

# CRANBERRY STATION NEWSLETTER

February 24, 2023 Vol. 24:2



UMass  
Cranberry  
Station

Research  
& Extension



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## GROWER OPEN HOUSE SAVE THE DATE!

Mark your calendars! We will be hosting an **Open House on Friday, March 24, 2023, Noon-3 PM** for our grower community. There will be guided tours throughout the afternoon and refreshments will be served. We are excited to showcase our new facilities! Be on the lookout for your formal invitation arriving in the mail. We hope you can join us!

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## Pesticide Credit News

by Marty Sylvia

### EARN PESTICIDE CREDITS IN MARCH

- Ocean Spray meet the Ag Researchers, **March 8, 2023**, from 2:00-4:00 PM, Ocean Spray Headquarters (2 Credits) contact Marty Sylvia at [martys@umass.edu](mailto:martys@umass.edu) or 508-265-6921 for more information
- CCCGA Winter Pesticide Training Virtual Workshop on **March 16, 2023**, from 7:30-10:30 AM (2 Credits) contact Kim Miot at [kmiot@cranberries.org](mailto:kmiot@cranberries.org) or 508-866-7878 x13 for more information
- UMass Pesticide Education Program held by Natalia Clifton via Zoom \$30/\$40 each session (2 Credits)

To register: <https://ag.umass.edu/services/pesticide-education/pesticide-recertification-training-workshops>

**March 8, 2023, from 7:45-10:15 AM** – Massachusetts Pesticide Laws and Regulations

**March 8, 2023, from 10:45-1:15 PM** – Pesticide Applicator Safety: PPE and Data Sheets

**March 9, 2023, from 7:45-10:15 AM** – Groundwater Protection, Environmental Fate, and MA Regs

**March 9, 2023, from 10:45-1:15 PM** – Special Topics for Pesticide Applicators

## WPS TRAINING FOR HANDLERS

Zoom trainings with certificate are being offered on **Wednesday, March 29, 2023, Friday, April 14, 2023, Wednesday, April 26, 2023, and Friday, May 12, 2023**, starting at 7:30 AM and will last about 1 hour. This training can be done with each person on a smartphone or computer, or in a group setting around a screen – but verification is needed for each person attending. **To attend a training** or for more information please contact **Marty** at **508-265-6921** or [martys@umass.edu](mailto:martys@umass.edu).

## UMASS CRANBERRY PESTICIDE SAFETY MEETING

**Save the date!** The UMass Cranberry Pesticide Safety Meeting has been scheduled for **Tuesday, April 25, 2022, from 7:30-NOON**. This will be a hybrid meeting with limited in-person seats available and on Zoom. Registration fee is \$50 per person, and you will earn 4 pesticide credits. Please look for the registration form in our March newsletter.

## News From the Plant Nutrition/Physiology Lab

By Peter Jeranyama, Sandeep Bhatti and Casey Kennedy

### SELECTED HIGHLIGHTS OF THE 2022 CRANBERRY NUTRITION AND FROST DATA

#### 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 (*Table 1*). We evaluated through trend analysis on

Tolerance°F	GDD°F	Growth Stage
20	100	White Bud Stage
22	150	Bud Swell Stage
25	200	Cabbage Head (Bud Break)

Table 1: Frost Tolerance Thresholds, Growing Degree Days (GDD) and Growth Stage

frost occurrence when tolerance is at 25°F. It seems as though frost occurrences are happening earlier in the season than was observed in the 1960s (*Figure 1*).

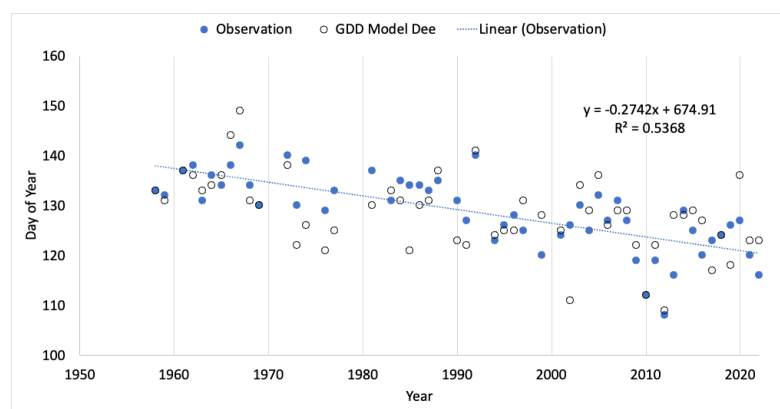


Fig 1. Trendline of the day of the year when 25°F tolerance is reached from 1957-2022

black” and “Howes”) and for the first-generation hybrids such as “Stevens”, 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 2*.)

#### 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

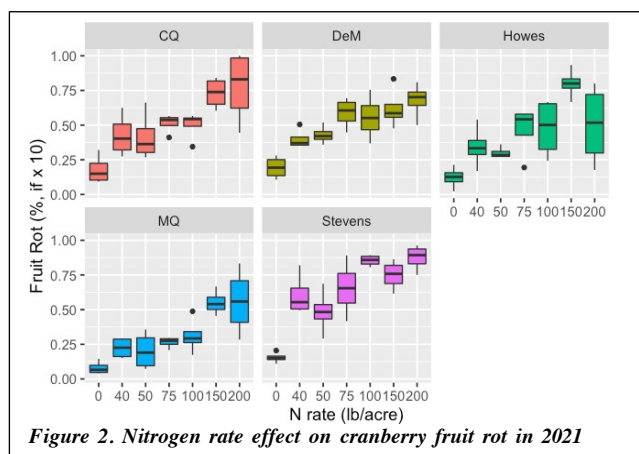


Figure 2. Nitrogen rate effect on cranberry fruit rot in 2021

**Systems Approach to Managing the Expression of Cranberry Fruit Rot (SAME).** In this project we take a multidisciplinary approach to understand and manage cranberry fruit rot. We will vet molecular methods to identify pathogens and monitor pathogen sensitivity to fungicides regionally and at the farm level (Obj. 1). We will systematically evaluate the impact of fertility and environmental stressors on fruit chemistry and symptom development (Obj. 2). Genetic resources for CFR resistance and stress tolerance will be identified to guide breeding (Obj. 3). We will develop predictive models for CFR management, examine the economics of CFR management, and distribute

tailored solutions to growers throughout the US through extension networks and training (Obj. 4).

**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  $^{13}\text{C}$ ,  $^{15}\text{N}$ , 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.

## News From the Plant Physiology/Fruit Lab

By Giverson Mupambi with support from Krystal DeMoranville, Justin Gullage, Marty Sylvia, Hilary Sandler, and Bryan Wicks

### SELECTED HIGHLIGHTS OF THE 2022 CRANBERRY PHYSIOLOGY/FRUIT QUALITY PROGRAM

We started a new research project aimed at exploring the use of unmanned aerial systems (UAS) or drones for various applications targeted at improving precision agriculture in cranberry production.

**Frost monitoring:** We investigated the use of long-wave infrared (thermal) imaging for mapping cold spots on cranberry bogs and improving the placement of temperature sensors used for frost protection. Data was collected on a cold morning in the spring using a ZENMUSE XT1 thermal camera mounted on a Matrice M100 Drone. We constructed orthomosaics and digital elevation models from raw images using Pix4D mapper photogrammetry software. Thermal calibration was done using a clear sun background.

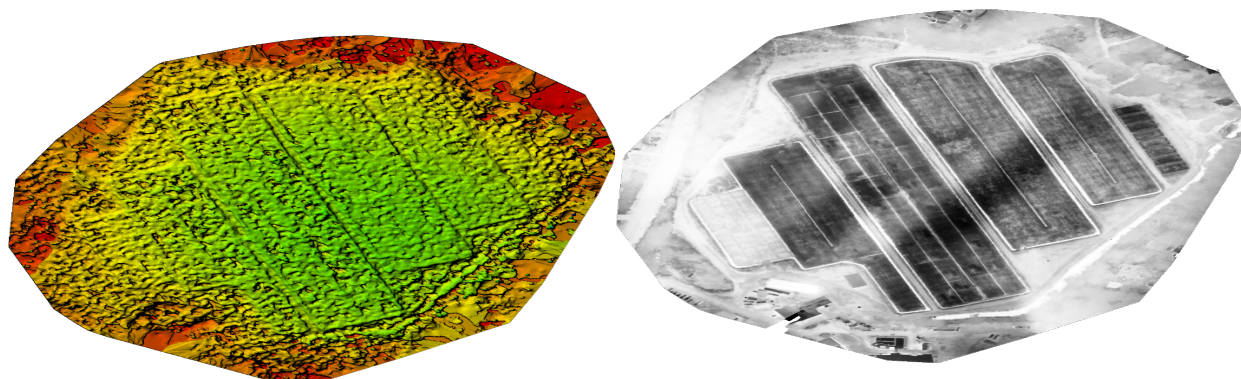
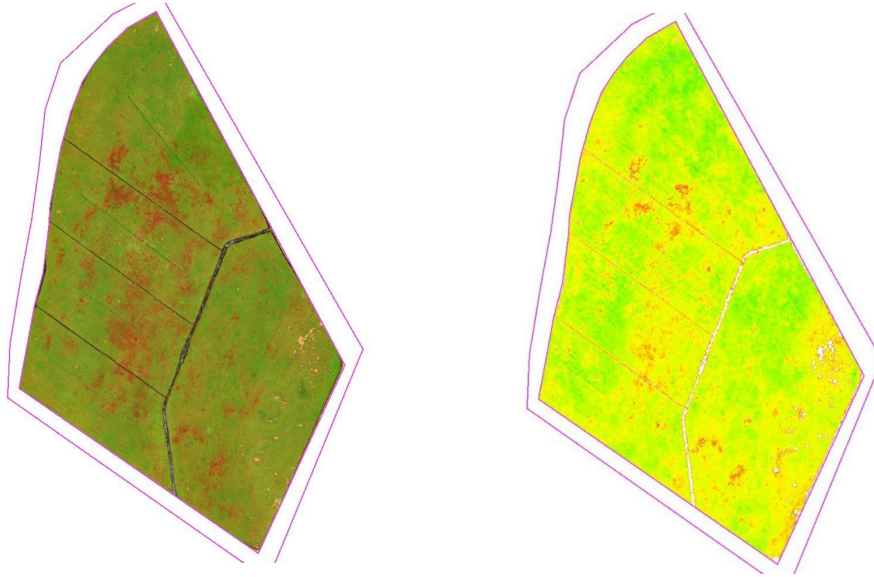


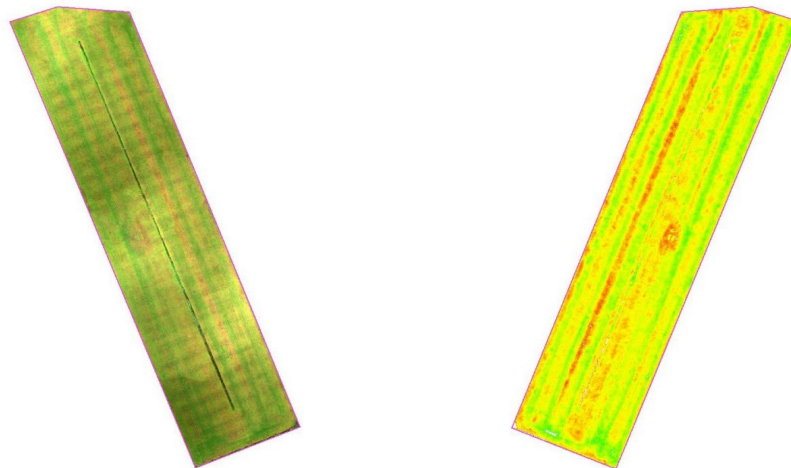
Figure 1: Digital elevation model and thermal image (greyscale) orthomosaic of a cranberry bog. The data was acquired at State Bog on March 18, 2022, at 6:00 AM EST. The ambient air temperature was 32°F, and the bog surface temperature was 20°F. The dark spots represent the colder temperature.

**Insect damage:** We explored the use of visible (RGB) and multispectral imaging to map and detect insect damage from Putnam scale and golden casebearer. Data was collected using a DJI P4 Multispectral Agriculture Drone with D-RTK 2 Mobile Base Station. We constructed orthomosaics from raw images using Pix4Dfields photogrammetry software. The camera was calibrated with a Parrot Sequoia calibration target using images acquired before and after the flight. A database will also be developed to understand the movement patterns of insect damage over different growing seasons.



*Figure 2: Visible (RGB) (left) and normalized difference vegetation index (NDVI) (right) image orthomosaic of a cranberry bog showing Putnam scale damage (reddish brown areas). The data was acquired using a multispectral camera.*

**Plant nutrition:** The use of a multispectral camera for detecting fertilizer application efficiency and nutritional deficiencies in cranberry bogs was explored. Data was collected using a DJI P4 Multispectral Agriculture Drone with D-RTK 2 Mobile Base Station. Tissue samples were also collected for nutrient analysis at a lab. The data produced can be used in future UAS applications for targeted fertilizer applications.



*Figure 3: Visible (RGB) (left) and normalized difference vegetation index (NDVI) (right) image orthomosaic of a cranberry bog showing inefficiency of hand cranking. The green stripes represent areas that received optimal fertilizer, and the brown stripes represent areas under fertilized.*

## News From the Plant Pathology Lab

By Leela Uppala with support from Salisu Sulley,  
Krystal DeMoranville and Olivia Capriotti

### SELECTED HIGHLIGHT OF THE 2022 CRANBERRY PLANT PATHOLOGY PROGRAM

#### Characterization of Cranberry Fruit Rot (CFR) Fungi in

**Massachusetts:** By employing multiplex PCR, we characterized CFR fungi from fruits sampled across 46 southeastern MA fields. Ripe rot caused by *Coleophoma empetri* was the most abundant pathogen detected across the locations with high relative abundance (35%) found in 42 of 46 sampled fields (*Figures 1a and 1b*). This is followed by bitter rot (*Colletotrichum* spp.

*Glomerellaceae*), black rot

(*Allantophomopsis cytispora*) and berry speckle (*Botryosphaeria vaccinii*). The number of fungal species detected were far greater from the wild bogs than conventional bogs. These results suggest that fungicides applied by conventional growers significantly impact the fungal species observed in the field.

Figure 1a. Relative CFR disease abundance.

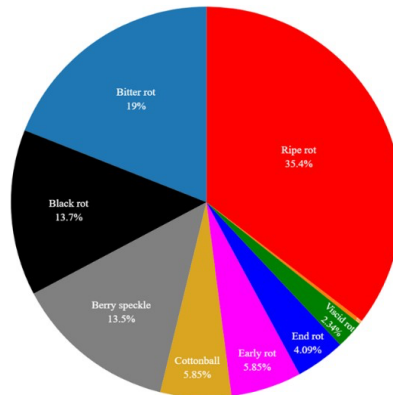
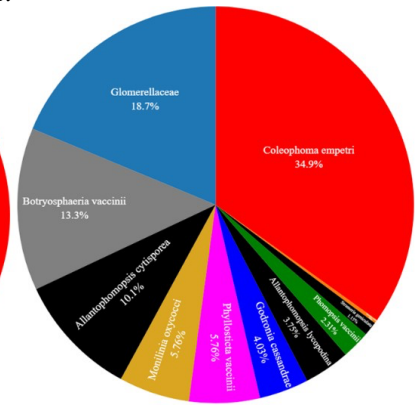


Figure 1b. Relative CFR fungal species abundance.



**Evaluation of Novel Fungicides for the Management of Cranberry Fruit Rot:** We are continuing our efforts to expand the shrinking CFR toolbox by evaluating novel fungicides from FRAC groups 2, 7, 3&7, 3&9, 3&11, 7&12, 9&12; coppers and biologicals.

**Understand the Role of the Bog Microclimate on Fruit Rot and Fruit Quality:** In collaboration with Cape Cod Cranberry Growers' Association (CCCGA) we are continuing our studies in 24 SE MA bogs to elucidate various factors impacting fruit rot incidence and fruit quality, with an objective to develop best management guidelines.

**Identify critical criteria that impact the outcome of late water floods in cranberry production and develop a decision-making model.** We are making progress towards the development of LW-DMM.

Figure 2a. LW-DMM Conceptual Model

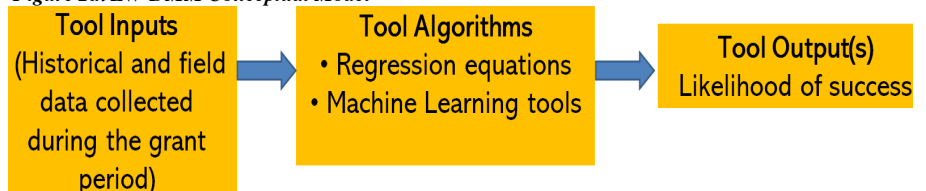


Figure 2B. Dashboard Potential Layout

## News From the IPM/Weed Lab

By Hilary Sandler and Katie Ghantous with support from Krystal DeMoranville

### SELECTED HIGHLIGHT OF THE 2022 CRANBERRY IPM/WEED PROGRAM

**Explore best use patterns for novel cranberry herbicides.** An herbicide product was recently labeled for cranberry use without input from the industry on use patterns. This herbicide has been shown to cause significant injury to blueberry (a closely related crop) with improper application timing. An inter-regional study was conducted in collaboration with NJ, WI and OR to study the effects of timing and rate on cranberry crop safety. A second herbicide recently received a tolerance for cranberry, but no product is currently registered. We are working with the registrant to establish use patterns and get a product labeled for cranberry use for this active ingredient. Both herbicide studies have been completed, and data analysis is ongoing.

Newly labeled (SLN) herbicide Zeus use patterns have been refined for established beds, but safety on new plantings was unknown. A greenhouse experiment was conducted on cuttings and rooted cuttings to study the effects of Zeus on beds being established.

**Perennial weed management.** Yellow loosestrife (*Lysimachia terrestris*; YLS) is a widespread and difficult perennial weed to manage. In recent years, growers reported increasing prevalence in production areas. In 2021 we tested six registered herbicides and two novel compounds for efficacy against YLS in a greenhouse study. We selected five herbicides for a field trial based on the results of the 2021 greenhouse study. Herbicides were applied preemergence (early in the spring). Weed biomass and cranberry fruit yield have been collected, and data analysis is ongoing.

**Exploring an alternative to glyphosate for woody weed management.** Although glyphosate remains registered and has been determined to be safe by the EPA, ongoing litigation and negative public perception have spurred interest in finding possible alternatives. We identified a promising herbicide used in non-food systems for woody weed management and conducted a pilot study using wiper applications to woody weeds within a cranberry bed. Initial results are encouraging, but more work needs to be done to refine use patterns to maximize crop safety. Field work and discussions with the registrant will continue in 2023.



## News From the Entomology Lab

By Anne Averill and Marty Sylvia

### SELECTED HIGHLIGHTS OF THE 2022 CRANBERRY ENTOMOLOGY PROGRAM

#### MANAGEMENT OPTIONS FOR RESISTANT CRANBERRY WEEVIL

**Introduction of Fanfare (bifenthrin, a pyrethroid).** Cranberry weevil has become sequentially resistant to each insecticide class, making it one of the most pressing pests. This year, we introduced a compound within a new insecticide class to manage recently Actara-resistant populations. We raised flags regarding safe application and worked with handlers and suppliers to have it available. The long

preharvest interval and high aquatic toxicity were addressed with growers. We found consistently high efficacy and received no adverse environmental reports.

## OUTBREAKING INSECT PESTS: BIOLOGY AND MANAGEMENT

### **Scale insects** – *Diaspidiotus spp.*

The scale insect outbreak was extensive in 2022 and injury was severe; this outbreak consumed the majority of our effort. DNA analysis just compiled by our UMass colleague based on rigorous scale sampling from plant species through our growing region revealed that what we called Putnam scale is actually a genetically distinct *Vaccinium* specialist found only on cranberry and blueberry.

**Outreach to growers:** We visited over 50 sites this summer and microscopically inspected over 160 infested samples (representing over 80 separate beds). We reported to growers and provided management recommendations. We suspect that drought and heat conditions caused an increase in summer scale reports; nearly half of our scale samples were reported and processed in August.

**Management evaluation:** SenStar (pyriproxyfen and spirotetramat), a more environmentally friendly option, was evaluated in a large field trial. We used a CO2 backpack spray at two sites with impressive scale infestations. Results look promising, but spring evaluation is required. We updated the Scale Insect fact sheet with new findings:

- Sylvia and Averill. *Vaccinium* Scale in MA cranberry (4pp)  
([www.ag.umass.edu/cranberry/fact-sheets](http://www.ag.umass.edu/cranberry/fact-sheets))

### **Black Bug-** *Plagiognathus repetitus*

Yet another new insect appeared in outbreak levels. Cranberry black bug, a tiny hemipteran with piercing-sucking mouthparts caused vine deformation and nearly 100% crop loss where the insects aggregated. We identified three sites with high populations and significant crop loss. Injury occurs in spring and goes unnoticed. We highlighted black bug in workshops and generated a fact sheet:

- Sylvia and Averill. Pest Alert – July 2022: Cranberry black bug—a new plant bug in cranberry (Mirid) (*Plagiognathus repetitus*) (4 pp)

### **Golden Casebearer** - *Triachus vacuus*

**Outreach to growers:** The outbreak continues to move across the industry. We worked with growers to educate and manage this tiny beetle that has reached huge numbers on a handful of bogs. We produced a new fact sheet:

- Sylvia and Averill. Pest Alert – July 2022: Golden casebearer—a new leaf beetle in cranberry (*Triachus vacuus*) (2 pp) ([www.ag.umass.edu/cranberry/fact-sheets](http://www.ag.umass.edu/cranberry/fact-sheets))

## Station News

By Hilary Sandler, Director

### CONSTRUCTION UPDATE



I am pleased to announce that we are officially OPEN for business in all three of our buildings!! We received our Temporary Certificate of Occupancy (TCO) for the Bogside Building (new construction) on February 14, 2023. We are waiting for one or two more things, and we anticipate getting our full CO by the end of March. We have a bit more work to do to provide more parking, so thank you for your patience. We are still in the process of moving into our offices and setting up the labs, but we are here to help with all things cranberry.

### BOGSIDE WORKSHOPS

The Cranberry Station is anticipating holding 3 bogside workshops:

- **one in May via Zoom 8:00-10:00 AM (2 credits)**
- **one in early June in-person, 10:00-12:00 PM (2 credits)**
- **one in late June via Zoom 8:00-10:00 AM via Zoom (2 credits)**

Be on the lookout for dates and how to participate in upcoming newsletters.

## PHONE NUMBERS

Our new phone system is now in place! You can now call **508-295-2212** and be connected to the person you would like to speak with. *You can also dial faculty and staff directly.* Our phone directory is located on our website [www.umass.edu/cranberry/faculty-staff](http://www.umass.edu/cranberry/faculty-staff) and listed below:

<b>CRANBERRY STATION FACULTY AND STAFF</b>		
Anne	Averill	508-970-7629
Sandeep	Bhatti	508-970-7630
Krystal	DeMoranville	508-970-7631
Julian	Draz	508-970-7632
Dawna	Gauvin	508-970-7633
Katie	Ghantous	508-970-7634
Robyn	Hardy	508-970-7635
Peter	Jeranyama	508-970-7636
Rick	Leibe	413-230-1865
Giverson	Mupambi	508-970-7638
Hilary	Sandler	508-970-7641
Salisu	Sulley	508-970-7642
		508-970-7643
Marty	Sylvia	508-265-6921(cell)
Leela	Uppala	508-970-7644
<b>USDA/ARS</b>		
Nicole	Henderson	508-219-6155
Casey	Kennedy	508-219-7120
Joey	Loffredo	508-219-7858
David	Millar	508-219-7859
Molly	Welsh	508-219-7742
Adrian	Wiegman	508-219-7736

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OFFICIAL BUSINESS

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