2012 Annual Summer Meeting of the American Cranberry Growers Association

Rutgers University
Marucci Center

Chatsworth, NJ

Thursday
August 16, 2012

RUTGERS
New Jersey Agricultural Experiment Station

American Cranberry Growers Association
2012 Summer Field Day
Thursday August 16, 2012
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 20)**

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

8:40–9:00 **Leaf drop and early fruit rot control during the establishment of cranberry plantings (Bog 20)**
Peter Oudemans, Department of Plant Biology and Pathology, Rutgers University

9:00–9:20 **Ongoing research and insecticide trials for cranberry pests (Bog 19)**
Cesar Rodriguez-Saona, Shawn Steffan, Vera Kyryczenko-Roth, and Robert Holdcraft, Department of Entomology, Rutgers University

9:20–9:40 **Mycorrhizae inoculation to promote early bed establishment (Bog 11)**
James Polashock, Research Plant Pathologist, USDA-ARS

9:40–10:00 **Irrigation cooling effects on cranberry growth during summer stress (Bog 7)**
Patrick Burgess, Bingru Huang, Jennifer Johnson-Cicalese, and Nick Vorsa, Department of Plant Biology and Pathology, Rutgers University

10:00-10:20 **Remote Sensing and Automation: Where we have been and what lies ahead (Bog 2)**
Kevin Connolly, president, KC Enterprises Ltd.

10:20-10:40 **Progeny Evaluations for Field Fruit Rot Resistance in Cranberry (Lower Bog)**
Jennifer Johnson-Cicalese, Nicholi Vorsa, Karen Destefano, and Susan Vancho, P.E. Marucci Center for Blueberry & Cranberry Research & Extension, Rutgers University, Chatsworth, NJ

CONFERENCE ROOM:

11:00–11:10 **2012 Cranberry statistics – An update**
John Gibbons, USDA, NASS

11:10–11:30 **In Season Herbicide Applications for Weed Control in Cranberries**
Brad Majek, Department of Plant Biology and Pathology, Rutgers University

11:30–11:50 **Status of Honey Bees in New Jersey**
Grant Stiles, NJ Beekeepers Association

11:50–12:15 **Southern pine beetle kills New Jersey pines: are your trees next?**
Mark Vodak, Department of Ecology, Evolution & Natural Resources, Rutgers University

12:15–12:30 **Footprinting, A new disease in cranberries**
Jocelyn Wardlaw and Peter Oudemans, Department of Plant Biology and Pathology, Rutgers University

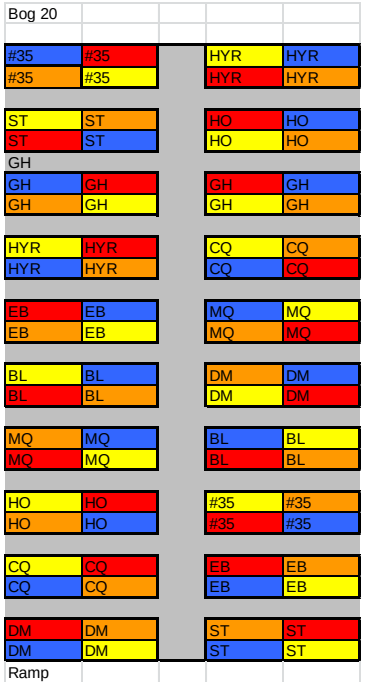
12:30–1:30 **LUNCH** (Pole Barn)

1:30–2:00 **Pesticide Applicator Safety (Pole Barn)**
Ray Samulis, Cooperative Extension Agent, Burlington County Extension, Rutgers University

Disease control in bed establishment

Peter Oudemans, Chris Constantelos, Timothy Waller, Jocelyn Wardlaw

Objective: To examine establishment of 10 cultivars using different fungicide regimes
Rationale: Distinct differences in growth rate using the new generation of fungicides has been noticed. There is no data on resistance to Phyllosticta leaf drop.
Approach: Beds were planted using rooted cuttings in the fall of 2010. All plots were fertilized equally. Fungicide treatments were applied on June 15, 2011, July 18, 2011, June 15, 2012 and July 15, 2012. Plots were evaluated on July 26, 2011, and July 26, 2012.



Cultivar	% Cover 2011		% Cover 2012	
GH	34.0	A	52.2	A
DM	32.2	AB	39.1	AB
ST	31.8	AB	41.3	A
EB	31.2	AB	46.5	A
MQ	28.7	AB	38.1	AB
HO	27.3	B	34.7	C
CQ	26.3	B	36.9	BC
#35	26.2	B	39.7	AB
BL	25.9	B	35.9	C

Treatment	% Cover 2011		% Cover 2012	
Indar/Abound	30.9	A	48.5	A
Indar/Abound/Phytophthora	30.5	AB	52.9	A
Untreated control	26.9	B	29.5	B
Bravo/Dithane	26.9	B	30.5	B

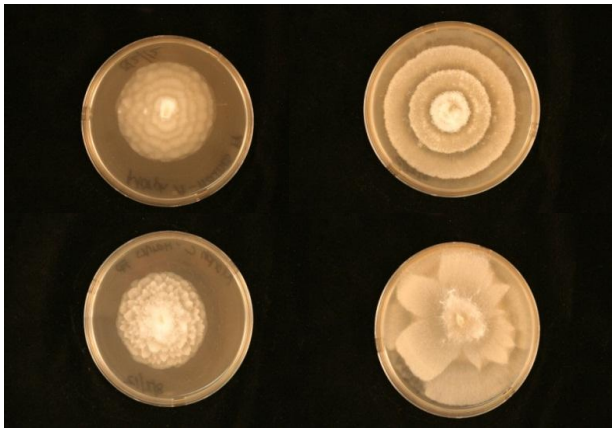
In 2011 only small differences in the growth of cultivars and treatments were recorded. In 2012 the plots had become better established and leaf drop has had a pronounced effect on certain varieties such as Ben Lear and Howes. The results clearly demonstrate the impact of the newer chemistries on leaf drop control. This project will continue for three more seasons. We will investigate the impact of different fungicide regimes and cultivars on the establishment of canopy and the onset and development of yield.

Funding for this study provided by the Cranberry Research Council.

Footprint Disease: A New Disease on Cranberry Plants

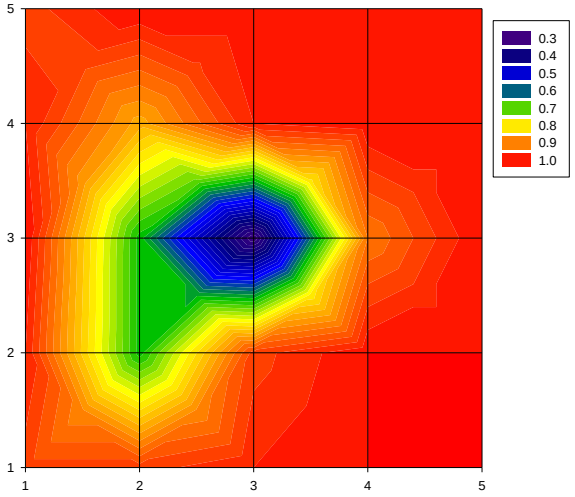
Jocelyn Wardlaw, Peter Oudemans, Chris Constantelos

Objective: To establish the identity and lifecycle of the causal agent(s) of Footprint Disease to develop better control and preventative methods
Rationale: The disease is increasing in frequency on high producing beds.
Approach: A single bed was identified as having the disease and research to identify the pathogen is underway. Several methods are being used to isolate the pathogen.

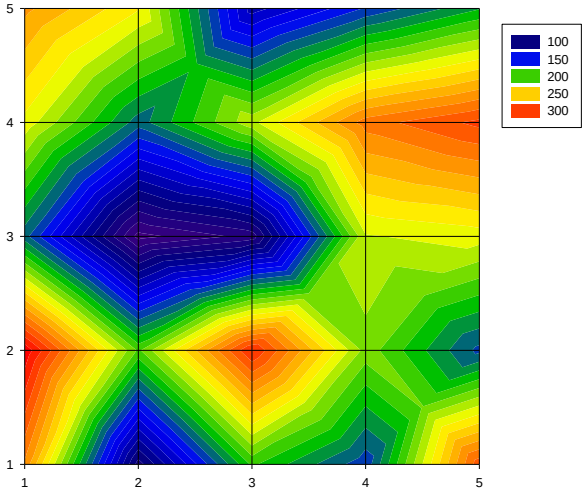


Several distinct colony types were isolated from symptomatic tissues using trapping and direct plating methods. These were tested for pathogenicity and non-pathogenic isolates were discarded. The remainder are being identified and retested in greenhouse trials.

Symptoms Foot Print 3b



Berries/sq.ft.



The impact of footprint exceeds the area of symptomatic growth as shown in this example. The chart on the left shows the proportion of healthy vines (dark blue is 30% healthy) whereas the graph on the right shows the number of healthy berries/ft2. Thus the impact of footprinting exceeds the area of symptomatic vines.

Funding for this study provided in part by FMC Inc.

ONGOING RESEARCH AND INSECTICIDE TRIALS FOR CRANBERRY PESTS

Cesar Rodriguez-Saona, Shawn Steffan[1], Vera Kyryczenko-Roth, and Robert Holdcraft

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

[1]USDA-ARS Vegetable Crops Research Unit, Madison, WI 53706

OBJECTIVES

1. Evaluate insecticidal activity of new insecticides against key cranberry pests in New Jersey.
2. Determine the best timing for insecticide applications

PRE-BLOOM CONTROL OF SPOTTED FIREWORM IN CRANBERRIES, 2012 FIELD TRIAL.

A study was conducted to evaluate the efficacy of a pre-bloom application of Altacor and Intrepid for spotted fireworm larval control in cranberries. Altacor is a new insecticide recently registered in cranberries for the control of various lepidopteran pests. The study was conducted in a commercial cranberry farm. Both Altacor and Intrepid showed good control against spotted fireworm. These insecticides have different mode of action and can be rotated to minimize onset of resistant populations.

RESIDUAL TOXICITY OF NEW INSECTICIDES IN THE FIELD EMPLOYING FOLIAGE BIOASSAYS IN THE LABORATORY.

This experiment tested the efficacy of Assail, Delegate, Rimon, Intrepid, Altacor, Avaunt, compound X, and Lorsban in controlling spotted fireworm larvae in cranberries. The experiment was conducted in a cranberry cv. 'Early Black' field located at the Rutgers PE Marucci Center for Blueberry and Cranberry Research and Extension in Chatsworth, New Jersey. Plots were 60 x 60 cm each, replicated 10 times. Each plot was separated by a 15 cm buffer zone. Applications were made with R&D CO_2 backpack sprayer, using a 1-liter plastic bottle. The sprayer was calibrated to deliver 50 gal of vol per acre at 30 psi, using a single T-jet VS 110015 nozzle, yielding 17.4 ml per plot. Insecticide-treated uprights were inserted in florists' water picks, enclosed in a ventilated 40-dram plastic vial, and secured on Styrofoam trays (as shown in picture). For assays with 1st instars, 8–10 vials each containing 1–3 larvae were setup for each treatment.

Each vial was considered a replicate. For 3rd instars, 5–10 vials each containing one larva were setup for each treatment. Spotted fireworm larvae used in assays were from a colony kept at the Rutgers PE Marucci Center. Plants and insects were then placed in the laboratory at ~25°C, on a 15:9 L:D cycle. Mortality was assessed at 7 days after setup. Results from these experiments will be presented in upcoming meetings.

PROGRESS TOWARDS A DEGREE-DAY MODEL FOR *SPARGANOTHIS* FRUITWORM TO TIME INSECTICIDE APPLICATIONS.

The cranberry plant and its associated arthropods generally disregard calendars and almanacs. Since plants and arthropods can only develop as fast as current temperatures allow, their developmental status is best measured by keeping track of heat units. Such units are often referred to as "degree-days," and they combine temperature (degrees above a threshold) and time (days). Keeping a running total of degree-days (DDs) provides an objective measurement of the organism's growth (i.e., its "physiological age" rather than its time-based age). With a DD running total, we can link this number to observed development in the field (eggs hatching, adult flights). After years of observation, we can assess the development of field populations by keeping track of daily weather. Having such information in-hand helps pest management professionals to assess 1) when their traps need to be deployed, 2) when egg-laying is starting, and 3) when pest pressure is at its peak. Timing of these biological "events" becomes particularly important when unusual weather descends upon us, as it did during the spring of 2012. To illustrate how DD accumulations can be useful for pest management, we are working together with Dr. Shawn Steffan (USDA-ARS, Wisconsin) on the development of a DD model for *Sparganothis* fruitworm to better time insecticide applications. This moth is a major pest in all cranberry growing regions, and we are slowly piecing together its biology. These data will be presented at future grower meetings.

Mating cage to study degree-day requirements for *Sparganothis* fruitworm mating and oviposition

Mycorrhizae Inoculation to Promote Early Bed Establishment
James Polashock

Introduction

Mycorrhizae are fungi that form mutualistic associations with some plant species. *Vaccinium spp.* and other plants in the family *Ericaceae* are known to harbor 'ericoid mycorrhizae', within their root cortical cells. We have isolated two mycorrhizal species associated with cranberry in New Jersey. These are *Rhizoscyphus ericae* and *Oidiodendron maius*. Colonization with mycorrhizal fungi has many potential benefits for cranberry. These include, but are not limited to: increased nutrient availability and uptake, decreased herbivory, increased drought tolerance, increased disease tolerance and nematode resistance- all of which can lead to increased yields. Earlier studies suggested that intensive managed cultivation, which includes a high rate of inorganic fertilizer use, can decrease or eliminate natural mycorrhizal colonization.

Commercial producers of cranberry can potentially benefit from mycorrhizal colonization by decreasing the amount of inorganic fertilizer inputs required, decreasing water use and possibly reducing the need for chemical control of certain diseases. Ericoid mycorrhizae have also been shown to have considerable saprotrophic capabilities, which would enable plants to receive nutrients from not-yet-decomposed materials via the decomposing actions of their ericoid partners. All of these characteristics can potentially enhance early plant establishment in new cranberry beds.

OBJECTIVES

1. Determine the extent of mycorrhizal colonization of cranberry in commercial beds in New Jersey.
2. Isolate the fungi and determine the species.
3. Perform controlled inoculations to confirm 'infective' isolates.
4. Test infective isolates in the field to determine effects on early establishment

Approach and Preliminary Data

Roots were collected from cranberry plants within cultivated fields in Burlington and Atlantic counties in New Jersey. Roots were stained to confirm mycorrhizal colonization. Roots were extensively washed, followed by breaking the fine roots into two-three cell fragments, plating on selective medium, and isolating any fungi the grow out of the root cells. Fungal isolates were identified by sequence analysis. The two expected species were isolated (*R. ericae* and *O. maius*) as well as a few others that may be true mycorrhizal fungi. All isolates are being tested for their ability to colonize cranberry using seedlings. Those isolates that colonize well in culture will be used in greenhouse tests with small potted plants for further characterization. Those that seem to benefit greenhouse-grown plants will be tested in field experiments. We have demonstrated commercially available cranberry rooted cuttings are already colonized with mycorrhizae. We have also demonstrated that commercially available mycorrhizae formulations do not contain the right fungal species for cranberry colonization.

Irrigation cooling effects on cranberry growth during summer stress

Patrick Burgess, Bingru Huang, Jennifer Johnson-Cicalese, and Nick Vorsa
Department of Plant Biology and Pathology, Rutgers University

High air temperatures during summer months imposes heat stress on cranberry plants and can be a major problem limiting large scale production in New Jersey. Growers have recently been using sprinkler irrigation to cool canopy temperatures during the hottest times of day, though little work has been done investigating specific plant response. The previous two-year study showed that ten-minute irrigation applied every thirty minutes from 1200 to 1600 h significantly lowers canopy temperature and maintains higher photosynthetic rates compared to non-irrigated plants. Aside from photosynthesis, other physiological and morphological responses of cranberry plants to this irrigation program are not yet documented. The present study aims to determine if midday irrigation causing lower leaf temperatures translates into better growth and enhanced berry production. Along with continual monitoring of air and leaf temperature via installed data loggers, length of new-growth uprights, number of leaves on a new-growth upright, leaf area, leaf chlorophyll content, number of fruits, and total weights of fruits on a new-growth upright are also being evaluated. Given that previous work has revealed higher photosynthesis following midday irrigation, total nonstructural carbohydrates of leaves and fruits will also be measured. Preliminary results reveal interesting changes to plant morphology coinciding with significantly lower leaf temperatures when the sprinkler was ran for 10 minutes every half hour when air temperature reaches 90 or 95 °F. Irrigation cooling at both 90 °F and 95 °F effectively cooled the leaves but the sprinkler on at 90 °F was more effective for cooling and had more positive effects on cranberry growth. Leaf temperature was 7-14 °F lower compared to non-sprinkled plants when sprinkler on at 90 °F and 3-5° F lower at 95 °F. Sprinkling at 90° F significantly increases leaf density on a new-growth upright. Individual leaf area was also higher or individual leaves are bigger with 90 °F-sprinkling program, which can facilitate better light harvesting for photosynthesis. Most importantly, the number of fruits on new-growth upright was on average 11% greater for plants with the 90° F- sprinkling cooling program.

Irrigation Automation Systems Inc.
174 Main Street
Buzzards Bay, MA 02571

Summary: Remote Sensing and Automation

As a company we have been Automating Irrigation pumps remotely since 2003. While Automation and Control remains the core of our business, it has become increasingly apparent over the years that remote sensing and the recording of sensor data must be an integral part of Automation in order to continue to "provide tomorrow's solutions today".

In 2003 sensors used to start and stop irrigation pumps were directly hard wired to the controller interface. Today wired probes or sensors are rarely considered. Wireless radios along with software development provide the ability to remotely monitor and record data from an unlimited number of sensors.

Our frost @lert system introduced in 2011 as a temperature and or soil moisture monitoring, recording and alarming device using the latest technologies available is an example of the ongoing technological advances.
Simplicity and accuracy were the key requirements for marketing a system that could monitor, record and alarm. A business partnership with Temperature Alert resulted in the birth of Frost@alert which more than met the requirements.
The device transmits data over mobile data networks, meaning that it is not reliant upon a traditional Internet connection to continue monitoring and reporting sensor changes. Over-the-air updates are also available, allowing for remote software upgrades no matter where sensors are located

Today frost@alert is a member of an @lert family of systems available. From temperature and soil moisture to discharge psi, relative humidity, leaf wetness, wind speed, dry contact, vapor sensing and more. Out of the box it needs only to be installed in the field and it is instantly recording and transmitting data over the mobile networks. Setting alarms is as simple as setting a threshold and determining who to alert and how. Whether it is temperature, pressure, water levels or more the user simply enters a value above or below then determines where to send the alerts.

The Future: Our @lert family will soon be available as a point to multi-point system. What that means is that a single @lert device will transmit data from as may as 256 wireless sensor points within a pre-determined range of that device. GPS, Infrared and Aerial technology will become an integral part of the remote sensing technology providing the ability to monitor and record what you want and where. As a company we remain excited about the future and the products we have planned to help "provide tomorrows solutions today"

Progeny Evaluations for Field Fruit Rot Resistance in Cranberry

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

An important objective of our cranberry breeding program is to improve resistance to the fruit rot disease complex. Fruit rot in cranberry is caused by fungi from at least 12 genera, and can result in complete crop loss if control measures are not used. Multiple sources of field fruit rot resistance have been identified in our germplasm collection, and these resistant accessions have now been used in over 130 crosses. Evaluations of the progeny are now underway.

In 2009, 1624 progeny, representing 50 crosses derived from fruit rot resistant parent(s), were planted in 5'x5' field plots, with each family replicated twice. These families included crosses between plants having the greatest fruit rot resistance (US88-30, US88-79, US89-3, and US88-1) with parents of exceptional yield and fruit quality, as well as crosses between two resistant parents. In 2011, the final two fungicide applications were withheld from this planting and disease pressure was severe enough to screen for resistance. On September 15, 2011, plots were rated for fruit rot using a 1-5 scale, where 5=90-100% rotten fruit. Fruit samples were also collected from a random sample of plots to determine yield and percent rot.

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 for field fruit rot resistance exists, which suggests predictable genetic gain, and the potential for improving resistance through breeding and selection cycles. In addition, introgression of fruit rot resistance into higher yielding genetic background was accomplished. For example, a progeny from US88-30 x Crimson Queen cross exhibited high levels of resistance, along with good berry size (2.1g/berry), color, and yield (> 600 bbl/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.

In 2012, these plots received only one fungicide application (June 7, Indar and Abound), in an effort to increase disease pressure. They will be evaluated for fruit rot in August and September. Differences in resistance are already apparent. For example, in samples taken August 8, the susceptible controls Stevens and Mullica Queen had 44.1% and 38.6% rotten fruit, compared to resistant US88-30, US89-3, and US88-79 with 8.2%, 2.7%, and 15.2% rotten fruit, respectively.

A genetic map of cranberry has provided SSR genetic markers. We are mapping these markers in families segregating for field fruit rot resistance to identify genomic regions (QTLs) associated with resistance, to facilitate future progeny selection. Our ultimate objective is to develop high-yielding cranberry varieties with increased levels of fruit rot resistance.

USDA-NASS-New Jersey Field Office
Cranberry Statistics Report and Update
Prepared for: American Cranberry Growers Associations
2012 Summer Field Day

John Gibbons, Director
USDA-NASS-NJ FO

August 16, 2012

2012 Acreage and Production Forecast

Released August 14, 2012 at 1:00 p.m. EST

2011 New Jersey Cranberry Crop Valued at $6.3 Million

New Jersey cranberry producers realized a total value of utilized production of $26.3 million in 2011, compared to $29.9 million in 2010. Cranberry price per barrel declined in 2011 to $51.60 per barrel, compared to $53.30 per barrel in 2010 and $54.50 per barrel in 2009. Growers produced on average 170.0 barrels per acre in 2011, down 11.3 barrels per acre from 2010.

New Jersey ranked third in the nation in total production of cranberries. In 2011, New Jersey cranberry production totaled 510,000 barrels, down 9.3 percent from the 2010 crop of 562,000 barrels. Harvested cranberry acreage also decreased from the 2010 growing season to 3,000 acres.

United States Cranberry Production Up by 14 Percent

The United States cranberry total production, at 7.74 million barrels in 2011, was up 14 percent from the 6.81 million barrels the previous year. Bearing acreage, at 38,500, was unchanged from the 2010 growing season. Massachusetts, Washington and Wisconsin acreage remained unchanged from 2010. New Jersey acreage declined by 100 acres, and Oregon increased by 100. The average yield in 2011 was 201.1 barrels per acre nationwide, an increase of 24.3 barrels per acre from the 176.8 barrels in 2010.

2012 CENSUS OF AGRICULTURE
YOUR VOICE. YOUR FUTURE. YOUR RESPONSIBILITY.

Top 10: Frequently Asked Questions

1. *What is the Census of Agriculture?*

The Census of Agriculture is a complete count of U.S. farms and ranches and the people who operate them. The Census, taken only once every five years, looks at land use and ownership, operator characteristics, production practices, income and expenditures. For America's farmers and ranchers, the Census of Agriculture is their voice, their future and their responsibility.

2. *Why is the Census of Agriculture important?*

The Census provides the only source of uniform, comprehensive and impartial agricultural data for every county in the nation. Through the Census, producers can show the nation the value and importance of agriculture, and they can help influence the decisions that will shape the future of American agriculture for years to come. By responding to the Census, producers are helping themselves, their communities and all of U.S. agriculture.

3. *Who uses Census of Agriculture data?*

Census data are used by all those who serve farmers and rural communities – federal, state and local governments, agribusinesses, trade associations and many others.

- Farmers and ranchers can use Census data to help make informed decisions about the future of their own operations.
- Companies and cooperatives use the facts and figures to determine the locations of facilities that will serve agricultural producers.
- Community planners use the information to target needed services to rural residents.
- Legislators use the numbers from the Census when shaping farm policies and programs.

4. *How is the Census conducted?*

NASS will mail questionnaires for the 2012 Census of Agriculture to farm and ranch operators in late December 2012 to collect data for the 2012 calendar year. Completed forms are due by February 4, 2013. Producers can return their forms by mail or can fill out the Census online via a secure website at www.agcensus.usda.gov.

5. Is the information an individual provides kept confidential?

Yes. Respondents are guaranteed by law (Title 7, U.S. Code, and CIPSEA, Public Law 107-347) that their individual information will be kept confidential. NASS uses the information only for statistical purposes and publishes data only in tabulated totals. The report cannot be used for purposes of taxation, investigation or regulation. The privacy of individual Census records is also protected from disclosure through the Freedom of Information Act.

6. Must I respond to the Census of Agriculture?

Yes. United States law (Title 7, U.S. Code, and CIPSEA, Public Law 107-347) requires all those who receive a Census report form to respond even if they did not operate a farm or ranch in 2012.

7. What if I only have a small operation or do not participate in government farm programs, do I have to fill out a Census form?

The Census of Agriculture is the responsibility of *every* farmer and rancher, regardless of the size or type of operation. For Census purposes, a farm is any place from which $1,000 or more of agricultural products were produced and sold, or normally would have been sold, during the Census year.

8. What if I did not receive or I lost my Census of Agriculture form?

If you need more information, or need help completing your Census form, call toll-free (888) 424-7828 or visit www.agcensus.usda.gov.

9. When will 2012 Census results be released?

NASS will release Census data, in both electronic and print formats, beginning in February 2014. Detailed reports will be published for all counties, states and the nation.

10. Where can I find Census of Agriculture data?

Census of Agriculture data is available through the local NASS field office in your area and at many depository libraries, universities and other state government offices. It is also available online at www.nass.usda.gov or www.agcensus.usda.gov. For additional information on the Census of Agriculture and other NASS surveys, call the Agricultural Statistics Hotline at (800) 727-9540.

“In Season “ Herbicide Applications for Weed Control in Cranberries

Bradley A. Majek

Weeds continue to cause serious problems in cranberry production. Greenhouse and field screening has identified Callisto 4SC as a potentially useful herbicide for use in cranberries. Callisto 4SC has demonstrated good crop safety when applied to dormant cranberries in early May, to actively growing and blooming cranberries in June, or after fruit set in July. Experiments conducted to evaluate the control of serious cranberry weeds in growers’ bogs have indicated that Callisto 4SC has the potential to control weeds that cannot currently be controlled in cranberries. Callisto 4SC appled at 0.25 lb ai/A in the spring has controlled false nutsedge soft rush and toad rush. Redroot control was less effective.

Research has resulted in recommendations to apply Callisto 4SC at 8 fl. oz. per acre (0.25 lb ai/A) in late spring (May) before bloom, and to repeat the application in early summer (July) after bloom. Use Callisto 4SC in newly planted or bearing cranberries to suppress or control rushes, sedges, and many annual broadleaf weeds. Treat newly planted bogs after cuttings have rooted, but before weeds have become established. Add NIS (nonionic surfactant) to be 0.25% of the spray solution or oil concentrate to be 1% of the spray solution. Choose NIS when cranberries are growing rapidly or when warm cloud humid weather encourages thin cuticle (wax layer) formation on cranberry leaf surfaces. Use oil concentrate when growth has “hardened off” or when hot dry sunny weather encourages a thick cuticle to form on cranberry leaf surfaces.

Callisto 4SC is active through foliage and root absorption in susceptible plants. Optimum performance can be obtained by ensuring an 8 to 12 hour rain-free period after application, followed by a light irrigation to move the herbicide into the root zone. Heavy irrigation, such as for frost protection, can move the herbicide below the root zone of target weeds and may result in reduced weed control or weed control failure. Time the spring application to precede a period of mild weather when irrigation for frost protection will not be needed. Callisto 4SC causes bleaching (whitening) of the stems and foliage of susceptible plants. Affected plants will appear white, red or purple. Occasionally cranberries may “flash” a temporary whitening in the growing tips of rapidly growing shoots. “Soft” growing conditions, warm cloudy humid weather, during periods of rapid growth the week before Callisto application and cold weather after application increase the possibility of observing the temporary “flash”. When observed, the cranberries recover with no long term affects on the crop.

Herbicide screening in cranberries also identified Quinstar 4L as a potentially useful herbicide for use with good crop safety more than ten years ago. Good crop safety has been observed at up to four times the labeled rate when applied to dormant cranberries in early spring or to actively growing and

blooming cranberries in late spring or early summer. Experiments conducted to evaluate the control of serious cranberry weeds in growers' bogs have indicated that Quinstar 4L has the potential to control weeds that cannot currently be easily controlled in cranberries. Applied at 8 fl. oz./A (0.25 ai/A), Quinstar 4L has controlled yellow loosestrife also known as swamp candle to some cranberry growers, when applied in early summer after cranberry bloom, near or shortly after the weed blooms. False nutsedge was controlled by Quinstar 4L when applied the spring.

Dodder has been an increasing problem in cranberry bogs in recent years, since the cancellation of the Furloe registration for cranberries. Kerb, applied twice, provided excellent dodder control in cranberries through Section 18 Emergency Exemptions, but the request was denied in 2009. Quinstar 4L applied at 8 fl. oz./A (0.25 lb ai/A) plus 1 percent oil concentrate was evaluated for dodder control in cranberries in 2009. The herbicide was applied in June after dodder had germinated and begun to attach, in July after attachment, and at both timings. The June application initially controlled dodder, but recovery was evident by August. Dodder bloom was delayed from late July to mid August, but not prevented. The application of Quinstar 4L in July did not control dodder. Two applications of Quinstar 4L, in June and in July was the only treatment that provided season long dodder control. The failure of the July treatment to control dodder strongly indicates timing of the application is critical to obtaining acceptable control. Quinstar 4L, applied earlier in the spring before attachment and at or immediately before dodder germination, followed by a second application in early summer, is likely to provide the best control and need to be evaluated further.

Quinstar 4L has been labeled for use in NJ for the past several years under Section 18 Emergency Exemptions, but use was not allowed by Ocean Spray Inc. due to the lack of a tolerance for Quinstar 4L in Europe for export products.

Southern Pine Beetle Kills New Jersey Pines . . .
Are Yours Next?

Mark Vodak, Department of Ecology, Evolution and Natural Resources
Rutgers University

Summary

Native to the Southeastern U.S. , southern pine beetle (SPB) is a serious pest of 'yellow pines', attacking pitch pine, shortleaf pine and Virginia pine in New Jersey. It most likely has been present in South Jersey for sometime, but only at "background levels", never at population levels large enough to cause problems – until 2001, when its presence was first confirmed. In 2010 New Jersey was the nation's SPB 'hotspot', killing pines on over 14,000 acres.

SPB generally only attacks stressed pines. However, when conditions permit populations to rapidly expand, beetles attack healthy trees and active 'heads' move in a definite direction, much like a forest fire. In the late spring and summer, symptoms of beetle attack can appear quickly, and the beetles can kill pines and move on quite fast. The dead trees from SPB infestations are the most obvious and dramatic impact of the beetle. But many more and far-ranging impacts result from SPB:

- increased wildfire risk;
- increased stream sediment buildup;
- increased stream temperature;
- forest type change;
- dead trees are hazardous (and costly to remove) around businesses and homes;
- marketing and utilization of SPB logs is challenging because of fungal stain;
- decreased wildlife habitat;
- decreased recreational and aesthetic value.

Life cycle: Adult beetles are about the size of a grain of rice. The adults breed and burrow through the pine's bark to the tree's cambium where they feed and the females lay eggs in galleries under the bark. As the larva hatch and mature, they, too, feed on the cambium. The larvae pupate in, or just under, the bark, and burrow their way back through the bark as adult beetles. The adult and larval feeding girdles the tree, killing it.

Infestations: SPB infestations are characterized or described in 'stages':

- 'Stage 3' trees are dead and the beetles have already left the tree, characterized by trees having either no foliage or red to reddish-brown crowns; small round exit holes on the trunk; bark that is loose, falling away to reveal blue stain fungus, old galleries, and possibly clerid beetle larvae or pupae (clerid beetles are voracious predators of SPB that reproduce in dead pine trees); and possibly fine, powdery sawdust at the base of the tree indicating the activity of ambrosia beetles, which attack after the tree has died.

- 'Stage 2' trees are considered the brood trees, with active adults, larvae and pupae, characterized by crowns fading from green to yellow; small, white, hardened pitch

tubes on the bark; new adults in and emerging from the bark; and active galleries with larvae and pupae just under the bark.

- 'Stage 1' trees have just been attacked, characterized by no crown symptoms; fresh, sticky pitch tubes and active adult beetles on the trunk; brightly colored boring dust in bark crevices; and brightly colored orange, black and white adult clerid beetles running up and down the tree trunk.

Suppression: SPB spot growth requires beetles, pines and attractants (pheromones and chemicals emitted by stressed trees). Disrupting any of these will disperse the beetle and suppress the infestation.

- 'cut-and-leave' suppression: all of the Stage 2 & 1 trees are identified, cut and directionally felled back into the infestation, towards the Stage 3 trees and into the direction of the initial attack. In addition, a buffer of un-infested trees in front of the direction of spread is cut and directionally felled back towards the advancing infestation. The width of the buffer should be at least equal to the height of the trees being felled, up to a distance equal to twice the height of the trees being felled.
- 'cut-and-remove' suppression: exactly the same as the 'cut-and-leave' procedure, except that rather than directionally felling and leaving the cut trees, the cut trees are removed from the site; this method is preferred because it reduces wildfire risk and utilizes the trees; logs must be removed shortly after the attack, however, because beetle-killed trees rapidly dry and degrade.

Monitoring: Each spring and summer the NJ Forest Service monitors the SPB population through a trapping program, and monitors infestations and spread by routine flights over South Jersey. Procedures are in place for suppression on state lands and for notification of private landowners. As part of their SPB program, the NJ Forest Service offers grants and cost-shares to landowners, municipalities, and non-profits affected by the beetle. Visit southernpinebeetle.nj.gov for more information on these programs.

Landowner assistance: Woodland owners can work with their professional forester to develop a management plan that includes thinning pine stands to lower the density of trees and increase their vigor and vitality. Landowners who have a forest management plan either through Farmland Assessment or the Forest Stewardship Program are eligible for cost-share assistance through the State Forestry Services. Cost-share assistance is also available through the NRCS's EQIP program. To qualify or participate, a landowner must have a Forest Stewardship management plan, and their forester must have taken NRCS's training to be a Technical Service Provider.

SPB is a potentially devastating pest of South Jersey's pines – and it is here to stay. But its impacts can be minimized through quick, decisive detection and suppression, as well as implementation of good, long-term forest management practices to create and maintain healthy, vigorous forests. For more information on SPB in New Jersey, available grants, or to report a sighting, visit the State Forestry Services' SPB website (mentioned above).