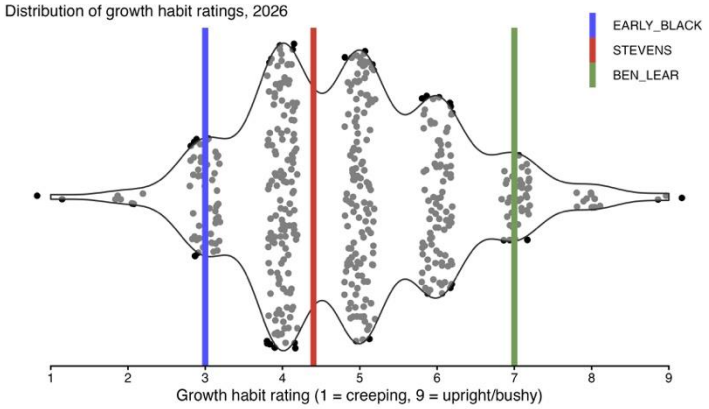
The timing and range of flowering are critical phenological traits and are important for management decisions, pollinator efficiency, and may be related to cold hardiness. Our preliminary data shows that flowering time is **strongly genetically controlled** and **negatively correlated** with percent fruit rot, yield, and coloring/ripening (i.e. TAcy).



Clones in our trial exhibited a two-week range in flowering time in 2026. We will use postharvest data to explore the relationship between flowering time and yield, percent rot, and fruit quality.

Growth habit

A trait that unexpectedly varied in our trial was growth habit, which may influence canopy closure (and weed suppression) and micro-environment for fungal infection or fruit sun exposure. We characterized on a scale from creeping/runnering to upright/bushy and we will continue to assess this trait and its relationship with productivity and disease severity.



Rating = 1

Rating = 5

Rating = 9

Field Evaluation of Nematodes Against Cranberry Rootworm

Lindsay Wells-Hansen, Senior Agricultural Scientist, Ocean Spray, Chatsworth, NJ, and Plant Products, Canton, MI USA

Cranberry rootworm (*Rhabdopterus picipes*) has posed a persistent threat in NJ cranberry production for decades. Larvae feed on fine roots of cranberry plants, leading to vine dieback, and in severe cases, damage across large areas of beds. Although historically considered a sporadic pest, the incidence and severity of cranberry rootworm damage have increased in recent years in NJ. Infestations are now more frequently observed in modern hybrid varieties compared to older cultivars such as 'Stevens' and 'Early Black'. Currently, management relies on a single chemical option: a soil soak application of imidacloprid (e.g.,

Figure 1. Vine damage resulting from cranberry rootworm larval feeding (top left), entomopathogenic nematode application June 2026 (top right), and leaf and berry damage resulting from cranberry rootworm adult beetle feeding (bottom left and right).

Admire Pro) applied mid-to late July (immediately post-bloom) to target early instar overwintering larvae.

Previous research conducted by Shridar Polavarapu in 1998 demonstrated that entomopathogenic nematodes were as effective as imidacloprid in controlling cranberry rootworm (Polavarapu et al., 2000). However, these biological treatments were not further developed at the time, as imidacloprid received a cranberry label and was more cost-effective and readily available than nematode-based alternatives.

Neonicotinoids such as imidacloprid are increasingly at risk of regulatory restrictions or discontinuation, particularly in specialty crops, due to concerns related to environmental impacts, pollinator health, and human safety. As a result, it is critical to evaluate alternative management strategies for cranberry rootworm now, to establish their efficacy, availability, and grower acceptance before such alternatives become urgently needed.

Because of its toxicity to pollinators, imidacloprid applications are restricted to the immediate post-bloom period and are intended to target early instar larvae. In contrast, entomopathogenic nematode applications offer several potential advantages: (i) greater flexibility in application timing, allowing treatments before and/or after bloom; (ii) the ability to make multiple applications to increase exposure of susceptible larvae and pupae; and (iii) the potential for pre-bloom applications to reduce adult beetle emergence and subsequent feeding damage.

This research was launched in collaboration with Plant Products to investigate the in-field efficacy of entomopathogenic nematodes for cranberry rootworm management compared to the grower standard imidacloprid soil soak treatment. Treatments were made to entire 0.5-acre beds at the P.E. Marucci Center in cranberry beds that are heavily infested with cranberry rootworm. Two species of entomopathogenic nematodes are being tested in this trial; *Heterorhabditis bacteriophora* (HB) and *Steinernema carpocapsae* (SC), both of which have shown efficacy in cranberry and other cropping systems against similar pests and are readily available for purchase.

Treatment details are listed below:

1. No insecticide treatment (untreated control)- Bed 20
2. Grower standard cranberry rootworm treatment (imidacloprid)- single post-bloom soil soak application-Bed 16
3. *Heterorhabditis bacteriophora* (HB) at 1.5 billion IJ per acre application rate, 06.08.2026- Bed 15
4. *Steinernema carpocapsae* (SC) at 1.5 billion IJ per acre, 06.08.2026- Bed 17
5. *Heterorhabditis bacteriophora* (HB) at 750 million IJ per acre + *Steinernema carpocapsae* (SC) at 750 million IJ per acre application rate, 06.08.2026- Bed 14

Cranberry rootworm has a single generation per year, and the timing of its development stages is strongly influenced by winter flood management. Overwintering larvae feed on the fibrous roots of cranberry plants at depths of approximately 1-2 inches through at least October before moving deeper into the soil (approximately 2-10 inches) to overwinter. Larval survival is not affected by the winter flood. Most vine damage resulting from larval feeding is observed in the early spring (e.g., April and May), shortly after winter flood removal. Feeding continues until pupation, which typically occurs in late May through June. The pupal stage lasts approximately 15 days, after which adult rootworm beetles emerge during June and July. Adult beetles are primarily nocturnal, sheltering within the duff layer during the day. They feed on cranberry foliage and fruit while laying eggs on or just below the soil surface. Eggs typically hatch within one week of deposition, generally during July and early August. Newly emerged larvae feed on cranberry roots through at least October before moving deeper into the soil (approximately 10 inches) to overwinter.

Treatment evaluations will continue through the 2026 growing season. In spring 2027, following winter flood removal, adult beetle emergence traps and sticky traps will be deployed within experimental beds to assess treatment efficacy by monitoring adult rootworm emergence and activity.

Figure 2. Life stages of cranberry rootworm.

Additional trial information.

Application details: Nematode applications were made in the evening (after 6:00PM) on 8 June 2026, targeting later-instar larvae and pupae. All nematode treatments were applied using the tractor-pulled boom sprayer equipped with XR8004 Tee Jet nozzles with mesh screens removed. Applications were made at 50 gallons per bed at 45 psi. Plots were irrigated for one hour prior to the treatments and for 30 minutes immediately following the treatments and for one hour the morning following treatments to ensure survival and incorporation of the nematodes into the soil. Imidacloprid applications were made immediately post-cranberry bloom, in mid-July, targeting early-instar overwintering larvae and adults.

Treatment efficacy assessments: Initial assessments of rootworm larvae and pupae populations were conducted prior to the applications on 8 June 2026. Ten square foot plots per bed were evaluated as the number of rootworm larvae, pupae and adults. Each plot was evaluated for three minutes at the following timepoints:

- Initial, pre-treatment assessment: 06.08.2026
- Post-treatment assessment #1– one week post treatment
- Post-treatment assessment #2- two weeks post treatment
- Post-treatment assessment #3- four weeks post treatment
- Post-treatment assessment #4- 8 weeks post treatment
- Post-treatment assessment #5- 12 weeks post treatment
- Post-treatment assessment #6- 16 weeks post treatment
- Assessments will resume in May 2027 once the winter flood has been removed

References:

Polavarapu, S., Stuart, R.J., and Schiffhauer, D.E., EVALUATION OF INSECTICIDES AGAINST CRANBERRY ROOTWORM, 1998, *Arthropod Management Tests*, Volume 25, Issue 1, 1 January 2000, C9, https://doi.org/10.1093/amt/25.1.C9.

Timing the First Fungicide Application for Cranberry Fruit Rot

Peter Oudemans, *Christine Constantelos*, *Matt Hamilton*, Rutgers University and *Lindsay Wells-Hansen*, Ocean Spray Cranberries

Time fungicides to the crop—not the calendar

Long-term New Jersey field trials show that cranberry fruit rot (CFR) control depends strongly on **when the fungicide program begins relative to crop development**.

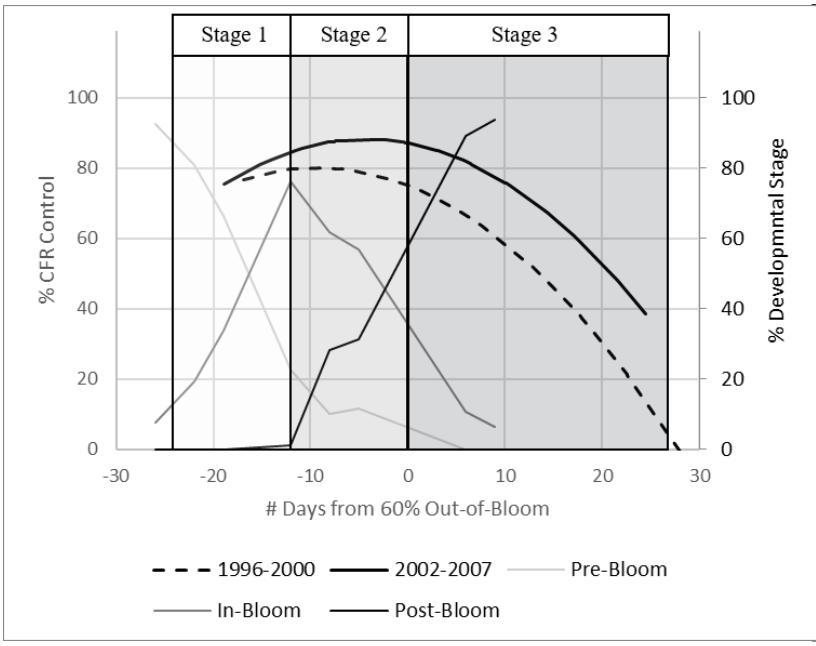


Fig. 1. Relationship between cranberry phenology and fruit rot control in two independent fungicide timing datasets (1996–2000 and 2002–2007). Timing of the first fungicide application was normalized to the estimated date of 60% out-of-bloom (day 0). Disease control remained relatively high when programs were initiated during bloom but declined as applications were delayed beyond 60% out-of-bloom and into early fruit development.

What did we learn?

- **Crop stage was more informative than calendar date.** Bloom timing varied among years, but the disease-control response relative to phenology was remarkably consistent.
- **~60% out-of-bloom is an important management benchmark.** Control declined when initiation of the fungicide program was delayed beyond this period.
- **Infection does not always result in fruit rot.** Apparently healthy fruit frequently contained fruit-rot fungi, suggesting that *when* infection occurs relative to fruit development helps determine whether disease is ultimately expressed.
- Commercial trials with **most cultivars** showed the same general timing response observed in the long-term **'Early Black'** trials.

With the current fungicide toolbox, an effective strategy is to use **FRAC 3 + 11 during bloom**, followed by **broad-spectrum protectants**. This places site-specific chemistry during the critical bloom period while broad-spectrum fungicides provide continued protection and resistance management.

The next challenge is replacement. If we know *when* protection is most important, can biological products, alternative chemistries, or other emerging tools replace some conventional fungicide applications without sacrificing fruit rot control?

Current and Pending Fungicide Toolbox for Cranberry Fruit Rot Management

Function	FRAC	Examples	Best fit in CFR program
Broad-spectrum protectant	M05	Chlorothalonil	Post-bloom backbone; low resistance risk
Broad-spectrum protectant	M03	Mancozeb	Post-bloom protection and low resistance risk
Targeted/systemic	3	Cevya, QuadrisTop, Proline	Bloom; combine/rotate with other groups
Targeted	11	Abound	Bloom partner; high resistance risk
Synergistic/additive	P07	Prophyt, Rampart, Reveille	Added to FRAC 3 fungicides it shows improved activity
Candidate replacement	7	Under IR-4 review	Potential rotational/combination chemistry
Candidate replacement	29	Under IR-4 review	Potential new protectant chemistry

The Strategy

Identify the critical window → Protect the crop → Replace inputs strategically

Over the past several years, we have evaluated programs combining registered fungicides with candidate replacement products. Several new sequences have provided CFR control equal to or better than current standards. The next step is to develop these into reliable, sustainable programs for growers.

Broad-spectrum protectants such as chlorothalonil and mancozeb have been the backbone of CFR management for decades, providing activity across the fruit rot complex while posing relatively low resistance risk. With the loss of chlorothalonil, however, CFR programs will become increasingly dependent on a smaller number of FRAC groups. This increases the importance of rotation, mixtures, and strategic replacement products to maintain efficacy and protect fungicide longevity.

The challenge: Can we replace conventional inputs while maintaining protection during the critical CFR infection window?

The Future

As new fungicides and FRAC groups are incorporated into cranberry fruit rot management, how they are used will be as important as which products are selected. FRAC 3, 7, and 11 fungicides can provide excellent efficacy but carry moderate to high resistance risk. FRAC

29 materials offer a lower-risk alternative, while the multisite FRAC M03 and M05 fungicides have historically played an important role in resistance management.

Future programs will need to emphasize strategic mixtures and rotations, improved coverage through appropriate spreader-stickers, and synergistic fungicide partners that increase efficacy while limiting selection pressure. The FLEX bioassay provides a rapid approach for identifying promising new fungicides and combinations, which can then be validated in field trials at the Marucci Center and other research locations.

The next step is to move the most promising programs into commercial grower trials—integrating timing, efficacy, and resistance management into practical programs that can replace vulnerable inputs without sacrificing CFR control.

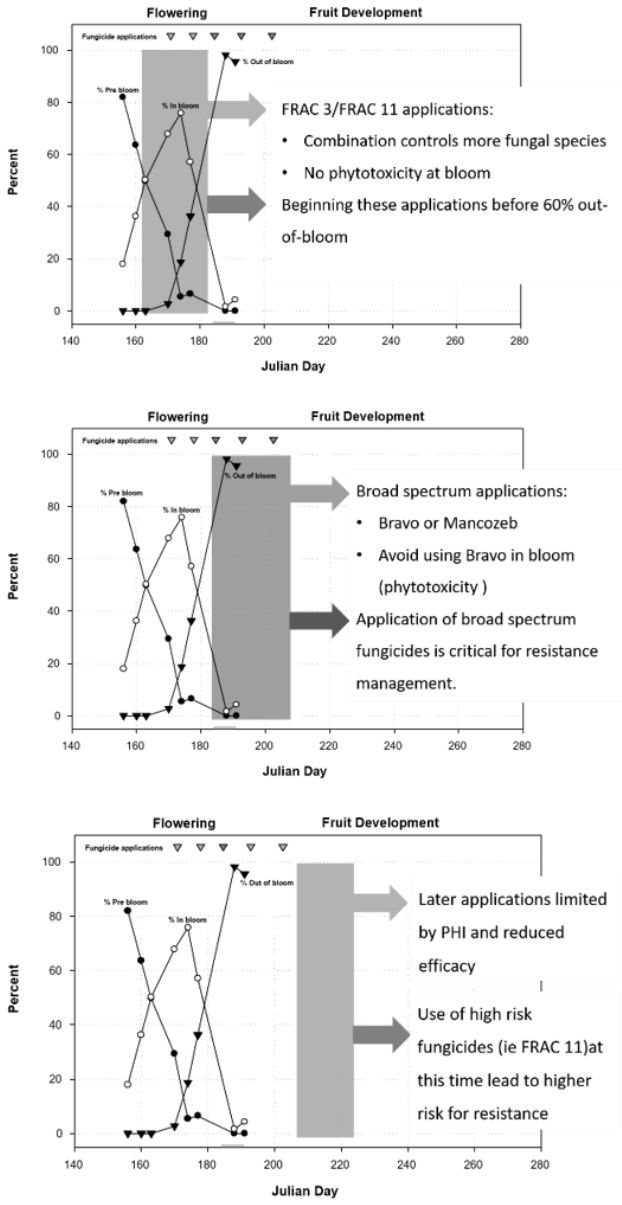


Fig. 2. Conceptual framework for timing fungicide applications for cranberry fruit rot (CFR) management relative to crop phenology. Fungicide applications begin during bloom (Stage 2 in Fig. 1). FRAC 3 + FRAC 11 combinations provide broad activity against the CFR pathogen complex and avoid the phytotoxicity associated with some broad-spectrum protectants during bloom. Following bloom (middle), broad-spectrum protectant fungicides such as chlorothalonil (Bravo) or mancozeb provide continued protection while reducing reliance on site-specific fungicides and contributing to resistance management. Later in fruit development (bottom), management options become increasingly constrained by preharvest intervals (PHI), declining efficacy, and the increased resistance risk associated with repeated use of site-specific fungicides such as FRAC 11. Together, these stages illustrate a phenology-based strategy of early targeted protection, post-bloom broad-spectrum protection, and limited late-season intervention.

Developing a Strategy for Fairy Ring Management
Detect early → Confirm → Map → Monitor → Manage

Peter Oudemans, *Sage Gleason*, *Jonathon Santiago*, *Ross Sousa*, *Matt Hamilton*, *Kristin Dana*, Rutgers University, *Ik Jae Lee* and *Hieu Nyguen*, Rowan University

Fairy ring is an economically important disease of cranberry that can progressively reduce vine health, yield, and the productive life of affected beds. However, management can also be costly, particularly as rings increase in size and require treatment over larger areas. Effective management therefore requires more than simply controlling the disease—we need to determine **when intervention is economically justified and whether the benefits of treatment outweigh the costs**. Earlier detection, accurate diagnosis, and precise mapping of affected areas provide the foundation for evaluating these tradeoffs and developing a more targeted and economically sustainable fairy ring management strategy.

1. DETECT — Find Suspicious Areas from the Air

Finding fairy ring early is critical for effective management. Fairy ring can persist and expand for years in cranberry beds, becoming increasingly difficult and expensive to manage as rings increase in size. New drone, artificial intelligence (AI), and low-cost microscopy tools provide an opportunity to detect small rings earlier, confirm their identity, and precisely map affected areas for targeted management. High-resolution RGB and multispectral drone imagery can rapidly survey entire cranberry beds and identify subtle patterns of vine stress that may be difficult to recognize during routine ground scouting. Repeated flights can further distinguish persistent and expanding disease patterns from temporary crop stress.

2. IDENTIFY — Use AI to Find Potential Rings

AI-assisted image analysis provides the next step by directing field scouts to potential fairy rings. Computer vision models can analyze drone imagery for characteristic spatial patterns of disease using complementary approaches. Object detection can locate small, potentially overlooked rings; image classification can evaluate candidate detections and help distinguish fairy ring from other causes of vine stress; and image segmentation can delineate affected areas so that ring size, location, and expansion can be measured. The goal is not for AI to replace diagnosis, but rather to identify where to look.

3. GROUND TRUTH — Go to the Ring

Suspected rings identified by AI can then be located in the field using mapped coordinates and ground-truthed for characteristic symptoms. Scouts should look for circular or arc-shaped patterns of vine decline, a distinct advancing margin, weak or dying vines, open canopy or dead runners within the affected area, and weed invasion in older ring interiors. Samples should be collected from the actively declining edge of the ring, where diagnostic signs are most likely to be found. The established Rutgers protocol recommends collecting

dead or dying runners from the ring edge, preferably with approximately 12 inches or more of associated root development.

Together, drone detection → AI identification → field ground-truthing → diagnostic confirmation provides a scalable pipeline for finding fairy rings while they are still small and potentially more manageable.

4. BRING THE DIAGNOSTIC LAB TO THE FIELD

A laboratory isn't always necessary for the first diagnosis. Low-cost digital microscopes that connect directly to a smartphone or tablet can allow growers, scouts, and field personnel to examine cranberry runners immediately after collection.

The key is to collect the samples properly to guarantee an accurate diagnoses. Samples are collected from the advancing edge of a suspected ring, gently cleaned if necessary, and examined for two characteristic signs of fairy ring: dark brown to black infection pads and golden-colored fungal mycelium. These structures can provide strong evidence that symptomatic vines are associated with fairy ring.

The real opportunity is connectivity. Images or videos captured with the microscope can be saved, georeferenced, and transmitted directly to a plant pathologist for rapid telediagnosis. Thus, a suspicious area identified by drone imagery can be located by a scout, examined in the field, and remotely evaluated by a diagnostician without first transporting the sample to a laboratory.

AI tells us where to look → The microscope tells us what is there → The diagnostician confirms what we are seeing

From remote sensing to remote diagnosis

Drone detection → AI alert → Ground truth → Digital microscope → Telediagnosis → Management decision

5. MAP — Know Exactly Where the Disease Is

Once fairy ring is confirmed, AI-derived segmentation can be converted into a georeferenced disease map that identifies the location, size, and boundaries of individual rings. This allows us to determine where each ring is located, measure its diameter and affected area, and identify the active disease front where management should be targeted. Mapping is particularly important because the visible symptoms do not necessarily define the full extent of the infection. Previous field studies found the pathogen at least 10 ft beyond the apparent symptomatic edge of established rings. Repeated mapping therefore provides a means to move from simply recognizing a ring to precisely defining and tracking the area that may require management.

6. MONITOR — Turn Images into a Disease History

Repeated drone flights during the growing season and from year to year can transform individual observations into a spatial and temporal record of disease development. AI-assisted analysis can compare imagery through time to determine when a ring first appears, whether it persists, how rapidly it expands, and ultimately whether it responds to management. Rather than relying on a single scouting observation, each ring develops a disease history that can be used to quantify progression, evaluate treatment effectiveness, and improve future management decisions.

7. MANAGE — Treat the Disease, Not the Entire Bed

The ultimate goal is precision disease management. Early detection, field confirmation, and accurate mapping can allow growers to focus scouting and management on affected areas rather than treating an entire cranberry bed. By identifying rings while they are still small, defining the extent of the affected area, and monitoring their response over time, management can become increasingly targeted and adaptive. Detection and diagnosis therefore become part of a continuous management cycle in which treatment response informs the next management decision.

FIND IT EARLY → CONFIRM IT → MAP IT → MANAGE IT

The goal is simple: combine remote sensing with field diagnostics to move from discovering fairy ring after substantial damage has occurred to finding, confirming, and managing rings while they are still small.

Fig 1. From Initial Detection to Verification. Simple digital microscopes are available from a variety of manufacturers. In this project we will use the Jusion WiFi/USB Digital Microscope the inset shows a 5mm scale bar with resolution to less than 0.1mm (Fig. 1a). It is advertised to be capable of 50 to 1000x magnification and is compatible with iPhone, iPad, Android, Mac, Windows and Linux. Ring-like structure observed from a field view (Fig. 1b); Edge of region showing fungal appearance inside the boundary (Fig. 1c); High magnification (50x) inspection of potential fungal region showing leaf discoloration, bare runners/stems (Fig 1d). Current practice of manually inspecting stem/stolon (Fig 1e); Stem appearance in camera image; Fig. 1f) Stem appearance in field microscope with dark spots confirming fungus (Fig 1g).

Summary of 2026 Entomological Research

Cesar Rodriguez-Saona, Extension Specialist, Department of Entomology, Rutgers University, *Robert Holdcraft*, Research Technician, *Yahel Ben-Zvi*, Post-doctoral Researcher, and *Hao-tian Liu*, PhD candidate, P.E. Marucci Center, Chatsworth, NJ

In 2026, research at the Rutgers P.E. Marucci Center continued to focus on three main objectives: (1) evaluate new insecticides for the management of various insect pests; (2) assess the effects of cranberry cultivars and leatherleaf on blunt-nosed leafhopper adult longevity; (3) understand phytoplasma acquisition and transmission among leafhoppers, other related insect pests, and cranberry plants; and (4) investigate how different fertilizer regimes affect interactions among cranberry plants, phytoplasma, and insect pests.

Objective 1. Evaluate new insecticides for the management of various insect pests.

The cranberry industry depends on having effective options for managing insect pests. In 2026, we evaluated the residual toxicity of new, unregistered insecticides against blunt-nosed leafhopper nymphs, Sparganothis fruitworm larvae, and toad bug adults using small-plot and laboratory assays at the P.E. Marucci Center (Fig. 1). Insecticide treatments were applied to 4 × 4-foot cranberry plots, and toxicity was assessed by exposing insects to field-weathered foliage residues collected at different intervals after treatment. On each sampling date, insecticide-treated cranberry uprights were collected, placed in florist's water picks, and enclosed in ventilated 40-dram plastic vials secured in Styrofoam trays. The plants and insects were maintained in the laboratory, and mortality was recorded following exposure. For each assay, the number of live, dead, and missing larvae or nymphs was recorded.

Fig. 1. Small plot/lab experiments evaluated toxicity of new insecticides on insect pests of cranberries.

Objective 2. Assess the effects of cranberry cultivars and leatherleaf on blunt-nosed leafhopper adult longevity.

We tested 12 cranberry cultivars ('Early Black', 'Howes', 'McFarlin', 'Potter', 'Ben Lear', 'Franklin', 'Stevens', '#35', 'Demoranville', 'Crimson Queen', 'Mullica Queen', and 'Haines') and leatherleaf for their effects on blunt-nosed leafhopper adult longevity. For each cultivar, two newly-emerged adults were placed in a dialysis tube and replicated 16 times. Mortality was assessed every 2-3 days.

Objective 3. Understand phytoplasma acquisition and transmission among leafhoppers, other related insect pests, and cranberry plants.

The objective of these studies is to determine the potential for acquisition and transmission of the phytoplasma that causes false blossom disease by sharp-nosed leafhoppers and cranberry toadbugs, as well as to determine the timing of infection. This work is being conducted in collaboration with Dr. James Polashock (USDA-ARS).

For the **acquisition** studies, five adult cranberry toadbugs were placed on phytoplasma-infected or non-infected (control) plants (Fig. 2). Insects were removed after 3 and 5 days of feeding and tested for phytoplasma using methods developed in Dr. Polashock's laboratory. Each insect × time combination was replicated three times, with five plants per treatment.

For the **transmission** studies, five sharp-nosed leafhopper nymphs or adults were placed on phytoplasma-infected plants. After 5 days of feeding, insects were transferred to non-infected plants. As a control, five nymphs or adults were placed on non-infected plants and then transferred to a second set of non-infected plants after 5 days. Plant material was collected at 5, 10, and 20 days after insect feeding to test for the presence of phytoplasma. Each treatment (infected-to-non-infected and non-infected-to-non-infected) × time interval combination was replicated three times. All studies were conducted under controlled greenhouse conditions.

Fig. 2. Greenhouse experiments evaluated the potential for acquisition and transmission of the phytoplasma that causes false blossom disease by various cranberry insect pests.

In addition, a **long-term transmission study** was initiated. Five adult blunt-nosed leafhoppers were placed on infected 'Ben Lear', 'Crimson Queen', and 'Stevens' cranberry plants. After 6 days of feeding, the insects were transferred to uninfected plants of the same cultivar. Plant samples are being collected every 20 days to assess for phytoplasma infection and determine the progression and timing of infection.

Also, we conducted an experiment to test whether leatherleaf serves as a reservoir for the phytoplasma. For this, blunt-nosed leafhoppers were fed on infected cranberry plants for 5 days and then transferred to leatherleaf. We then collected samples from leatherleaf to test for phytoplasma infection.

<u>Objective 4. investigate how different fertilizer regimes affect interactions among cranberry plants, phytoplasma, and insect pests.</u>

These studies aim to evaluate cranberry resistance to insect pests and diseases under different nutrient levels. The research is being led by PhD candidate Hao-tian Liu in

collaboration with Dr. James Polashock (USDA-ARS). Phytoplasma-infected and uninfected ‘Ben Lear’ plants were propagated in the greenhouse and subjected to four fertilizer rates. In 2025, we examined the effects of these treatments on blunt-nosed leafhopper feeding behavior and oviposition using a series of choice experiments. In 2026, we continued these experiments to evaluate the effects of fertilizer rate and phytoplasma infection on blunt-nosed leafhopper adult longevity (Fig. 3). To investigate the mechanisms underlying these interactions, plants from the same treatments were also used for volatile collection and hyperspectral imaging analyses.

Fig. 3. Greenhouse experiments evaluated the effects of phytoplasma infection and fertilizer rates on blunt-nosed leafhopper adult longevity.

Survey of Leafhoppers In and Around Cranberry Beds

Yahel Ben-Zvi, Post-doctoral Researcher, and *Cesar Rodriguez-Saona*, Extension Specialist, P.E. Marucci Center, Rutgers University, NJ

One of the biggest threats to the cranberry industry in New Jersey and across North America is cranberry false blossom disease (CFBD). The disease is caused by a phytoplasma, a type of bacterium that lives in the plant phloem and is transmitted by phloem-feeding insects such as leafhoppers. The primary known vector of CFBD is the blunt-nosed leafhopper (BNLH, *Limotettix vaccinii*). BNLH nymphs can be found in cranberry beds as early as May, with adult populations peaking in late June through July. However, it remains unclear whether all BNLH originate within cranberry beds or whether some move into the beds from nearby forests. Additionally, little is known about the diversity, seasonal activity, and distribution of other leafhopper species in and around cranberry farms.

Our study addressed three main questions: (1) Which leafhopper species are present? (2) When are they active? and (3) Where are they coming from?

Methods

We established four transects across six commercial cranberry beds. Each transect included three sampling points within the cranberry bed, spaced 50 m apart, and one additional sampling point in the adjacent forest (see figure). The transects were spaced 30 m apart.

We sampled weekly at each point using the grower-standard method of 25 sweeps, from the first week of May through the first week of August. We also deployed red sticky traps at each sampling point, which were replaced every two weeks.

In the laboratory, we identified all leafhopper and planthopper specimens to the lowest taxonomic level possible.

Results

The commonly caught leafhoppers included:

Blunt-nosed leafhopper (BNLH)
Limotettix vaccinii
Adults have wings with stripes going longways, and stripes going across the head. Nymphs were found mid May throughout June, adults were found starting mid-June until end of July. These leafhoppers feed on cranberry and leatherleaf. This is the only known leafhopper vector of cranberry false blossom disease. They were only found in beds.

Sharp-nosed leafhopper (SNLH)
Scaphytopius sp.
Adults and nymphs have characteristically sharp noses and adults often come in colors ranging from reddish to brown. There are at least 2 generations of these leafhoppers, and both life stages were found from late May throughout early August. These leafhoppers likely feed on cranberries as well as wild blueberries, huckleberries, other ericaceous plants, and woody and weedy plants. They were found both in beds and in the forest.

Black-faced leafhopper (BFLH)
Graminella nigrifrons
Adults have four dots in a row along their noses, and a dark marked face, otherwise they look rather similar to BNLH. Adults were found from late May to late July and were relatively common. These leafhoppers are known to feed on grasses; whether they feed on cranberries is unknown. They were found mostly in beds, but some were also in the forest.

Aster leafhopper

Macrosteles quadrilineatus

Adults have two pairs of dots on their noses, and often a pattern of four stripes and two spots on each side of the face, but otherwise look similar to BNLH and BFLH. Adults were found mid-May throughout July in relatively low numbers. Whether these leafhoppers feed on cranberries is unknown, but they do have a wide host range, so they likely feed mostly on weeds. They were found mostly in beds, with one found in the forest.

Constricted leafhopper

Agallia constricta

Adults have a broader head and body than BNLH. They range in lighter to darker brown and have two dark spots on head and two dark spots on the thorax. Adults were found starting early/mid-May until early July in relatively low numbers. Whether these leafhoppers feed on cranberries is unknown, but they do have a wide host range, so they likely feed mostly on weeds. They were found both in beds and in the forest.

Potato leafhopper

Empoasca fabae

Adults are green and have row of six white dots along the thorax behind their head. Adults were found from late May throughout late July in relatively low numbers. Whether these leafhoppers feed on cranberries is unknown, but they do have a wide host range, so they likely feed mostly on weeds. They were found both in beds and in the forest.

Discussion

We captured many leafhopper species, but only six were consistently found in the cranberry beds. BNLH, SNLH, and BFLH were the most frequently captured species. BNLH were not detected in the adjacent forests, suggesting that they are likely completing their life cycle within cranberry beds rather than moving in from surrounding forests. It is also possible that BNLH move between nearby cranberry beds following insecticide applications. Additional statistical analyses are needed to evaluate movement patterns within and among the beds. Further analysis is also needed to determine whether the presence and abundance of BNLH and other leafhopper species are associated with the presence of CFBD.

A Visit from the New UMASS Cranberry Station Director

Luis Marquez, UMass Cranberry Station Director, East Wareham, MA

Throughout my career, I have focused on the intersection of molecular biology, plant–microbe interactions and field-based agronomy, building programs that are scientifically rigorous and directly responsive to grower needs. I spent the last decade and a half working in the Ag Biotech industry, leading *in-planta* testing pipelines that have produced a portfolio of both natural and genetically engineered microbial product candidates for protecting horticultural and row crops against both abiotic and biotic stresses. This work depended on close coordination with contract research organizations and growers across multiple U.S. states, thoughtful experimental design and impact assessment, and clear communication of results to both scientific and non-scientific audiences. These are the same core competencies required to guide the UMass Cranberry Station's research and extension agenda in support of the Massachusetts cranberry industry.

In my new role as director of the UMass Cranberry Station, I look forward to:

- **Leading a strategic, integrated research and extension agenda** that addresses disease management, soil and water stewardship, climate resilience, and economic sustainability for the cranberry industry.
- **Strengthening existing partnerships and cultivating new ones** with growers, other academic units at UMass Amherst, state agencies, cranberry industry organizations and colleague scientists across cranberry producing states.
- **Supporting and advocating for Station faculty, staff, and students**, through mentoring, transparent communication, and opportunities for leadership and professional growth.
- **Pursuing external funding and collaborative projects** with federal agencies, industry partners, and foundations, leveraging my experience with venture-backed R&D, government-funded projects, and multi-stakeholder collaborations.
- **Ensuring effective administrative management** of human, physical, and financial resources at the Station, including stewardship of the research bogs and recently modernized facilities.

New Jersey Agricultural Statistics

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New Jersey cranberry producers expect to harvest 449 thousand barrels in 2025; an 18% decrease compared to 2024. NASS released the 2025 production forecast on May 1, 2026. Massachusetts production is forecast to be 1.90 million barrels, down from 2.20 million the previous year. Oregon producers expect to harvest 529 thousand barrels, down from 600 thousand in 2024. Wisconsin production is forecast at 4.6 million barrels, compared to 5.35 million barrels in 2023. Altogether, the total forecast for these four states is 7.51 million barrels, down from a realized 8.74 million barrels in 2024.

For more detail, including acreage and value of production, USDA's National Agricultural Statistics Service released the 2026 Non-citrus Fruit and Nut Final Summary on May 1, 2026, available at: https://www.nass.usda.gov/Publications/Reports_By_Date/index.php.

We appreciate your partnership as we work together to ensure the most accurate representation of New Jersey cranberry production. Thank you for your help.