2012 Annual Winter Meeting of the American Cranberry Growers Association

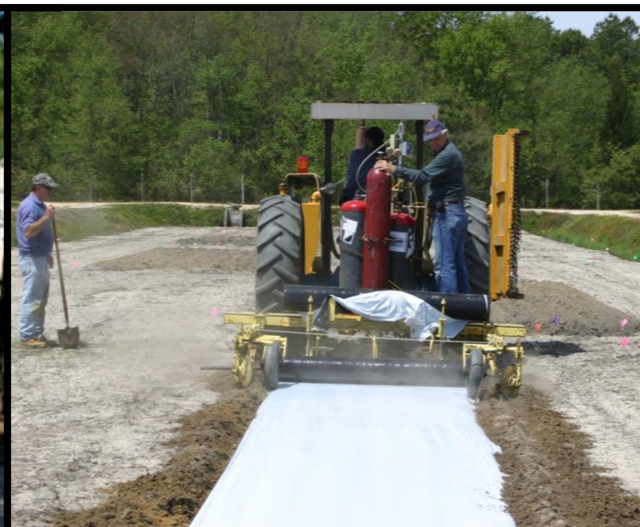
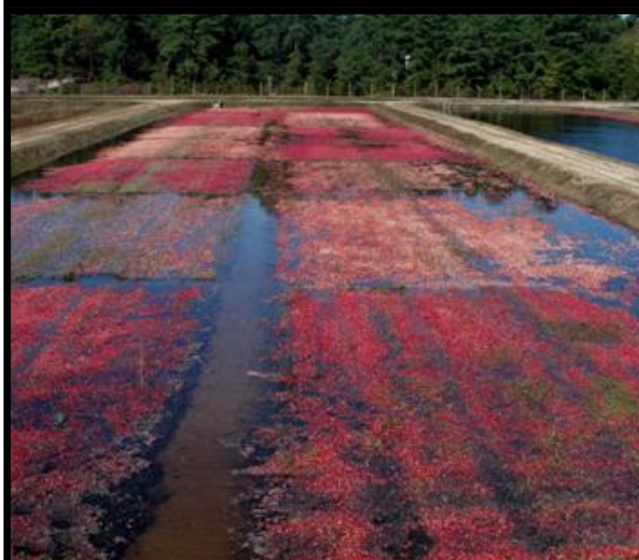
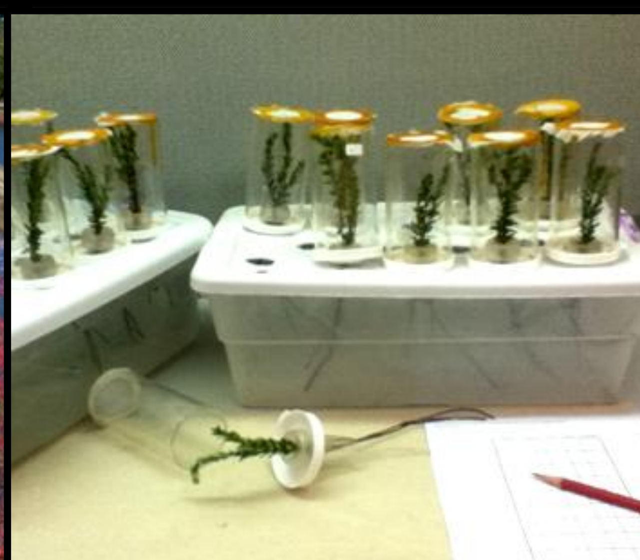
AMERICAN CRANBERRY GROWERS association

Rutgers University EcoComplex

Bordentown, NJ

Thursday
January 26, 2012

RUTGERS
New Jersey Agricultural Experiment Station

Presentation Summaries

ACGA Winter Meeting Program
Thursday, January 26, 2011

8:00-8:30 Registration and Coffee

8:30-8:40 Welcoming Remarks– **Shawn Cutts, President, ACGA**
Treasurer's Report **– Stephen Lee IV**

8:40-8:50 Grower Updates **– Bill Cutts & Stephen Lee III**

8:50-9:20 **Cranberry Disease Control and Use of GIS for Field Evaluation**
Peter Oudemans, Department of Plant Biology and Pathology, Rutgers University

9:20-9:40 **Cranberry flavonoids: from their role in the plant to benefits to human health**
Nicholi Vorsa, Jennifer Johnson-Cicalese, Ajay P. Singh, Department of Plant Biology and Pathology, Rutgers University

9:40-10:00 **Genotypic variation and irrigation effects on canopy temperature and photosynthesis of cranberry under heat stress**
Chenpig Xu, Jennifer Johnson-Cicalese, Nick Vorsa, and *Bingru Huang*, Department of Plant Biology and Pathology, Rutgers University

10:00-10:30 **Entomology Research in Cranberries: Fruitworms, Stink Bugs and more**
Cesar Rodriguez-Saona, Department of Entomology, Rutgers University

10:30-10:45 Break

10:45-11:00 **Update on Research funding for Marucci Center**
Joe Darlington, NJ Blueberry/Cranberry Research Council

11:00-11:20 **Colonization of cranberry by ericoid mycorrhizae**
James Polashock, Research Plant Pathologist, USDA-ARS

11:20-11:40 **Assessing the effectiveness of different bee species for cranberry pollination**
Daniel Cariveau and *Rachael Winfree*, Department of Entomology, Rutgers University

11:40-12:00 **Advances in Breeding for Fruit Rot Resistance: 2011 Progeny Evaluations**
Jennifer Johnson-Cicalese and *Nicholi Vorsa*, Department of Plant Biology and Pathology, Rutgers University

12:00-1:00 Lunch

1:00-1:20 **Status of the Southern Pine Beetle in 2011**
Jim Lashomb, Department of Entomology, Rutgers University

1:20-1:50 **Cranberry Minor Use Registrations - The CI, IR-4 and MRLs**

John Wilson, Cranberry Institute

1:50-2:20 **What are the real farm safety hazards on our farms?**
Ray Samulis, Burlington County Agricultural Agent, Rutgers University

2:20 **Adjournment**- *ACGA Board of Directors Meeting*

Understanding Variation in Yield Using Geographic Information Systems

Peter Oudemans and Marilyn Hughes

Rutgers University PE Marucci Center for Blueberry and Cranberry Research and Extension

Site specific agriculture is dependent on several components. At its heart are the collection, analysis and application of data for increasing agricultural efficiency. Our goal is to develop applications for detecting and mapping yield loss in cranberry beds. In this talk, I will examine the use of GIS for accurate acreage measurements. This measurement is critical for estimating yields accurately, for applying correct amounts of fertilizer and pesticides as well as more advanced analysis for investigating and detecting yield loss. Once yield is accurately estimated the trend of yield over time can be investigated. Cranberry yields vary significantly from one year to the next making it difficult to see trends. It is common for the industry to use four or five year running averages to examine these trends. In our work we utilize a normalization procedure followed by trend analysis to examine changes in bed performance. The results are plotted on a map showing beds with positive, negative or neutral slopes over a four year time frame. Integration of remote sensing imagery provides improved detail on areas of reduced crop. In 2011 we utilized data from Digital Globe's, WorldView-2. This new satellite, which was launched in October 2009, collects three near infrared bands as well as five visible bands. The data was analyzed by to examine the relationship of bed yield with canopy reflectivity at different bands. Results indicate that use of the "red edge" band gave increased sensitivity to yield variation. The maps created can be used to investigate the impact of different diseases, and cultural methods and some insects on yield variability.

Cranberry flavonoids: from their role in the plant to benefits to human health

Nicholi Vorsa, Jennifer Johnson-Cicalese, and Ajay P. Singh

Department of Plant Biology and Pathology, Rutgers University

Proanthocyanidin content in the cranberry ovary from flower to mature fruit

Proanthocyanidins of the American Cranberry (*Vaccinium macrocarpon*) fruit have received considerable attention for their potential benefits to human health. The role of proanthocyanidins in plants, however, is thought to be for protection, against disease, e.g., pathogenic fungi, as well as anti-herbivory activity. In New Jersey, cranberry fungal fruit rot is a major concern and growers routinely apply fungicides from approximately 10% bloom through early fruit development. Flower ovaries may not express disease symptoms, but are likely to be infected, and disease symptoms manifest later in fruit development and ripening. Previous study has indicated that proanthocyanidin content is higher earlier in fruit development. In the hope of increasing field fruit rot resistance, FFRR, the germplasm collection and breeding populations were screened for resistance (fungicide applications were discontinued). A number of germplasm accessions were identified as having some level of FFRR. The objective of this study was to determine both quantitative and qualitative proanthocyanidin composition in flower ovaries through fruit development in FFRR varieties compared to standard cultivars, and to determine if proanthocyanidin composition and content may play a role in FFRR. Proanthocyanidins were analyzed using LC-MS/MS (liquid chromatography with mass-spectrometry), and composition and quantity of polymers having degree-of-polymerization (DP) of DP-2 through DP-13 were determined. Proanthocyanidin content dramatically decreased at fruit set in all varieties. Compositional changes also occurred through the season. FFRR varieties and standard varieties exhibited similar profiles. Resistant varieties were found to have significantly higher levels of proanthocyanidins during fruit set and fruit development. Proanthocyanidins might play a role in reducing fruit rot.

Some recent reports from our laboratory of the effects of cranberry flavonoids relevant to human health

Cranberry proanthocyanidins induce cancer cell death and increase sensitivity to chemotherapeutic drugs - A paper published in the ***International Journal of Ontology*.**
Singh, A.P. Ajay P. Singh, T.S. Lange, K.K. Kim, L. Brard, T. Horan, R.G. Moore, N. Vorsa and R. K. Singh. **2012**. *Purified cranberry proanthocyanidins (PAC1-A) cause pro-apoptotic signaling, ROS generation, cyclophosphamide retention and cytotoxicity in high-risk neuroblastoma cells*. Int. J. Ontology 40(1):99-108.)

Proanthocyandin extracts (PAC-1A) from cranberry were found to selectively affect the viability of various neuroblastoma (NB) cancer cell lines. PAC-1A induced apoptosis (a process of self-induced programmed cell death resulting in the elimination of unwanted cells without causing harm in the surrounding area. Apoptosis is critical in maintaining health by eliminating old cells, unnecessary cells, and diseased cells). PAC-1A increased the sensitivity of cancer cells to chemotherapeutic agents (cyclophosphamide). PAC-1A has demonstrated chemotherapeutic potential to treat a broad spectrum of NBs including highly malignant tumors that show resistance to standard chemotherapeutics and apoptotic stimuli.

Molecular mechanisms were identified as to the molecular basis for why flavonoids, such as those found in cranberry, are beneficial to human coronary health. A paper published in PLoS ONE, an on-line scientific journal, reports on the underlying anti-atherogenic molecular mechanisms that cranberry flavonoids have (Shabrova E. V.,4, O. Tarnopolsky1, A. P. Singh, J. Plutzky, N. Vorsa, L. *Quadro (*2011*) Insights into the Molecular Mechanisms of the Anti-Atherogenic Actions of Flavonoids in Normal and Obese Mice* PLoS ONE 6(10): e24634. doi:10.1371/journal.pone.0024634)
We analyzed the effects of daily dietary supplementation with cranberry flavonoids in normal and obese mice compared to mice maintained on the same diets lacking cranberry flavonoids. Obese mice supplemented with cranberry flavonoids showed an amelioration of insulin resistance and plasma lipid profile, and a reduction of visceral fat mass. Non obese mice on a cranberry flavanoid supplemented diet had reduced plasma atherogenic cholesterol. We provided evidence that the adiponectin-AMPK pathway is the main mediator of the improvement of these metabolic disorders.

Genotypic variation and irrigation effects on canopy temperature and photosynthesis of cranberry under heat stress

Chenping Xu (Research Associate), Jennifer Johnson-Cicalese (Research Associate), Nick Vorsa (Professor), and Bingru Huang (Professor)

Department of Plant Biology and Pathology, Rutgers University

This report summarizes results from two experiments performed in 2011

Field study

Irrigation cooling experiment

On August 9th 2011, the canopy temperature increased to about 32°C. Five irrigation treatments were applied to the foliage from 13:00. 1) No irrigation; 2) Irrigation for 10 minutes every half an hour from 13:00-14:00; 3) Irrigation for 10 minutes every half an hour from 14:00-16:00; 4) irrigation for 5 minutes every half an hour from 14:00 – 16:00. The 10-minute irrigation from 13:00 to 14:00 decreased the leaf temperature quickly. The leaf temperature, monitored by infrared thermometer, decreased 30.8°C at 13:30 while the leaf temperature without irrigation was 32.2°C. The leaf temperature was reduced even at 14:30, but after 15:00 leaf temperature increased to the same level as leaf temperature without irrigation. The 10-minute irrigation from 14:00 to 16:00 also decreased the leaf temperature quickly. The leaf temperature decreased 31.8°C at 14:30 while the leaf temperature without irrigation was 33.6°C. The leaf temperature was always reduced by 16:00. The 5-minute irrigation from 13:00 to 16:00 only marginally decreased leaf temperature. The results suggest that 5-minute irrigation per half an hour might be not enough to reduce leaf temperature, and 10-minute irrigation per half an hour could reduce leaf temperature but leaf temperature will increase one hour after irrigation. Therefore, the 10-minute irrigation for long period was tested on August 26th. On that day, the air temperature was 30°C and leaf temperature was 31.3°C at 12:00, and increased to 34.8°C and 35.5°C at 13:00, respectively. The 10-minute irrigation per half an hour from 12:00 to 15:00 was applied to cranberry foliage. Both leaf and air temperatures were reduced during the period. For example, the leaf and air temperatures with irrigation were 34.3°C and 30°C, while without irrigation they were 36.7°C and 34°C, respectively. Also, with irrigation the photochemical efficiency was reduced at 14:00. The data suggest that 10-minute per half an hour irrigation from 12:00 to 16:00 is very efficient to reduce leaf temperature.

Comparing photosynthetic rate or heat tolerance between varieties

We determined hourly changes in photosynthetic rate of four varieties, Demoranville, Crimson Queen, Mullica Queen, and Stevens, from 10:00 to 17:00 on July 12th, 2011 in field plots at the Marucci Cranberry Research Center. Canopy temperature and leaf temperature was also monitored. On July 12th, the highest canopy temperature was about 35°C at 14:00 and 15:00, and the highest leaf temperature was 37.1°C. The photosynthetic rate declined in all varieties after 10:00 when the canopy temperature was 28.5°C. However, Stevens had the lowest photosynthetic rate from 12:00 to 17:00, while Demoranville and Crimson Queen had significantly higher photosynthetic rate than Stevens during most of the time.

Growth chamber study

In order to examine photosynthesis response to heat stress, plants were exposed to high temperatures in a growth chamber. Plants of four varieties, Demoranville, Crimson Queen, Mullica Queen, and Stevens, were maintained at 25°C for 3 days, then half of the plants were exposed to 35°C, while half of plants were kept at 25°C. The photosynthetic rate, chlorophyll content, maximum carboxylation rate of Rubisco (Vmax), and maximum electron transport rate (Jmax), were determined every 5 days.

Under 25°C, the photosynthetic rate and chlorophyll content did not change as after 5 days in all varieties, while Jmax and Vmax slightly decreased at 10 days of treatment. The photosynthetic rate, Jmax, and Vmax decreased in all varieties under 35°C, while the chlorophyll content increased slightly in all varieties. Under heat stress, Stevens had the lowest photosynthetic rate especially at 5 days of the treatment, and lowest values of Jmax and Vmax, while Demoranville had the lowest chlorophyll content.

In summary, the results indicate that in the field 10-minute irrigation per half an hour from 12:00 to 16:00 is very efficient to reduce air and leaf temperature, Stevens had the lowest photosynthetic rate during hot time, while Demoranville and Crimson Queen had significantly higher photosynthetic rate than Stevens. Study in growth chamber suggests that low photosynthetic rate of Stevens under heat stress might result from low maximum Rubisco carboxylation rate and rate of ribulose 1,5-bisphosphate regeneration mediated by electron transport.

Entomology Research in Cranberries: Fruitworms, Stink Bugs and more

Cesar Rodriguez-Saona, Vera Kyryczenko-Roth, and Robert Holdcraft

Department of Entomology, Rutgers University

Within the last few years three new reduced-risk insecticides, Assail, Delegate, and Rimon, have been registered for use in cranberries. One more reduced-risk insecticide became registered this year (Altacor), and another insecticide with similar chemistry is expected registration soon. Adoption of these new insecticides among NJ cranberry growers will require testing their toxicity against major cranberry pests. *Sparganothis* fruitworm is considered a key direct insect pest of cranberries in NJ. This insect has two generations per year. It overwinters as a 1st-instar larva. The 1st generation larvae feed on foliage during the spring and develop into adults by late spring. The adults fly from late spring to mid-summer. The 2nd generation larvae cause most of the crop damage. These larvae hatch in late June or early July and burrow into the developing fruit. Studies were conducted to evaluate toxicity of Assail, Delegate, Rimon, Altacor, and other insecticides against *Sparganothis* fruitworm to increase adoption of these reduced-risk insecticides among NJ cranberry growers.

The brown marmorated stink bug (BMSB) is an invasive insect pest native to Asia. It was first identified in the US in 2001 from specimens collected in Allentown, PA. Large populations are now established in several states (mainly in the northeast US), including NJ, PA, DE, MD, WV, and VA. BMSB is a polyphagous insect of many crops including apples, plums, peaches, pears, pecans, cherries, bell peppers, tomatoes, raspberries, blueberries, grapes, among others. <u>So far cranberries have not been reported as a host</u>.

Research objectives:

1. Compare the insecticidal toxicity of Assail, Delegate, Rimon, Intrepid, Altacor, and other insecticides on *Sparganothis* fruitworm eggs, larvae, and adults.
2. Assess the survival of nymphs and adults of BMSB on cranberries.

Approach: Semi-field and laboratory experiments were conducted to determine the activity of insecticides with different modes of action on various life-stages (eggs, larvae, and adults) of

Sparganothis fruitworm. Foliar applications of Lorsban, Assail, Delegate, Intrepid, Rimon, Altacor, and an unregistered insecticide were applied to small (4-by-4 feet) cranberry plots. Residual toxicity of these insecticides was evaluated by placing neonates and 3^{rd} instars *Sparganothis* fruitworm on field-weathered foliage residues collected 3, 7, 14, and 21 days after treatment.

In addition, studies were conducted to determine toxicity of insecticides against *Sparganothis* fruitworm eggs, larvae, and adults, in laboratory bioassays. Petri dishes with eggs or adults and diet cups with larvae were treated with the different insecticides. Mortality of eggs, larvae and moths was assessed.

Laboratory experiments were also conducted to determine the survival of BMSB nymphs on cranberries. Fruit was collected in July from cranberry beds located at the Rutgers Marucci Center. Five uprights were inserted in florists' water picks, enclosed in a ventilated 40-dram plastic vial, and secured in Styrofoam trays. Two to three 2^{nd} or 3^{rd} instar nymphs were placed individually in each vial. Plants and insects were placed in the laboratory at 25°C. Mortality was assessed every 2-3 days for 2 weeks.

Results from these studies will be presented and discussed.

Colonization of cranberry by ericoid mycorrhizae

J.J. Polashock, USDA-ARS

P.V. Oudemans, S. Zhao, N. Zhang, Rutgers University

J.P. Harris, University of Delaware

Mycorrhizae are fungi that colonize the roots of plants, forming a symbiotic relationship. The association is usually mutualistic, where both organisms benefit from the interaction.

Mycorrhizae can benefit the plant by:

- Increasing drought tolerance
- Facilitating nutrient uptake
- Enhancing disease resistance
- Deterring herbivores

Cranberries are expected to harbor ericoid mycorrhizae (a type of mycorrhiza associated with members of the *Ericales*). Ericoid mycorrhizae are sometimes credited with the success of ericaceous plants, primarily because they allow growth in edaphically stressful environments. Although ericoid mycorrhizae are well known, there have been few studies examining the species present in cultivated cranberry. The primary species reported to colonize *Vaccinium* spp. is *Rhizoscyphus ericae.* In controlled studies, this species was reported to increase nitrate flux in cranberry.

Our Objectives were to:

- Survey cultivated and wild cranberries for the presence of mycorrhizae
- Isolate and characterize any mycorrhizae present

- Develop molecular probes for the most common species isolated to facilitate rapid screening

We determined that at least two species are present on cranberry in New Jersey. The most common species was *Oidiodendron maius*, but we also isolated *Rhizoscyphus ericae.* Presence of both species was confirmed using a newly-developed TaqMan real time PCR assay. The mycorrhizae were not limited to wild cranberries, and rooted cuttings grown under high nitrogen conditions were also found to be infected. Impact (potential benefit) studies will be problematic since it is difficult to maintain mycorrhizae-free plants. Although certain fungal strains may be more beneficial to the plants than others, field-level manipulation of the mycorrhizal community may be intractable.

Assessing the effectiveness of different bee species for cranberry pollination

Daniel Cariveau and Rachael Winfree

Department of Entomology, Rutgers University, New Brunswick, NJ

Honey bees and wild bees deliver pollen to cranberry flowers thus ensuring fruit production in cranberry. While over 55 species of bee are known to visit cranberry, little is known about the effectiveness of these bees for pollination. We conducted a three-year study to assess the relative contributions of the main bee species that visit cranberry in New Jersey.

The effectiveness of a given bee species for pollination is a combination of the abundance of that species and the average number of pollen tetrads it deposits during a single visit. In 2009 and 2010 we collected and observed bees visiting cranberry flowers at 32 different bogs. We found that honey bees provided an average of 75% of visits to cranberry flowers while wild bumblebees provided 16% and other wild bees provided 9%. In 2010 and 2011 we measured the number of pollen tetrads deposited in one visit to a cranberry flower for the main bee species observed on cranberry. We found that honey bees deposited an average of 3.4 pollen tetrads per visit while wild bees (including bumble bees) delivered an average of 6.4. The most effective wild bees were leaf-cutter bees (*Megachile* and *Osmia* species: on average of 9.2 pollen tetrads per visit) and bumblebees (*Bombus* species: on average 7.4 pollen tetrads per visit). Using these measures, we estimated that honey bees provided on average, across all farms in the study, 64% of the total pollination delivered to cranberry flowers. Wild bumblebees and other wild bees delivered 27% and 9%, respectively. These results suggests that while honey bees are the primary pollinators of cranberry, wild bees, and especially bumblebee are also important and their contribution is greater than what would be predicted by their abundance alone.

Advances in Breeding for Fruit Rot Resistance: 2011 Progeny Evaluations

Jennifer Johnson-Cicalese and Nicholi Vorsa
P.E. Marucci Center for Blueberry & Cranberry Research & Extension,
Rutgers University, Chatsworth, NJ

Recent germplasm evaluations have identified multiple sources of resistance to cranberry fruit rot, a serious disease complex caused by fungi from at least 12 genera. These field fruit rot resistant (FFRR) accessions have now been used in over 130 crosses. Progeny from initial crosses were evaluated in 2005-2007. Fungicides were withheld to increase disease pressure and the 2.25m^2 plots were rated for fruit rot (1-5 scale, 5=nearly 100% rotten fruit). Families with a resistant parent had a higher frequency of resistant progeny, indicating potential for improving resistance through breeding. In 2007, disease pressure was so severe that of the 1644 plots evaluated from 30 crosses (just 4 of these crosses had a resistant parent), 1085 plots had a rating of '5', while only 13 plots had a rating of '2'.

In 2009, 1624 progeny, from 50 crosses amongst resistant material, were planted in field plots, with each family replicated twice. These crosses were of significantly different composition than the initial crosses; they included parents with the greatest FFRR (US88-30, US88-79, US89-3, US94-176), and crosses where both parents were resistant. In 2011, the final two fungicide applications were withheld from this planting and disease pressure was severe enough to screen for FFRR. Significant differences were found between families, and within families, in fruit rot ratings and rotten fruit counts. Moderately high heritability estimates were obtained with offspring-midparent regression (R^2=0.52), indicating additive genetic variance. In addition, introgression of FFRR into higher yielding genetic background was accomplished. For example, CNJ05-73-39 (US88-30 x Crimson Queen) exhibited high FFRR, along with good berry size (2.1g/berry), color, and yield (>600b/A est.). However, a few resistant progeny also originated from susceptible parents, suggesting that susceptible plants can carry alleles for resistance, and that multiple loci are involved in resistance.

An additional 600 progeny were planted in 2010 for genetic studies of resistance, including selfs of resistant material, and resistant x highly inbred cranberry lines. These will be evaluated as soon as they are established. A genetic map of cranberry has provided SSR genetic markers. We are mapping these markers in families segregating for FFRR to identify genomic regions (QTLs) associated with resistance, and facilitate future progeny screening. Replicated trials of FFRR material have also been planted in Washington and Wisconsin to evaluate performance and resistance to fruit rot. Our ultimate objective is to develop high-yielding cranberry varieties with increased levels of fruit rot resistance.

Status of the Southern Pine Beetle in 2011

Jim Lashomb

Department of Entomology, Rutgers University

The recent outbreak in NJ's Pine Barrens, with Southern Pine Beetle now also attacking Pitch Pine along with expected hosts, possible controls, monitoring efforts, timber stand improvement techniques; pest biology and lifecycle, and historical losses and treatments in the southern US will be presented. Comments on Ips and ambrosia beetles will made as well.

ACGA Winter Meeting Program
Thursday, January 26, 2011

Cranberry Minor Use Registration – The CI, IR-4 and MRLs
John Wilson, Cranberry Institute

Background - In the early 1990s, the Cranberry Institute began taking on the task of getting newer and safer chemicals approved for use on cranberries. The process involves coordinating university extension researchers, the IR-4 Project (IR-4) and chemical companies; integrating all of this into a continuously moving regulatory process. It can take 5 years for a chemical to move from experimental trials in the field to receiving a final label. The CI's objective is to keep evaluating new products while at the same time, proven products are run through the IR-4 system and finally submitted to EPA for approval.

A couple of years ago, a new phase of this process was added: obtaining MRLs. MRL or Maximum Residue Level is the amount of a pesticide residue allowed in another country or market. With 25% of the US cranberries going to foreign markets, pursuing international MRLs has become a top priority. For example, when EPA sets a tolerance level, for say Altacor®, then the European Union (EU) has to set a similar residue level before Altacor treated fruit can be sold in that market. An approved MRL must exist for Altacor before it can be sold; any fruit found with Altacor without an MRL is in violation of that market's pesticide laws.

The Cranberry Marketing Committee (CMC) since 2002 has been pursing foreign markets and working to obtain MRLs on the older more established chemicals. To do this, the CMC uses the services of an international marketing firm (Bryant Christie Inc.) that travels to priority markets to work with their regulatory agencies. With each country having their own pesticide residue approval process and schedule, it makes sense to have a group knowledgeable of each country's local rules and customs for approving MRLs. In the last 2 years, the CI has been joining forces with the CMC with a goal that newly registered chemicals will have MRLs in place to enable some fruit to be sold internationally.

Finding new products - When a new chemical has been field tested and ready for EPA approval, residue tests need to be conducted according to specific EPA standards. Either the chemical company can do those tests or the IR-4 Project at Rutgers University. IR-4 is funded by grants from USDA and has established a world-class team to help get chemicals approved on minor crops. IR-4 has become a model for similar registration systems in other countries. For the most part, the cranberry industry relies on IR-4 to do the residue testing and EPA submissions.

In the last 5 years, there has been an effort by both the US and Canada to improve the regulatory process so that a new product can receive simultaneous approval in both countries. In the past, a new product may get registered in the US three years or more before it is approved in Canada. Today, the US EPA and the Canadian Pest Management Center coordinate the residue testing and joint submission to their respective agencies. This has been an evolving process that continues to improve. Examples of joint US/Canadian cranberry projects include Callisto, Delegate and Altacor. In addition, there are at least 2 new materials in the works.

Results - Since 2006, there have been 19 new chemicals approved for use in the US and 6 new ones in Canada. In addition to these, another 5 new materials are at various stages of testing and regulatory review.

Obtaining MRLs - Today the registration process does not end with the approval of a new chemical in the US or Canada, but continues with getting international MRLs. To manage the industry's marketing appetite for MRLs, a joint CI/CMC group called the MRL Subcommittee (SC) was formed and meets quarterly. The group currently tracks the MRLs for 29 priority chemicals in 9 priority countries or markets. Participants to the MRL SC include a broad base of handlers, researchers and grower associations.

The MRL SC is making progress with MRLs in spite of several obstacles. The most frustrating issue is different markets can have different MRLs. For example, consider the older material Sevin (carbaryl): it has a tolerance of 3 ppm in the US and it has six different MRLs in 7 different markets, ranging from 0.05 ppm (EU) to 10 ppm (Canada). The objective is to harmonize MRLs; that is, to have a country's MRL equal or exceed the US tolerance. Abound (azoxystrobin) is an example of a harmonized compound with MRLs in seven markets equal to or exceeding the 0.5 ppm US tolerance.

Please note that fruit treated with a pesticide that is labeled for use on cranberries in the US does not need any MRLs if that fruit is marketed within the US. Only fruit going overseas requires notice of specific market MRLs. Also, a MRL less than the US tolerance does not automatically make this an export problem for handlers. If the MRL is less than the US tolerance and the chemical poses a residue concern (based on the sampling of incoming deliveries), a handler may impose pesticide restrictions on their growers. The market-to-market MRL variations are not just problematic to cranberries, but to all commodities sold overseas. As a result, there are a few new international initiatives being tested that are intended to reduce MRL variations that come from non-harmonization.

MRL Results - What kind of progress have we made? Growers already know that some handlers have already imposed restrictions if growers use certain chemicals. The MRL SC considers these chemicals as a top priority when it comes to getting a foreign market MRLs. In 2011, the industry obtained 4 new MRLs in Canada; 4 new MRLs in the EU and 5 new Codex MRLs; 8 new MRLs in Australia; 10 new MRLs in Taiwan; 4 new MRLs in Japan. In addition, there are another 14 MRLs pending in Australia, Taiwan and Japan.

Progress is being made to not only find new and safer chemicals growers can use to control cranberry pests, but to also make sure that the fruit can be sold to markets outside the US.

WHAT ARE THE REAL FARM SAFETY HAZARDS ON OUR FARMS?

Ray Samulis
Burlington County Agricultural Agent
2 Academy Drive
Westampton, NJ 08060-3826

The advent of modern pest control technology really came into vogue after World War II; however the start of this technology goes much farther back into the 19th century. Man has always had challenges dealing with producing food and protecting it from the ravages of insects, diseases, weeds and many other perils that affect our food supply. In the 1850's David Pettit, a farmer from Salem County, New Jersey made the statement "….." What he was describing was late blight of potato, a disease that changed the course of history and resulted in worldwide immigration from Ireland and other countries. Early farm publications were touting educational meetings "as good as money!" as early as 1900, despite not understanding the basis for many agriculture pest problems. Early pest control focused on application technology that utilized dusts that were applied at heavy rates and resulted in considerable off site deposition of the materials. Today's technology of course focuses on spray applications that are more controllable and effective in dealing with and controlling various pests. Hazards of pest control in those days were both real and abundant in Agriculture.

After World War II, great advances were made in developing newer, more effective spray materials. Safety standards for pesticide usage came in later years as various problems arose and training of applicators was instituted at both a state and national level. One situation that can cause contamination problems is when pesticide storage is near food eating areas. Workers should be made aware that even pesticide vapors can cause problems and that frequent hand washing is critical in order to protect their own health as well as preventing unwanted residues. Sometimes cross contamination not only occurs with human hands and food but also can occur between various other pesticides. Volatile pesticides such as 2,4 D can impregnate other materials and cause problems because even small amounts of residue can damage highly sensitive plants. Spill isolation of pesticides is another area of concern. If storage is large in size and contains many gallons of liquid pesticides, some type of containment system should be incorporated into the storage design. On the other hand, if only a few gallons on small containers are involved a simple aluminum pan and some kitty litter might be all that is needed to stabilize a small, less than1 gallon leak or spill.

Choosing the right respirator is something that should be given consideration in order to give you, the applicator, adequate protection. It is easy to assume that a respirator is a respirator and they are all about the same. This however is not true. Be sure you are buying a respirator that is designed and designated for volatile vapors/pesticides. I sometimes see farmers wearing simple dust masks as protection but these are woefully inadequate for the intended task. A pesticide respirator cartridge does list a use by date much like perishable foods. You should use the mask within the certified dates to get the maximum protection out of them. A pesticide respirator is only as good as its fit. We all have different shaped faces, heads etc so therefore it is important to test the fit of your respirator to see that it works properly. Place the mask over your face and breathe out slowly. If there is air rushing between your mask and face, the seal is not good and must be adjusted to for your face. Safety supply companies sell a substance called "banana oil" which is a material that you can smell even at low levels. By following the edge of your respirator with the oil capsule as you breathe in and out you will be alerted by smell to even a very small problem with the fit of your mask.

Modern agriculture uses many pieces of equipment that are powered by relatively high amounts of horse power. The most common method to power other pieces of farm equipment is of course the PTO unit. PTO units actually convert power (movement) into torque (spinning motion) to make things work. The problem is that there is no human being no matter how strong they are that is a match for the power released from these types of mechanisms. PTO accidents can occur within a 1/10 of a second, so before you know what is happening to you the accident / entanglement has occurred. Actually one of the best case scenarios from a PTO accident is to have all of your clothing ripped off your body. Embarrassment is not pleasant however it is much better than death or permanent, lifelong injuries. Studies have shown us that PTO accidents occur for a lot of reasons but that three reasons are most often to blame. First, farmers work long hard, hours and as a result fatigue is on of the prime causes of accidents. Second, because there are so many things to do on the farm being in a hurry is another prime cause of farm accidents. Third, the new Jersey farm population is getting older which slows the reaction time. Some farmers have a fatalistic attitude and more or less accept accidents as "the price of doing business". I feel that this is a very misguided attitude and there are many things we can do to at least lower the number of accidents. Here are some of my suggestions:

1) Always shutoff the tractor and equipment when dismounting to explore a problem
2) Be sure all decals and shields are in their proper place. Just because you have done something a million times does not mean it is safe!
3) No loose fitting clothing or hair. Secure if necessary.
4) Make sure shoe laces are tied. Taught to kids but still a problem with PTO entanglements
5) Walk around equipment and DO NOT step over PTO shaft whether engaged or not!
6) No extra riders or bystanders on tractors when you are working with equipment.

Equipment on farms seems to be an obvious source of danger on our farms. But there are many other less obvious hazards we can over look. For example, a hazard from water on farms is the second leading cause of death on Pennsylvania farms. A full 18% of farm deaths are from drowning. I have even been involved in a farm pond drowning incident where horses were involved which caused the farmer unneeded problems. A tractor roll over is still another potential problem on farms even in New Jersey where we are flat. In demonstrations I have done, a simple 3" log is all that is needed to roll a tractor where there is a short front wheel base. We have many of these type tractors still in use today on fruit and vegetable farms here in New Jersey. A pile of grain or fertilizer may seem picturesque however they can de deadly if you are sucked into a vortex that can occur when these materials are augered from the bottom of the piles.

Hazards on farms do not always have to be equipment related. With today's emphasis on food safety geese and other wildlife can are considered a hazard. E coli contamination in recent times has caused considerable economic loss as well as deadly health issues. Food safety audits are becoming the norm and are sure to accelerate in the next few years. Something as simple as poison ivy, a plant on all our farms, can be a potential hazard. I personally know two farmers who were sued when customers came in contact with poison ivy on their farms. The farmers lost the suits even though the PYO customers wandered into parts of the farm they were not supposed to be. Forklifts are still another accident prone area on farms. Lifting heavy loads of produce, cranberries, or any other commodities high in the air can cause significant changes in the pivotal balance point where the tractor can flip from front to back as was the case with one cranberry grower.

Farm accidents occur and unfortunately are a fact of life in agriculture which results in giving agriculture the distinction of being one of the most dangerous occupations along with fishing and mining. After a farm accident, everything changes except for the desire of the farmer to continue farming. Many surveys have shown this outcome. Last year I negotiated a grant to have New Jersey farmers participate in a program called AgrAbility. To put it simply, AgrAbility's goal is to keep farmers with disabilities farming. Between 15-25% of all farmers have some type of disability that prevents them from performing their farming duties as efficiently as possible. One example is a cranberry grower I work with who is older and has a hard time getting around the farm. On the other hand he is still is the most knowledgeable person on the farm when it come to the equipment, how it is used, and to how to fix it. What we will do is obtain a piece of equipment called a Ventrac which will enable him to freely move around the farm on his own accord. He can try it for a while and then can decide if he wants to buy one of his own. A few years back we were able to get a paralyzed farmer a chair lift that he could get on and off his tractor by himself and maintain some independence. The possibilities are endless on what this program can do to keep farmers farming. AgrAbility deals with all type of disabilities even those which some farmers feel are minor such as hearing loss, back problems etc. I would encourage any farmer who would like to hear more about the program to give me a call at (609) 265-5050 and I will to my best to make the program work for you.

Farm accidents are unfortunately all too common. The list I am showing you are all farmers in our New Jersey Ag community that have died from farm accidents. I know all of them and I will bet that there is no one in this room who does not know at least one of them. The sad situation is that this slide is usually out of date because these accidents occur frequently. Let us all work to loose our distinction of being the most dangerous occupation in the world!

RUTGERS
New Jersey Agricultural
Experiment Station

PLANT & PEST ADVISORY

a seasonal management newsletter available in four editions:

⬩ Vegetable Crops (weekly) ⬩ Fruit (weekly)
⬩ Landscape, Nursery & Turf (biweekly)
⬩ Cranberry (biweekly)

2012 Season

- ✔ **Stay informed of insect and disease advisories**
- ✔ **Get the latest information on your crop and region**
- ✔ **Reduce costs through IPM and more effective use of pesticides**
- ✔ **Learn effective cultural practices and the latest results of New Jersey crop research**
- ✔ **Improve storage/handling procedures. Learn new marketing techniques and opportunities**
- ✔ **Be informed of upcoming meetings, seminars and trainings**

The Plant & Pest Advisory is a cooperative effort between New Jersey county agents, research specialists, growers, landscapers and the agricultural services industry. This publication provides you with the most timely information on your growing problems and IPM needs.

RUTGERS
New Jersey Agricultural
Experiment Station
Plant & Pest Advisory
SEBS Office of Communications
Rutgers, The State University of New Jersey
57 US Hwy. 1 South
New Brunswick, N.J. 08901-8554

What's the Plant & Pest Advisory worth to your operation?
Here's what readers have to say:
(responses from Plant & Pest Advisory Reader Survey)

"This advisory with weekly IPM scouting has saved us thousands of dollars."

"It often helps lick the problem on the onset, making a much more marketable product."

"IPM practices have reduced pesticide costs 20 – 25%."

"We use a lot more horticultural oils vs. higher costing insecticides."

"Saving of time spent researching pest and application needed or not."

"We're saving customer's plants from destruction thus saving them replacement costs and saving our reputation."

"Through suggested timing of insect and fungus monitoring we are able to better manage our nursery."

"Less spraying and timely spraying equals thousands of dollars saved."

"Knowing what varieties to use and what varieties to stay away from."

"Reduced usage by $3000, Increased crop production $8000, Reduced fertilizer input $1000."

"By getting timely information I knew early what to look for. When it's easier and cheaper to control – this could add up to over $100,000 in lower costs and crops saved."

For back issues of the Plant & Pest Advisory visit our web site at:
http://njaes.rutgers.edu/pubs/plantandpestadvisory.

PLEASE FILL OUT SECTIONS BELOW:

1 I'd like to receive the newsletter starting early Spring 2012:
____ by mail ____ by e-mail (same day)

2 CHECK WHICH EDITION(S) :

		mail	e-mail
___	Landscape, Nursery & Turf (16 issues)	$32	$20
___	Vegetable Crops (29 issues)	$58	$36
___	Fruit (33 issues)	$66	$40
___	Cranberry (10 issues)	$20	$13

TOTAL ENCLOSED $______

3 BUSINESS NAME ________________

TO WHOSE ATTENTION ________________
FIRST NAME LAST NAME

ADDRESS ________________

CITY, STATE, ZIP ________________

BILLING ADDRESS (IF DIFFERENT FROM ABOVE) ________________

COUNTY ________ PHONE (   ) ________

E-MAIL ADDRESS ________________
(FOR E-MAIL SUBSCRIPTIONS) PLEASE PRINT CLEARLY

4 PAYMENT - CREDIT CARD

NAME ON CARD ________________

TYPE OF CARD: MASTER CARD VISA DISCOVER

CREDIT CARD # ________________

EXP. DATE ________ 3 DIGIT SECURITY CODE ________ (ON BACK OF CARD)

SIGNATURE ________________

5 PAYMENT - CHECK PAYABLE TO: Rutgers, The State University of NJ

MAIL PAYMENT TO:
Rutgers Snyder Research & Extension Farm
Plant & Pest Advisory
140 Locust Grove Road
Pittstown, NJ 08867

FOR OFFICE USE