2010 Annual Summer Meeting of the American Cranberry Growers Association

AMERICAN CRANBERRY GROWERS association

Rutgers P.E. Marucci Center

Chatsworth, NJ

Thursday August 19, 2010

RUTGERS
New Jersey Agricultural Experiment Station

American Cranberry Growers Association
2010 Summer Field Day
Thursday August 19, 2010
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 located at the Center, adjacent to Conference Room.

CRANBERRY BOGS:

8:00–8:30 **Continental Breakfast (Bog 3)**

8:30–8:40 **Opening Remarks**
Stephen V. Lee, IV President, American Cranberry Growers Association

8:40–8:50 **2010 Cranberry Statistics – An Update**
Troy M. Joshua, USDA, NASS

8:50–9:10 **Cranberry Pollination: Wild Bees, Honeybees, and the Mechanics of Pollen Delivery (Bog 3)**
Dr. Daniel P Cariveau, Postdoctoral Research Associate, *Dr. Rachael Winfree*, Assistant Professor, Department of Entomology, Rutgers University

9:10–9:25 **Performance of Rutgers New Cranberry Varieties: Crimson Queen®, Mullica Queen® and Demoranville® (Bog 3)**
Dr. Nicholi Vorsa, Professor, *Dr. Jennifer Johnson-Cicalese*, Research Associate, Department of Plant Biology and Pathology, Rutgers University

9:25–9:45 **GA treatment to enhance bed establishment (Bog 6)**
Dr. James Polashock, Research Plant Pathologist, USDA-ARS, *Dr. Peter Oudemans*, Associate Professor, Department of Plant Biology and Pathology, Rutgers University

9:45-10:05 **Evaluating New Cranberry Selections for Fruit Rot Resistance and Yield (Bog 17)**
Dr. Jennifer Johnson-Cicalese, Research Associate, *Dr. Nicholi Vorsa*, Professor, Department of Plant Biology and Pathology, Rutgers University

10:05-10:35 **2010 Entomology Research and Trials with New Insecticides (Bogs 19)**
Dr. Cesar Rodriguez-Saona, Department of Entomology, Rutgers University

POLE BARN:

10:45–11:15 **Fairy Ring Disease of Cranberry: Dissecting the Life Cycle and Development of Control Strategies**
Jennifer Vaiciunas, Research Technician, *Dr. Peter Oudemans*, Associate Professor, Department of Plant Biology and Pathology, Rutgers University, *Dr. James Polashock*, Research Plant Pathologist, USDA-ARS

11:15–11:45 **Pesticide Applicator Safety**
Ray Samulis, Cooperative Extension Agent, Burlington County Extension, Rutgers University

11:45–12:00 **Equipment Dealers/Company Presentations**

12:00–1:00 **LUNCH**

1:00–2:00 **Equipment Display**

CRANBERRY POLLINATION: WILD BEES, HONEYBEES, AND THE MECHANICS OF POLLEN DELIVERY

Daniel Cariveau and Rachael Winfree

Department of Entomology, Rutgers University, New Brunswick, NJ

Fruit production in cranberry is dependent upon pollination - a service provided primarily by bees. Managed honeybees are the primary pollinators of cultivated cranberry. While they are often less numerous, wild bees, such as bumblebees are also important pollinators of cranberry. Wild bees rely on the area surrounding farms for nesting sites and food resources when cranberry flowers are not in bloom. In 2009 and 2010, we collected bees at 16 sites in New Jersey to determine how the amount of cranberry agriculture surrounding a bog influenced wild bee populations. In 2009, we found over 45 species of wild bees. The overall abundance of bees was not affected by the amount of land in cranberry production. Individual bee species differed in their response. Some species showed an increase in numbers with more land in cranberry agriculture while others decreased.

The average effectiveness of each bee species for pollinating cranberry is a function of the number of individuals of that species visiting cranberry combined with the number of pollen grains an individual bee delivers during each visit. To assess pollinator effectiveness, in 2010 we measured the number of pollen grains delivered by honeybees and wild bees to cranberry flowers.

To augment wild bee populations in agricultural settings, the National Resource Conservation Service (NRCS) has constructed flower plantings at sites throughout New Jersey. In the future, we will be assessing the efficacy of these plantings for providing food resources for wild bees. A number of wild bee species, including the highly effective bumblebees, need floral resources before and after cranberry bloom to maintain their populations. By understanding the value of these plantings we hope to be able to recommend simple, inexpensive techniques that will increase population sizes of the most effective wild bee species in cranberry bogs and thus augment essential pollination services.

PERFORMANCE OF RUTGERS NEW CRANBERRYS: CRIMSON QUEEN®, MULLICA QUEEN® AND DEMORANVILLE® VARIETIES

Nicholi Vorsa and Jennifer Johnson-Cicalese

P.E. Marucci Center, Department of Plant Biology and Pathology, Rutgers University

In June 2006, Bog 3 was planted for the purpose of doing management studies on large replicated plots of the Rutgers new Mullica Queen (CNJ97-105-4; US PP19,434 P3), Crimson Queen (NJS98-23; US PP18,252 P3), and Demoranville (NJS98-35; US PP18,911 P2) varieties, along with the standard cultivar, Stevens. Rooted cuttings ($1/ft^2$) were used to plant four replications of each variety in 20' x 45' plots. In 2009, the trial was fully established so two $1ft^2$ samples were harvested from each plot on September 15 and 25, and yield, fruit size, fruit rot, TAcy, Brix, and titratable acidity were determined.

For yield in 2009, Mullica Queen, Crimson Queen, and Demoranville all performed significantly better than Stevens. Mullica Queen had the highest yield ($418g/ft^2$), more than twice as high as Stevens, while total anthocyanin (TAcy) was equivalent to Stevens. Demoranville and Crimson Queen had TAcy values three times as high as Stevens on September 15. Crimson Queen exhibited higher fruit rot in the September 25 harvest. Crimson Queen comes into bloom earlier (3-4 days) than Stevens, and will require earlier fungicide applications. Mullica Queen also comes into bloom earlier than Stevens, but did not appear to exhibit higher fruit rot.

Performance of cultivars in Bog 3 in 2009

			15-Sep						25-Sep					
	Mean Yield g/ft^2	**Total Yield g/ft^2**	**Fruit wt g/fruit**	**% fruit rot**	**Tacy mg/ 100g frt**	**BRIX % solids**	**% Titrat. acid**	**Total Yield g/ft^2**	**Fruit wt g/fruit**	**% fruit rot**	**Tacy mg/ 100g frt**	**BRIX % solids**	**% Titrat. acid**
Mullica Queen	418.9 a	375.6	2.5	4.0	7.6	8.9	2.60	462.2	2.6	4.3	13.1	8.9	2.55
Demoranville	403.7 a	417.2	2.6	4.5	20.0	8.5	2.47	390.2	2.7	5.5	27.1	8.9	2.25
Crimson Queen	360.7 a	301.7	2.5	7.2	21.4	9.3	2.54	419.6	2.6	11.1	25.4	9.1	2.39
Stevens	190.4 b	186.6	1.9	6.4	6.5	9.4	2.66	194.2	2.1	4.1	13.9	9.4	2.65

At other locations, Rutgers new varieties continue to perform well. In established half acre test plots in Browns Mills, NJ, 2009 yields were: Mullica Queen® 419 bbl/acre, Crimson Queen® 286 bbl/acre, and Demoranville® 270 bbl/acre, while Stevens, Ben Lear and Grygleski #1, in contiguous beds yielded 320, 276 and 253 bbl/acre, respectively.

The most mature (4 yr) commercial beds of Crimson Queen® in Wisconsin yielded 416 and 628 bbl/acre. Three and four year old beds of Demoranville® in Wisconsin yielded 380 and 474 bbl/acre, respectively. The three varieties have now been planted in Massachusetts, Michigan, New Jersey, Oregon, and Washington State in the US; and in British Columbia, Quebec, and Nova Scotia in Canada. With several hundred acres coming into production soon, we will have the opportunity to evaluate the new varieties' performance under varied climates and conditions.

A description of each variety is given below (Excerpted from **Fruit and Nut Register List 45;** HORTSCIENCE VOL. 45(5) MAY 2010):**CNJ97-105-4** (**Mullica Queen**®). Midseason cultivar with very high production potential. **Origin:** Rutgers University, NJAES, Chatsworth, NJ by N. Vorsa and J. Johnson-Cicalese. Lemunyon x No. 35; cross 1997; selected 2000; introd. 2007. US PP19,434 P3, 11 Nov 2008, Canada PBR applied for. **Fruit:** large over 2g in NJ, WI; widely elliptic, with rounded to square stem end and rounded calyx end, Tacy typically 15% higher than Stevens. **Skin:** shiny, with little to no bloom. **Plant:** vine stolons and uprights moderate

NJS98-23 (**Crimson Queen**®). Early season, large fruited, early high anthocyanin content, exceptional vegetative vigor, highly productive cranberry cultivar. **Origin:** Rutgers University, NJAES, Chatsworth, NJ by N. Vorsa. Stevens x Ben Lear; cross 1988; selected 1998, tested as NJS98-23; introd. 2006. US PP18,252 P3, 27 Nov 2007; Canada PBR applied for. **Fruit:** large over 1.9g in NJ, WI; elliptic, with rounded to slightly pointed stem end, and rounded calyx end, Tacy typically 50% > than Stevens. **Skin:** shiny, bloom around calyx end, otherwise with little to no bloom. **Plant:** vigorous stolon production; vines moderately coarse; early flowering phenology (2-3 days advanced relative to Stevens), fruit-rot susceptibility similar to Ben Lear.

NJS98-35 (**Demoranville®**). Early season, large fruit, early high fruit anthocyanin content, highly productive cranberry cultivar. **Origin:** Rutgers University, NJAES, Chatsworth, NJ by N. Vorsa. Franklin x Ben Lear; cross 1988; selected 1998; introd. 2007. US PP18,911 P2, 10 Jun 2008; Canada PBR applied for. **Fruit:** large, over 2g in NJ, WI; elliptic, with rounded to slightly pointed stem end, and slightly protruding calyx, Tacy typically 60% higher than Stevens, lower titratable acidity than Stevens. **Skin:** shiny with little to no bloom, except waxy bloom around calyx. **Plant:** moderately vigorous stolon production; uprights moderate coarseness; early flowering phenology (1-2 days advanced relative to Stevens); appears less fruit-rot susceptible than Ben Lear. Named in honor of I.E. Demoranville, Univ. Massachusetts Cranberry Station, MAES, East Wareham, MA.

GIBBERELLIC ACID TREATMENT TO ENHANCE BED ESTABLISHMENT

James Polashock[1] and Peter Oudemans[2]

[1] USDA ARS, Chatsworth, NJ, U.S.A
[2] PE Marucci Center, Rutgers University, 125a Lake Oswego Road, Chatsworth, NJ, U.S.A.

Introduction

We initiated a project four years ago to inhibit flowering in cranberry during the establishment years. Inhibition or elimination of flowering and fruiting could be advantageous for several reasons. First, eliminating the fruit load will shift allocation of plant resources to vegetative growth. Second, we have shown that open ground in cranberry beds allows the establishment of undesirable seedlings from dropped and rotted fruit. Thus, elimination of fruiting in the early stages of bed establishment will help preserve cultivar purity. Third, many fruit rot pathogens sporulate on infected fruit. Eliminating the unharvested fruit is predicted to reduce build up of fungal inoculum.

Objective

The objective of this project is to eliminate flowers and/or fruit in establishing cranberry beds. When we first started this project, we tried two approaches 1) ‘burn’ flowers and/or young fruit using chemical treatment such as ammonium thiosulfate and 2) prevent flowering and/or fruiting using plant growth regulators such as gibberellic acid and abscisic acid. Our preliminary data suggested approach 2 to be the most viable and treatment in 2009 (and 2010) was limited to the most promising candidate in this category, ProGibb (a commercial product containing gibberellic acid).

Treatments

We selected two different sources of plant material. The first source is now a 4-year old bed of rooted cuttings of ‘Crimson Queen’ and ‘Stevens’ (Bog 3). The second source is an established bed of ‘Stevens’ (Bog 6). We have also planned treatment for newly planted beds in 2010. ProGibb was typically applied in two applications (one at the end of July and one at the start of August).

Results

Data collected in the fall 2009 showed that across both beds (3-year old and mature) and both cultivars (Stevens and Crimson Queen), that the ProGibb treatment consistently showed no phytotoxicity, increased vegetative growth, and the lowest yields (almost no berries) as compared to the control. The extensive vegetative growth in response to ProGibb treatment was monitored for hardening and susceptibility to winter injury. Winter injury was observed this year (winter 2009-2010) as evidenced by browning of vegetative tissue and leaf drop. However, the runners were not killed and the plants fully recovered. We also noticed that beds receiving the normal fertilizer regime sometimes appeared to be yellowing. We determined that this was not a phytotoxicity response, but rather evidence that more fertilizer is required to support the extensive vegetative growth increase.

Conclusions

Based on four years of data, only the gibberellic acid (ProGibb) treatment has the potential to safely accomplish the objective. We have shown that we can 1) dramatically reduce the occurrence of unwanted fruit and 2) dramatically increase vegetative growth. Although some winter injury was evident this year, the plants recovered and obvious injury is no longer visible.

Future Plans

Overall, we are convinced of the efficacy and safety of this approach. We hope to begin grower recommendations following additional data collection. Registration issues will be pursued.

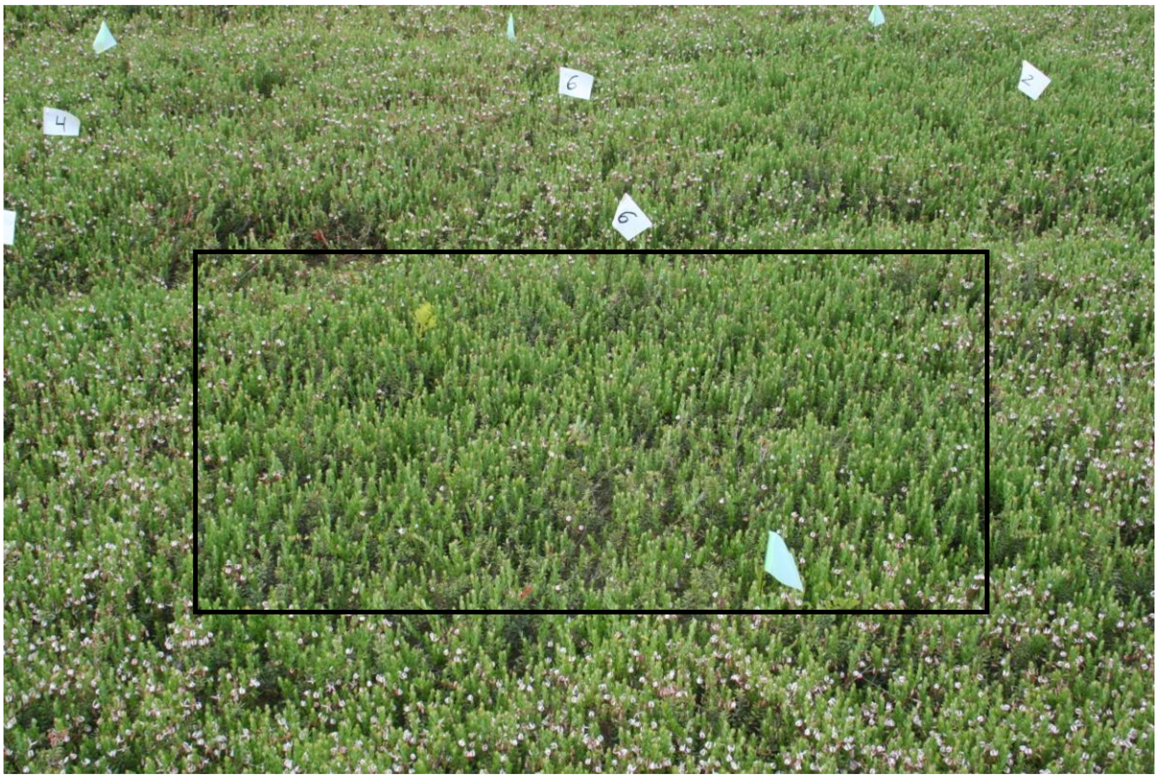


Figure 1. ProGibb Treatment of 'Crimson Queen' (boxed area). Note the absence of flowers and increased runner growth.

EVALUATING NEW CRANBERRY SELECTIONS FOR FRUIT ROT RESISTANCE AND YIELD

Jennifer Johnson-Cicalese, Nicholi Vorsa, Karen DeStefano and Sue Vancho

P.E. Marucci Center, Department of Plant Biology and Pathology, Rutgers University

In June 2003, 80 advanced cranberry selections were planted in a trial for evaluation as possible new varietal releases. These advanced selections represent the best of 6585 progeny that had been evaluated during the previous 10 years, in five progeny evaluation trials. The parents of the progeny include named varieties such as Stevens, Ben Lear, Black Veil, Franklin, Pilgrim, Early Black, Bergman, #35, and Wilcox; selections from previous breeding and selection cycles; as well as several germplasm accessions that showed exceptional performance in some particular trait, such as fruit chemistry or yield.

Each selection was established from rooted cuttings (1/ft^2) in 10'x10' plots, replicated three times, and maintained with standard practices. The varieties, Stevens and Ben Lear, were included in the trial for comparison. In 2004 and 2005, the trial was rated for establishment. In 2006 through 2009, the trial was evaluated for yield, % fruit rot, fruit size, total anthocyanin (TAcy), soluble solids (Brix), and titratable acidity. Fruit samples (1ft^2) were harvested from each plot in September and October.

Several advanced selections have exhibited consistently better performance, including yields 30% higher than Stevens, and good color and fruit size. These promising selections have recently been planted in larger trials under grower conditions in New Jersey, Washington, Oregon, and/or Wisconsin. Future plans include additional yield and fruit chemistry evaluations, and testing for specific phenolic compounds. Fruit rot resistance will be rated in the future by withholding fungicides. Other traits evaluated will be fruit storage life, and possible testing of insect resistance.

2010 ENTOMOLOGY RESEARCH AND TRIALS WITH NEW INSECTICIDES

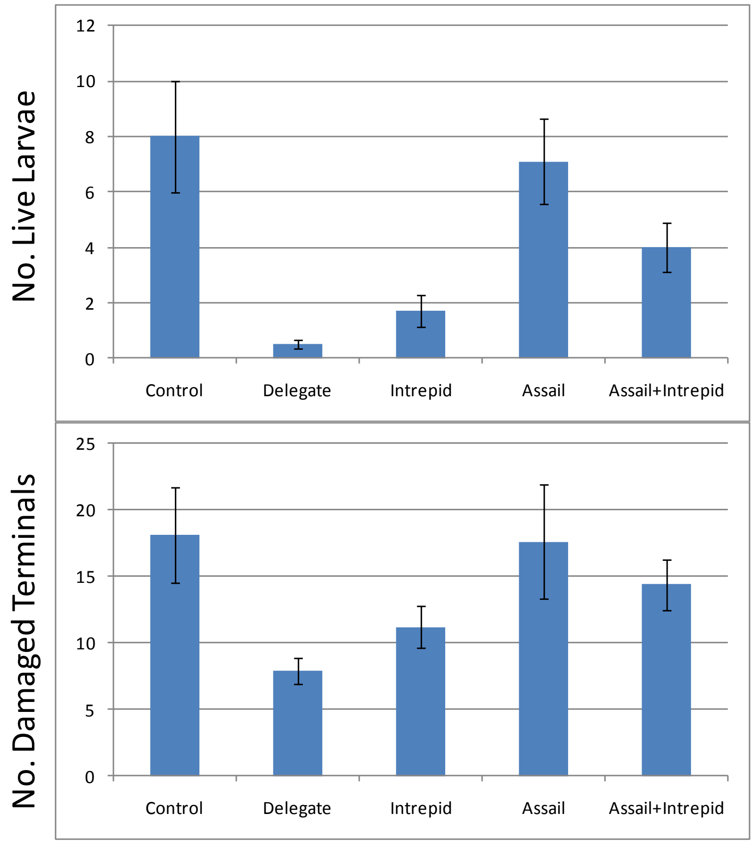
Cesar Rodriguez-Saona[1], Robert Holdcraft[1], Vera Kyryczenko-Roth[1], and Dan Schiffhauer[2]

[1] P.E. Marucci Center for Blueberry & Cranberry Research & Extension,
Rutgers University, Chatsworth, NJ
[2] Ocean Spray, Chatsworth, NJ

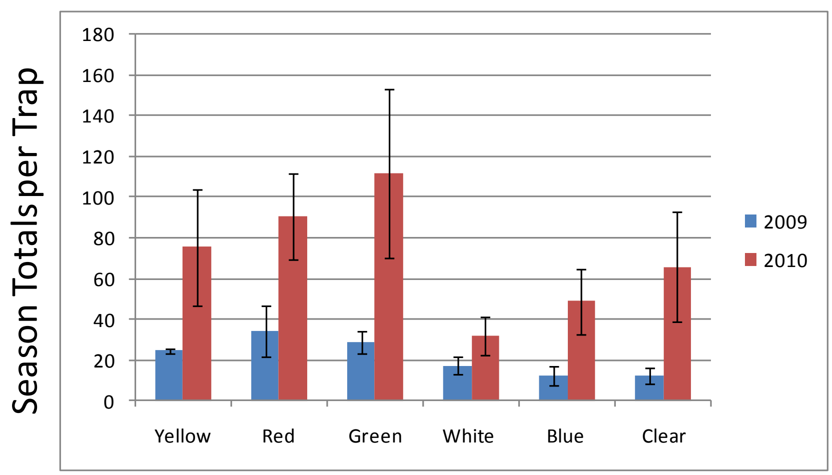
Here are the entomology highlights of this year's cranberry season:

- After experiencing high gypsy moth populations in 2007 and 2008, and a big decline in numbers in 2009, the gypsy moth outbreak is finally over. As a result, growers did not need to apply insecticides to control this insect in 2010.
- Early in the season, some farms experienced areas of high blackheaded fireworm, *Sparganothis* fruitworm, and cranberry blossomworm that required treatment. Some farms also had to treat for *Sparganothis* fruitworm after bloom. Now that the gypsy moth outbreak is over, growers need to make sure to monitor for these and other, e.g. spotted fireworm, pests in upcoming years.
- Some growers also reported areas of high blunt-nosed leafhopper and grub infestations. It is also important to continue to monitor for these secondary pests in upcoming years. This is particularly important because many of the newer "reduced-risk" insecticides are very selective and effective only against lepidopteran pests but have minimal or no insecticidal effects against other insect pests (e.g. beetles, leafhoppers, etc.).
- This year, there were a few new insecticides registered in cranberries: Belay, Oberon 2SC, and Rimon 0.83EC. However, we do not have information on maximum residue levels (MRLs) for them. These levels are critical when exporting cranberry products. Thus, at this point, these products have limited use in New Jersey cranberries. I will keep growers updated on the status of MRLs for these newer products in upcoming meetings. Also, more efficacy trials need to be conducted with these insecticides against important cranberry pests in New Jersey.
- I am aware of some growers that used Delegate this season. I will continue to encourage growers to use this product. Delegate is an excellent insecticide for the control of Lepidopteran pests, including fireworms and fruitworms.
- Future research will continue to focus on testing new insecticides with novel modes of action, particularly for fruitworm and fireworm control.

Field trial for Sparganothis fruitworm control. We evaluated the efficacy of a pre-bloom application of Assail, Delegate, and Intrepid for *Sparganothis* fruitworm control under field conditions. This study was conducted in a commercial cranberry bog with previous history of high *Sparganothis* populations. Ten 4' × 4' plots were sprayed with either Delegate at 6 fl oz/A, Assail at 5.3 fl oz/A, Intrepid at 16 fl oz/A, or Assail and Intrepid at 5.3 and 8 fl oz/A, respectively. Control plots received no insecticide applications. Applications were made with a R&D CO_2 backpack sprayer. The sprayer was calibrated to deliver 102 gal of vol per acre at 30 psi, using a single T-GET VS110015 nozzle, yielding 141 ml per plot. Treatments were applied on 20 May. A week later, number of live larvae and damaged terminals were recorded per plot. Delegate provided the best (>90%) larval control of all treatments.



New methods for monitoring blunt-nosed leafhoppers in cranberries. Field experiments were conducted to examine the attraction of blunt-nosed leafhoppers to different color traps in cranberries. This was a continuation of a 2009 study. Six colors were tested for attraction: yellow, red, green, white, blue, and clear (control) from the first week in July through the first week in August (peak adult flight). A set of six traps, one of each color, was placed in one cranberry bog. Each set was replicated 4 times. Traps were checked weekly in the lab for the presence of leafhoppers. In both years 2009-2010, higher blunt-nosed leafhoppers were caught on red and green traps than on other color traps.



FAIRY RING DISEASE OF CRANBERRY: DISSECTING THE LIFE CYCLE AND DEVELOPMENT OF CONTROL STRATEGIES

Jennifer Vaiciunas, Peter Oudemans, and James Polashock

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[2] USDA ARS, Chatsworth, NJ, U.S.A

Fairy ring is a serious disease affecting cultivated cranberries in New Jersey and Massachusetts. The disease is expressed as expanding patches of dead vines leading to long term yield loss. Recently, we observed dark infection pads associated with dying vines and subsequently isolated the pathogen and confirmed pathogenicity. Sequence analysis showed the causal agent to be a species of *Helicobasidium* (teleomorph) and the anamorph isolated from cranberry was identified as *Thanatophytum* sp. A second anamorphic phase of this pathogen, *Tuberculina*, a rust mycoparasite, may function as the recombinant stage of the pathogen life cycle. A collection of isolates from New Jersey and Massachusetts revealed a high level of diversity as determined by vegetative compatibility (VC) and molecular analyses. Isolates collected from individual rings were identical whereas most isolates collected from different rings were distinct. This suggests that an active sexual phase is responsible for dissemination. The rust mycoparasite stage is an important intermediate stage of the fairy ring life cycle. We found the *Tuberculina* stage on a rust infecting greenbrier (*Smilax* sp.), and another infectin Swamp Loosestrife (*Decodon verticilatus*) both common weeds in cranberry beds. These isolates were identical to the cranberry pathogen based on DNA sequence analysis. A complex life cycle has emerged and includes at least three distinct stages on distinct host species. Control of the rust will likely limit spread of the disease into cultivated cranberry beds.