New York Berry News

CORNELL UNIVERSITY

Volume 08, Number 3 March 17, 2009

What's Inside

CURRANT EVENTS

March 19, 2009: *Regional Berry Pruning Work shop*. Columbia County CCE. More information: More information: Steven McKay, Columbia County CCE, 518-828-3346 or sam44@cornell.edu.

March 25, 2009: *Regional Berry Pruning Work shop* Jefferson County CCE. More information: Sue Gwise, Jefferson County CCE, 315-788-8450 or sjg42@cornell.edu.

March 26, 2009: *Regional Berry Pruning Work shop* Livingston County CCE. More information: David Thorp, Livingston County CCE, 585-658-3250 ext 109 or dlt8@cornell.edu.

March 27, 2009: *Berry Growing Workshop*, Steuben County CCE, Bath NY. For more information or to register : Stephanie Mehlenbacher, 607-664-2300, sms64@cornell.edu.

March 30, 2009 *Finger Lakes Culinary Bounty Spring Workshop*, Jordan Hall in the NYS Agricultural Experiment Station, Geneva, NY. Finger Lakes farm and food producers are invited to learn how to develop product, get it to market and effectively tell their story to gain the greatest access to growing markets interested in local foods. Program cost (including workshops, handouts and lunch) for advanced registration is $25 for FLCB current members and $45 non-members. To register in advance, or for more info, call Cornell Cooperative Extension Tompkins County at (607) 272-2292 or email Liz Karabinakis at mailto:evk4@cornell.edu**.**

March 31, 2009: *Ontario Strawberry School*, Guelph. This program will give growers up to date information on strawberry production and marketing. It is well suited to new growers as well as those who would like an update. Space is limited, so to pre-register contact the Ontario Berry Growers Association at 613-258-4587 or **info@ontarioberries.com.** (flyer follows below).

April 6, 2009: *Regional Berry Pruning Work shop* Delaware County CCE. More information: Janet Aldrich, Delaware County CCE, 607-865-6531, or jla14@cornell.edu.

April 20, 2009: *Small Fruit IPM Scout Training – Session III*. Green Acres Farm, Rochester, NY.

April 23, 2009: *Introduction to Berry Growing Workshop*, Seneca County CCE, Waterloo NY. See flyer that follows for details.

May 12, 2009: *Small Fruit IPM Scout Training – Session IV*. Green Acres Farm, Rochester, NY.

DEPARTMENT HOSTS FARMERS' MARKET INFORMATION DAYS

Meetings Encourage Direct Marketing Opportunities at Local Farmers' Markets

Jessica A. Chittenden, Director of Communications, NYS Department of Agriculture & Markets, 10B Airline Drive, Albany, NY 12235, 518-457-3136, www.agmkt.state.ny.us

New York State Agriculture Commissioner Patrick Hooker today announced twelve regional "Farmers' Market Information Day" meetings scheduled throughout the State. The meetings are held in cooperation with the Farmers' Market Federation of New York and will provide farmers with information on the direct marketing opportunities at New York State's more than 400 farmers' markets.

The Farmers' Market Information Day meetings will provide updates and information for farmers and market managers on various state and federal nutrition programs. In particular, there will be training for the new monthly WIC Vegetable and Fruit Check Program, as well as an update on the New York State Wireless EBT program.

Farmers interested in participating at farmers' markets will be able to meet with market managers at the meetings, learn about product needs, and obtain market applications, schedules, rules, and other market information. The informational meetings are free to attend and will be held in the following locations:

Tuesday, March 17, at 9 a.m.
Erie County Cornell Cooperative Extension, 21 South Grove St., E. Aurora

Tuesday, March 17, at 1 p.m.
Monroe County Cornell Cooperative Extension, 249 Highland Ave., Rochester

Wednesday, March 18, at 9 a.m.
Chemung County Cornell Cooperative Extension, 425Pennsylvania Ave., Elmira

Wednesday, March 18, at 1 p.m.
Cayuga County Cornell Cooperative Extension, 248 Grant Ave., Auburn

Thursday, March 19, at 9 a.m.
Oneida County Cornell Cooperative Extension, 121 Second St., Oriskany

Thursday, March 19, at 1 p.m
Broome County Cornell Cooperative Extension, 840 Upper Front St., Binghamton

Friday, March 20, at 9 a.m.
Franklin County Cornell Cooperative Extension, 63 West Main St., Malone

Tuesday, March 24, at 9 a.m.
Albany County Cornell Cooperative Extension, 24 Martin Rd., Voorheesville

Tuesday, March 24, at 1 p.m.
Dutchess County Cornell Cooperative Extension, 2715Route 44, Millbrook

Wednesday, March 25, at 9 a.m.
Orange County Cornell Cooperative Extension, 18 Seward Ave., Middletown

Thursday, March 26, at 9 a.m.
Suffolk County Cornell Cooperative Extension, 246Griffing Ave., Riverhead

Friday, March 27, at 9 a.m
Seafarers, 123 East 15th St., New York

Farmers and market managers interested in attending one of the Farmers' Market Information Day meetings can register with Diane Eggert of the Farmers' Market Federation of New York by calling 315-637-4690 or e-mail to diane.eggert@verizon.net <mailto:diane99@dreamscape.com> .Please indicate which meeting you plan to attend and the number of people registering.

Farmers' markets are becoming more popular in the nation and have more than doubled in number in the past five years. Farmers' markets benefit city, suburban and rural residents by allowing them more access to fresh food. They also help farmers maximize their profit margins by enabling them to sell directly to the consumer.

There are more than 1,700 farmers participating in New York's 400 farmers' markets statewide. Last year, nearly $5.6 million in New York State Senior Farmers' Market Nutrition checks were redeemed at farmers' markets for locally grown fresh fruits and vegetables.

Introduction to Berry Growing

Thursday, April 23rd, 2009, 6:30PM – 8:30PM
Cornell Cooperative Extension Seneca County
308 Main Street Shop Centre, 3rd Floor, Waterloo

This workshop will be most useful to beginning berry growers and home gardeners. Strawberries, brambles, blueberries, currants and gooseberries will be included in the discussions.

Presenter:

Cathy Heidenreich, Cornell Berry Extension Support Specialist, Department of Horticulture, College of Agriculture and Life Sciences, Cornell University

The Workshop will cover keys to successful berry growing:

- Nutrient management
- Marketing
- Weed, insect and disease management
- Startup costs
- Trellising
- Site Selection
- Irrigation

Topics include:

- Preparation and layout
- Cultivar selection and planting
- Crop production and management
- Labor and profitability

Fee: $10.00 per farm/family. Refreshments provided.

To register or for additional information, contact Cornell Cooperative Extension at 315-539-9251.

Please contact the Cornell Cooperative Extension Seneca County office if you have special needs.

Registration Form for Introduction to Berry Growing

Thursday, April 23rd, 2009, 6:30PM-8:30PM, Seneca County CCE, 308 Main Street Shop Centre, Waterloo, NY

Fee: $10 per farm/family

Name(s):_____

Please Print Clearly

Address: _____

Phone number (in case of cancellation): _____

Number attending: _____ Total amount enclosed: $ _____

Please make check payable to "Cornell Cooperative Extension Seneca County" and **mail to:**

Attn: Berry Workshop
Seneca County CCE
308 Main Street Shop Centre
Waterloo, NY 13165

Send now, don't delay! Space is limited so pre-registration is strongly suggested.

2009 Strawberry School

Tuesday, March 31, 2009 - Springfield Golf Course, Guelph

Agenda

9:00 a.m.	What is Your Market
9:30	Strawberry Physiology
10:00	Preparing for Planting
10:30	Production Systems
Lunch	
1:00 p.m.	Choosing a Variety
1:30	Soil Management
2:00	Weed Management
2:30	Key Strawberry Pests
3:00	Harvesting and Handling Strawberries

Presenters

Kevin Schooley	Ontario Berry Growers Association
Adam Dale	University of Guelph
Pam Fisher	OMAFRA, Berry Specialist
Anne Verhallen	OMAFRA, Soil Management Specialist
Margaret Appleby	OMAFRA, IPM Systems Specialist
Jennifer DeEll	OMAFRA, Fresh Market Quality Program Lead

Registration Fee:

OBGA Members: $75.00
Non-Members: $100.00

SPACE IS LIMITED
REGISTER EARLY

For Information Contact the OBGA

Email:
info@ontarioberries.com

Phone: 613-258-4587

Ontario Berry Growers Association

Ministry of Agriculture, Food and Rural Affairs

Ontario

WANTED – BLUEBERRY AND SWEET CHERRY GROWERS INTERESTED IN EXTENDING SHELF LIFE & MARKETING WINDOW

Craig Kahlke of the Lake Ontario Fruit Team from CCE is looking for large blueberry growers (dealing in pallets of blueberries) and any size sweet cherry growers to test out modified atmosphere packaging (MAP) that can extend blueberry shelf life 6-8 weeks and sweet cherry shelf life up to 4 weeks. This is passive packaging that does not need any gases pumped in. The bags are inexpensive and reusable. Craig will be available for instructions in use. For anyone interested or wanting more information please contact Craig at 585-735-5448 or cjk37@cornell.edu.

NEW YORK FARM NUMBERS INCREASE

For the second consecutive year, farm numbers in New York increased, reports Stephen Ropel, Director of USDA's National Agricultural Statistics Service, New York Field Office. The number of farms for 2008 is estimated at 36,600, an increase of 200 from 2007. Land in farms decreased to 7.10 million acres, lowering the average farm size to 194 acres, 4 acres less than the previous year. Farms with sales over $500,000 increased by 500 to 2,300 while farms with sales between $250,000 and $499,999 fell by 100 to 1,700. The area of land operated by farms in these two groups totaled 3.04 million acres, 9 percent above a year ago. The next smaller sales class, farms with sales between $100,000 and $249,999 decreased by 200 to 3,100 while land operated by these farms dropped 40,000 acres. Average farm size as a result rose from 303 acres to 310 acres. There were 10,800 farms with sales between $10,000 and $99,999 compared with 10,700 a year earlier. Land they operated totaled 1.70 million acres. There were 100 fewer small farms with sales between $1,000 and $9,999 in 2008, at 18,700. Land in farms for this class decreased 200,000 acres from the previous year to 1.40 million acres for an average farm size of 75 acres.

The number of farms in the United States in 2008 is estimated at 2.2 million, 0.2 percent fewer than in 2007. Total land in farms, at 919.9 million acres, decreased 1.56 million acres, or 0.2 percent, from 2007. The average farm size was 418 acres, unchanged from the previous year. The decline in the number of farms and land in farms reflects a continuing consolidation in farming operations and diversion of agricultural land to nonagricultural uses.

Farm numbers declined slightly in the $1,000-$9,999, $10,000-$99,999, and $100,000-$249,999 sales classes. Farm numbers rose slightly in the two largest sales classes. Because of strong commodity prices and rising value of sales many farms and ranches near the top of their sales class in 2007 may have moved into the next higher sales class in 2008 without expanding their operations.

The largest percentage changes from 2007 occurred in the smallest and largest sales classes. Farm numbers declined 0.5 percent, to 1.22 million farms, in the $1,000-$9,999 sales class. Meanwhile, the number of farms in the $500,000 and over sales class increased by 4.8 percent to 126,000 farms. The number of farms with less than $100,000 in sales fell 0.6 percent from 2007 while the number of farms with $100,000 or more in sales rose 1.6 percent.

MERRIGAN TO BE NOMINATED AS DEPUTY SECRETARY OF AGRICULTURE

Washington, Feb. 24, 2009 - President Barack Obama today announced his intention to nominate Kathleen A. Merrigan to be Deputy Secretary of Agriculture.

"We at the U.S. Department of Agriculture welcome the President's intention to nominate Dr. Merrigan," said Secretary Tom Vilsack. "She will bring to USDA extensive expertise in agricultural marketing and nutrition and in legislative affairs and will provide excellent, experienced leadership as we move President Obama's agricultural and nutritional agenda forward."

Merrigan currently is an assistant professor and Director of the Agriculture, Food and Environment M.S. and Ph.D. Program at the Friedman School of Nutrition Science and Policy at Tufts University, Boston.

In 1999, she was appointed administrator of USDA's Agricultural Marketing Service by then-President Clinton. Prior to that, Merrigan was a senior analyst at the Henry A. Wallace Institute for Alternative Agriculture and an expert consultant at the Food and Agriculture Organization of the United Nations in Rome.

From 1987 to 1992 she was a staff member on the U.S. Senate Committee on Agriculture, Nutrition and Forestry where she helped develop the Organic Foods Production Act of 1990 which mandated national organic standards and a program of federal accreditation.

Merrigan holds a Ph.D. from the Massachusetts Institute of Technology in environmental planning and policy, a Master of Public Affairs from the University of Texas and a B.A. from Williams College.

MICROSATELLITES HAVE MAJOR BENEFITS FOR BERRY RESEARCH

By Laura McGinnis, Public Affairs Specialist, Room 1-2224-A, 5601 Sunnyside Ave., Beltsville, MD 20705-5129, 301-504-1654, Laura.McGinnis@ars.usda.gov

March 9, 2009. Good things often come in small packages, so it's not surprising that microsatellite genetic markers developed by the Agricultural Research Service (ARS) have major benefits for berry research. The markers are being used throughout the United States for research on blueberries and cranberries.

Microsatellites are collections of short, repetitive, non-coding DNA sequences that can be used to compare species and varieties. Useful microsatellites show considerable sequence variation among individuals. This variation can be used to track genetic diversity and greatly accelerate breeding for improved agronomic, quality and nutritional traits. They have been used to enlarge genetic maps, identify berry cultivars and establish relationships between berry varieties.

In a study partially supported by the Northwest Center for Small Fruit Research, Nahla Bassil, a plant geneticist with the ARS National Clonal Germplasm Repository at Corvallis, Ore., has worked with geneticist Jeannine Rowland at the ARS Genetic Improvement of Fruits and Vegetables Research Unit in Beltsville, Md., to generate several DNA sequences for blueberries.
Chandler blueberries (above left) compared with an older ARS developed variety, Bluecrop (right). Photo by Scott Bauer

The scientists developed microsatellite genetic markers from those DNA sequences, and established that these markers could be used to identify not only blueberry varieties, but cranberry and rhododendron varieties as well.

A different type of DNA-based marker had previously been developed for cranberries by plant pathologist James Polashock, formerly with Rutgers University and now with the ARS Plant Sciences Institute in Beltsville. Bassil and Polashock are collaborating to identify the strengths and weaknesses of each marker system for use in identifying cranberry varieties.

In related work, Rowland and Bassil are collaborating on an international effort to develop more genetic markers for blueberries, to be used for improving traits such as cold hardiness and fruit quality.
Read more about ARS research with state and university partners in the March 2009 issue of Agricultural Research magazine. ARS is the principal intramural scientific research agency of the U.S. Department of Agriculture.

PRESIDENT OBAMA ANNOUNCES UNDER SECRETARIES FOR AGRICULTURE DEPARTMENT

Washington, March 13, 2009 - President Barack Obama today announced his intention to nominate James w. (Jim) Miller to be Under Secretary of Agriculture For Farm and Foreign Agricultural Services and Dallas P. Tonsager to be Under Secretary Of Agriculture for Rural Development.

"Jim Miller and Dallas Tonsager are well aware of the challenges and opportunities in rural America. They have dedicated their lives to enhancing the success and improving the lives of farmers, ranchers and those living in rural areas," said Secretary Vilsack.

Miller currently is chief of staff for the national farmers union, a position he accepted in 1999 after serving four years as senior analyst for agriculture and trade on the majority staff of the senate budget committee. Miller also has served as chief economist for the national farmers union and as vice president for government relations for the national association of wheat growers.

Miller operated a fourth-generation family farm in eastern Washington for over 20 years and served as president of the national association of wheat growers in 1987. He was co-chairman of the Canada-U.S. Joint commission on grains, a federal commission established to resolve grain trade issues between the two countries. He is a graduate of Washington State University. He and his wife, Sandy, have two sons and two grandsons.

Tonsager currently serves as a board member of the farm credit administration (FCA), a position to which he was appointed in 2004. He also is a member of the board of directors of the farm credit system insurance corporation. Prior to his appointment to the FCA, he was executive director of the South Dakota value-added agriculture development center, where he coordinated initiatives to better serve producers who developed value-added agricultural projects.

Tonsager was appointed by President Clinton as the South Dakota State Rural Development Director in 1993 and was named one of two outstanding state directors by USDA in 1999. In partnership with his brother, he owns Plainview farm in Oldham, S.D., a family operation that includes corn, soybeans, wheat and hay. He is a graduate of South Dakota state university. He and his wife, Sharon, have two sons.

AGRICULTURE SECRETARY VILSACK ANNOUNCES DISASTER ASSISTANCE FOR PRODUCERS

USDA extending buy-in waiver for those impacted by natural disasters

WASHINGTON, March 17, 2009 - The recently approved American Recovery and Reinvestment Act of 2009 (ARRA) allows producers to become eligible for 2008 disaster assistance authorized by the 2008 Farm Bill even if they did not previously obtain otherwise statutorily required crop insurance from the Federal Crop Insurance Corporation (FCIC) or Non-insured Crop Disaster Assistance Program (NAP) coverage for 2008 by now paying a buy-in fee through May 18, 2009.

"President Obama is providing an additional opportunity to producers who suffered losses as a result of natural disaster because he understands they are going through tough times and he acknowledges their importance in helping stimulate the economy and create jobs," said Agriculture Secretary Tom Vilsack.

Paying such a buy-in fee does not provide the producer with crop insurance or NAP for the 2008 crop year; it merely permits the producer to become eligible for the 2008-crop disaster assistance programs.

Producers who have not already taken the necessary steps to become eligible for the Supplemental Revenue Assistance Program (SURE), Emergency Assistance for Livestock, Honeybees, and Farm-Raised Fish (ELAP), and the Tree Assistance Program (TAP) may now become eligible for such programs by completing the following steps by May 18, 2009:

- Paying a $100 buy-in fee per crop. The maximum fee for insurable or noninsurable crops is $300 per county, per producer, not to exceed $900 for multi-county producers.
- In the case of each insurable crop (those for which insurance is available from FCIC), excluding grazing land, agreeing to obtain a policy or plan of insurance for the next insurance year for which crop insurance is available; coverage level should equal 70 percent or more of the yield at 100 percent of the price.
- In the case of each noninsurable crop, agreeing to file the required paperwork and pay the applicable administrative NAP coverage fee by the applicable state application closing date for the next available year.

Producers who choose to buy in under this provision will be considered, for insured crops for the 2008 Farm Bill disaster assistance programs only, to have obtained a policy or plan of insurance for the 2008 crop year at a level of coverage not to exceed 70 percent of the yield at 100 percent of the price. For noninsurable crops for the 2008 Farm Bill disaster programs only, producers will be considered to have a level of coverage equal to 70 percent of the yield. These levels of coverage will be used to calculate the 2008 SURE guarantee. Producers who buy in will not be eligible for actual crop insurance or NAP benefits for the 2008 crop.

Producers who meet the definition of "Socially Disadvantaged, Limited Resource," or "Beginning Farmer or Rancher," are not required to pay the buy-in fee.

Blueberries and Birds

- Bird problems in blueberries cost NY growers $ every year, especially during drought years. Up to 30% of the crop may be lost. Damage is most frequently caused by robins, grackles and starlings. In some areas song birds pose a serious threat.
- We are looking for blueberry farms across NYS that have mature blueberries bordered on at least 2 sides by roosting trees and a known bird problem to participate in on-farm demonstration trials for 2009.
- Treatments would include: Netting, Methyl anthranilate (taste repellant), Untreated control. They may be trialed alone or in conjunction with your existing bird control program.
- Twenty to thirty random berry clusters within treated areas will be tagged and evaluated on a weekly basis for bird damage.
- Results will be shared through newsletters, on-farm twilight meetings, and reports.

For more information or to participate in this on-farm demonstration/research trial please contact:

Laura McDermott (Eastern NY) at 518-746-2562, lgm4@cornell.edu

or

Cathy Heidenreich (Western NY) at 315-787-2367, mcm4@cornell.edu.

Yes, I am interested in participating in the 2009 blueberry bird study. Please contact me.

Name:_____

Address:_____

Phone:_____E-mail:_____

Bird control tactics already in use: (check all that apply) □ none □ netting □ taste deterrents □ visual or audio scare device(s) □ other_____

Best time of day to contact me:_____

News from the NYS Berry Growers Association

Dale Ila Riggs, Chair
The Berry Patch
Stephentown NY

Welcome to the NY Berry News from the New York State Berry Growers Association (NYSBGA)! The Association plans to meet you in this newsletter in each issue – sometimes with news of the activities of the association, sometimes with introductions of our Board members, and sometimes with reminders of what the association can do for you.

As a first introduction, I'm Dale Ila Riggs, I own and operate The Berry Patch, a small diversified farm in Stephentown NY, nestled right up against the Massachusetts border in Southeastern Rensselaer County. I started my farm 12 years ago by planting ½ acre of strawberries, 1/10th of an acre of raspberries and 1/3 acre of blueberries. What was supposed to be a "hobby farm" has grown into anything but that, keeping myself, my understanding husband, and our 8 employees busy from March through late November (in the field that is) each year. We now raise 2 acres of strawberries, 1/10 acre of fall raspberries in a high tunnel, and ½ acre of blueberries, in addition to about 5 acres of vegetables and ¼ acre of cut flowers, almost all of which are retailed through our on-farm retail store.

This diversification has led some of our customers and employees to ask why we call ourselves The Berry Patch. After all, we grow more vegetables than we grow berries. Well first off, our customers named us The Berry Patch, and we don't want to change a name that our customers created. But more than that, the word "berries" is a unique identifier of a great product. "Berries" conjures a positive image in people's minds that is unlike anything that will ever be achieved by the words "vegetables" or "flowers". We've been hearing from our outstanding Berry Extension Team that a lot of growers in the state don't consider themselves to be "berry growers". "I just grow a few berries, my primary crop is sweet corn (or vegetables, or apples, or fill in the blank)", say growers. Well I say "Balderdash!" to that. If you grow any berries at all, you are a berry grower, and you can benefit from being a member of The NYS Berry Growers Association.

The Association Board works diligently to address research needs of the industry through our voluntary research fund; we partnered with Cornell University to get a NYS Farm Viability Institute grant to create the Extension Berry Support Team filled by Cathy Heidenreich and Laura McDermott; we have a web site in which members can list their operation in our "Find a Farm" section (worth far more than the dues alone); and the Board is investigating the potential for mounting a statewide promotion and marketing campaign to benefit members. That's not a complete list of what we do, but it should give you a picture of why you should grab the membership form on page following this newsletter and become a member. The future of agriculture in NYS is bright for those who are involved in their industry. To brighten your future, join the NYS Berry Growers Association today.

Dale and her husband, Don Miles, with their high tunnel raspberries.

MANAGING FRUITWORMS AND MAGGOTS IN BLUEBERRIES

Molly Shaw, Cornell Coop. Ext., South-Central NY Ag. Team, Tioga County & Greg Loeb, Department of Entomology, NYSAES, Geneva, NY

Introduction

In comparison to a fruit crop like apples, blueberries in NY are not afflicted by a large number of serious arthropod pests. However, there are a few species that can be very problematic in some locations and in some years. Our presentation today will focus on two of these pests, fruitworms and blueberry maggot. There will be three sections to this tag team talk. Molly will start by providing an overview of their biology and then she will summarize a survey she conducted at 10 blueberry farms in the southern tier for fruitworms and blueberry maggot. Greg will finish with a discussion of the different control options for these pests.

Pest Biology and Damage

There are two species of fruitworm that attack blueberry fruit in our area: cranberry fruitworm and cherry fruitworm. In the south-central region of NY, cranberry fruitworm seems to be the major problem, with cherry fruitworm a minor contributor. Both of these pests are moths as adults that emerge in the spring and lay eggs on the fruit right around petal-fall. Eggs hatch and the larvae burrow into the green fruit. Cranberry fruitworm makes a mess while it feeds, tunneling between berries in a cluster, webbing them together, and leaving sawdust-like frass in globs outside the berries. Cherry fruitworm is much more subtle, living in one or two berries and not leaving much evidence of its whereabouts on the outside of the fruit. However, when a berry is infested with either larva, it will turn blue earlier than all the neighboring berries, and growers can see pretty easily how much damage they have by scouting the planting for clusters that are blue before the first healthy berries start to change color. There is only one generation per season for both species of moths. Michigan State Extension has a very nice website with fact sheets containing much more life cycle details on these and many other blueberry pests. See http://www.blueberries.msu.edu/.

The blueberry maggot adult is a medium-size fly with characteristic markings on the wings. These flies overwinter as pupae in soil and start to emerge as adults in the middle of the summer when the fruit is turning blue. Adults will mate and lay eggs over a period of a month or so, starting in July. They lay their eggs just under the skin of the berry and the tiny maggots burrow into the fruit and gorge themselves until they're full grown (about three weeks), at which time they exit the berry, drop to the ground, pupate, and wait until next summer to emerge as adults. A berry with a maggot in it looks nearly identical to a healthy berry, and therein likes the problem. When the berries are picked and used, the maggots have a nasty habit of floating to the top of jams and crawling out into breakfast cereal. Although blueberry maggot has only one generation per season, emergence is not very synchronous and as a consequence, new flies can appear from July until late August. Again, see Michigan's excellent fact sheet on the blueberry maggot life cycle at http://www.blueberries.msu.edu/.

Monitoring for Fruitworms and Blueberry Maggots

We set out traps for cranberry fruitworm, cherry fruitworm, and blueberry maggot on 10 farms located in Tioga, Tompkins, Cortland, Chemung and Schuyler counties. Each farm got at least one trap for cranberry fruitworm and one for cherry fruitworm, and at least two for blueberry maggot. The traps for the fruitworms were baited with sex pheromone and therefore captured male moths. The traps for blueberry maggot were yellow cards covered with sticky material and baited with a food odor/feeding stimulant.

We found that in the Southern Tier of NY, the populations of these insects were spotty. Only one farm had cherry fruitworm present. Six of the ten farms had cranberry fruitworm, with the highest trap count for the season being 447 at a location in the Finger Lakes, while several regional farms had zero moths trapped. Two of the ten had blueberry maggot. Population distributions didn't seem to follow a recognizable pattern. Sometimes one farm happened to have them while the farm down the road did not. Many farmers have had variable insect pressure over the years—one year they may be bad at a certain location, while the next year they could be almost non-existent.

Since these pests aren't present at every farm, and since they show up at slightly different times each year because of weather variations, monitoring for their presence makes sense. Knowing what's going on with the insects can save insecticide sprays and can improve spray effectiveness by allowing the timing to be more precise.

Who Benefits From Using Traps?

We found that three types of farms in particular would benefit from setting out traps to monitor for these insects:

1. *Growers who spray every year assuming they'll have a problem, but who never see insect damage in the harvest.* Two growers in this group realized that they could use the traps to decrease their insecticide applications, and maybe eliminate insecticides all together when adults were not present in the traps.
2. *Growers who have variable levels of damage, and would spray if in a particular year a high number of moths were trapped.* There were three growers in the study in this group. They had enough damage from cranberry fruitworm in the past that if the adults showed up in high numbers in their traps (this "high number" is arbitrarily set by the grower, there is no established threshold), then they will spray an insecticide for control. But if few moths are in the traps, they will not spray and they'll tolerate a low level of damage in the harvest.
3. *Growers who do not spray insecticides at all, no matter the extent of the damage.* Whether it's for personal safety reasons or philosophical convictions, they will not apply insecticides. There were five growers in the study in this group, and while it was useful for them to monitor for the insects for one year to learn their life cycle, it wouldn't be worth their while to trap for years to come because the results would not affect their management decisions.

Learning How To Use The Traps

There are two fact sheets that will help growers learn how to use the traps to make management decisions. First, read about the life cycles of the pests from the Michigan State Extension website (http://www.blueberries.msu.edu/). It's important to understand the pests' life cycles before trying to control them. Second, the trapping instructions and other information can be downloaded from our Tioga county extension website (http://counties.cce.cornell.edu/tioga/tcag.php) or you can ask for a copy to be mailed to you by calling Molly Shaw at 607-687-4020 x 319 or e-mailing her at meh39@cornell.edu. The fact sheets provide details about where to buy supplies, how to set the traps in the field, and what to look for in the traps.

Control Decisions

Michigan State recommends using the traps for the cranberry and cherry fruitworms to determine when to start scouting for eggs laid on the fruit and to *scout for eggs* in order to determine the optimal spray time. Scouting for eggs provides more reliable spray timing than trap counts alone. At one farm that had a history of high cranberry fruitworm damage we did scout for eggs and found that nearly 30% of the clusters had eggs on them. Scouting for eggs is not as hard as it sounds. With a little practice you can even tell which eggs are just about ready to hatch, since they change color as they mature. Determining when the eggs are ready to hatch pinpoints the optimal first spray coverage timing. However, this same grower had been using the traps for the past few years to help time his sprays without ever scouting for eggs, and he still got satisfactory control. In a u-pick situation (like we have for the most part in NY but unlike the wholesale markets in Michigan where berries are mechanically harvested), using the traps alone may be good enough, because growers generally tolerate some level of damage at harvest. By just using the traps this grower found out that he could start his sprays later than his usual late bloom timing (and therefore apply one less spray that season) and still get satisfactory control of the fruitworms.

There are a number of different insecticides that can be used against fruitworms in blueberries. Some important characteristics to consider are efficacy, spectrum of activity, length of residual efficacy, impact on pollinators or natural enemies, and worker safety. We will discuss some of these aspects during the talk as well as highlight some of the new materials recently labeled in New York.

Blueberry maggot is no fun to deal with in terms of control. Since flies emerge over a two-month period and lay eggs on ripening fruit, spraying for maggot control involves multiple sprays with a low residual/short days-to-harvest product. The recommendation is to apply the first spray within a week after the first sustained catch of flies on the traps ("sustained" means several flies per week, not just one or two flies), and to continue spraying according to the label directions. The sprays target the female fly as she tries to lay an egg in a berry, so the insecticide has to be present on the berry surface to work. During the presentation we will summarize characteristics of the different insecticides labeled for use against blueberry maggot as well as other management approaches.

Chemical Control: Cranberry Fruit Worm

Pesticide	Restricted Use	Bee Safe (Y/N)	Nat Enemy Impact	Vulnerable Stage	DTH (days)	REI	COST PER ACRE
azinphos-methyl [Guthion, others]	Y	N	H	Larva	7	7 d (30 d public)	$14.10
phosmet [Imidan]	Y	N	M	Larva	3	3 d	$10.67
carbaryl [Sevin 80S, others]	N	N	M	Larva	7	12 hr	$16.67
fenpropathrin [Danitol]	Y	N	H	Larva	3	24 hr	$20.16
acetamiprid [Assail]	N	N	L-M	Larva	1	12 hr	
***Bacillus thuringiensis [Bt]**	N	Y	L	Larva	0	4 hr	$12.67
tebufenoxzide [Confirm, IGR]	Y	Y	L	Egg, Young Larva	14	4 hr	$22.12
pyriproxyfen [Esteem, IGR]	N	Y	L	Egg, Young Larva	7	12 hr	$16.80
spinosad [Spintor, *Entrust]	N	N	L	Young Larva	3	4 hr	$30.54/$45.62
spinetoram [Delegate]	N	N	L	Young Larva	3	4 hr	$39.24

**Organic option*
Compiled by G. Loeb, Cornell University, NYSAES, Geneva (most prices based on 2008 retail, using high label rates).

Chemical Control: Blueberry Maggot

Pesticide	Restricted Use	Nat Enemy Impact	Vulnerable Stage	DTH (days)	REI	COST PER ACRE
azinphos-methyl [Guthion, others]	Y	H	Adult	7	7 d (30 d public)	$14.10
phosmet [Imidan]	Y	M	Adult	3	3 d	$10.67
malathion [Malathion]	N	M	Adult	1	12 hr	$9
carbaryl [Sevin 80S, others]	N	M	Adult	7	12 hr	$16.97
fenpropathrin [Danitol]	Y	H	Adult	3	24 hr	$13.43
acetamiprid [Assail]	N	L-M	Adult	1	12 hr	
imidacloprid [Provado]	Y	L	Adult	3	12 hr	$24.96
pyrethrin [*Pyrenone]	N	L-M	Adult	0	12 hr	
spinosad [*Gf-120 bait]	N	L	Adult	0?	4 hr	

**Organic option*
Compiled by G. Loeb, Cornell University, NYSAES, Geneva (most prices based on 2008 retail, using high label rates).

(Article reprinted with permission from: Proceedings of 2009 Empire State Fruit and Vegetable EXPO and Becker Forum, February 11-12, 2009. Tables courtesy G. Loeb)

SOIL MANAGEMENT FOR OPTIMAL BLUEBERRY PRODUCTION

Marvin Pritts, Professor, Dept. of Horticulture, Cornell University, Ithaca, NY 14853

Demand for fresh blueberries has grown considerably over the past 50 years, and is showing no sign of slowing down. Studies associating consumption of blueberries with health is contributing to this demand, as is the consumer's desire to purchase locally-grown fruit. To respond to this increased demand, growers are starting to plant blueberries on soils that are less than ideal.

Criteria exist for blueberry soils, and if these criteria are not met, then it is difficult to establish a successful blueberry planting. The first criterion is that the soil be composed of a significant amount of sand to allow for good drainage and pore space. Sands, loamy sands and sandy loams are acceptable. Silts and clays are generally not conducive for blueberry root development because they lack pore space of an appropriate size. Blueberries have extremely fibrous roots that do not penetrate heavier soils and small pores. Blueberry roots require a large pore space in order to lengthen and develop. Despite the fact that blueberries can tolerate wet soils, root growth is far better on well-drained soils. Clay and silt soils can become compacted, whereas sandier soils tend to be more resistant to compaction and drain better.

A second criterion is low pH. An optimal pH for blueberries is 4.5, with a range between 4.2 and 4.8. At a lower or higher pH, certain essential nutrients become unavailable. One of the most common problems in blueberry plantings is high pH. When pH exceeds 5.0, the availability of iron becomes limiting and chlorophyll production ceases, leading to interveinal yellowing of leaves and poor growth. Other nutrients also become unavailable at a high soil pH. If the soil pH is slightly higher than desired, sulfur can be added to lower it. The amount of sulfur is dependent on the current pH, the soil type and the cation exchange capacity. Sandier soils require less sulfur to modify than clayey soils.

A third criterion is calcium content. Blueberries do poorly when soil calcium levels exceed about 2,000 lb/A, probably because calcium interferes with the uptake of other nutrients. Even if soil pH is 4.5, blueberry plants will not grow well if the calcium level is high. Unfortunately, growers cannot preferentially remove calcium from the soil. They can inadvertently add calcium, however, if they irrigate blueberry with high lime water.

To summarize, a blueberry soil should be lighter than a loam, have a pH less than 5.0, and have a calcium content of less than 2,000 lb/A. The pH can be changed whereas the other two factors are fixed.

Once there criteria are met, then other modifications can be made to enhance blueberry performance. For example, blueberries can be grown on raised beds to improve drainage. Organic matter can be added to improve moisture and nutrient holding capacity. Ammonium forms of nitrogen can be used to fertilize plants as these forms provide N in a source that blueberry plants can use directly, and ammonium uptake contributes to soil acidification. Blueberries also have a symbiotic relationship with endomycorrhizal fungi in which nitrogen and phosphorus uptake are improved through this association. High organic matter and low fertilizer rates contribute to the growth of these beneficial fungi.

Should supplemental nutrients be required before planting, avoid chloride (muriate) forms of fertilizer. For example, if the soil tests low in potassium, apply potassium sulfate rather than muriate of potash (potassium chloride). Certain ions (e.g. nitrate, chloride) are toxic to blueberry roots.

Incorporated cover crops can provide organic matter prior to planting. Once plants are established, most growers applied wood chips and/or sawdust under plants. This mulch can improve soil moisture, suppress weeds and supply organic matter.

Without the foundation of a good soil, a blueberry planting will not be successful. Planting blueberries in inappropriate soils is one of the most common problems that we are seeing among berry growers.

(Article reprinted with permission from: Proceedings of 2009 Empire State Fruit and Vegetable EXPO and Becker Forum, February 11-12, 2009.)

Questions or Comments about the New York Berry News?

Ms. Cathy Heidenreich
New York State Agricultural Experiment Station, 630 W. North Street, Geneva, NY 14456
Phone: 315-787-2367 *Email*: mcm4@cornell.edu

PRACTICAL ECOLOGY AND MANAGEMENT OF WHITE PINE BLISTER RUST IN CURRANTS

Kerik D. Cox, Assistant Professor, Dept. of Plant Pathology and Plant-Microbe Biology, Cornell University, NYSAES, Geneva, NY 14456 and Steven McKay, Area Extension Educator, Hudson Valley Fruit Program, Cornell Cooperative Extension Columbia County, Hudson, NY 12534

White Pine Blister Rust in NY

White pine blister rust (WPBR), caused by the fungus *Cronartium ribicola*, is a disease of white pine that greatly impacted the white pine industry in the United States. Like other macrocyclic rust diseases (cedar apple rust, wheat stem rust), WPBR needs two hosts in order to complete its life cycle. The hosts in the life cycle of WPBR are pine and members of the *Ribes* genus (currants, gooseberries, etc.). The most common strategy for eliminating this type of rust disease is to kill off one of the two hosts. In the case of WPBR, it was decided that the Pine industry was more valuable than *Ribes* production and as early as April 1917, *Ribes* quarantine and eradication legislation was beginning to be put into effect. From 1961 to 1967, there was a more extensive *Ribes* eradication effort in the US (2, 6). This effort was quite successful in the eastern United States to the point where it was believed that wild *Ribes* posed little danger to the pine industry (2). Eventually, the federal ban on currant production was removed due to the development of rust resistant pines (1, 3). However, individual states still impose severe regulations or bans on currant production. Despite the availability of new scientific data and management practices to mitigate dangers to the pine industry, no revisions to state restrictions on were made for some time (2). In New York, planting restrictions on currant production were first discussed in 1998 (7, 8) and restrictions were slightly revised recently in 2003. Rust resistant and immune *Ribes* varieties do exist, but are often less horticulturally desirable than highly susceptible black currant varieties such as Ben Alder (1). Because of these varietal concerns, the New York State Department of Environmental Conservation has established both currant fruiting and currant quarantine districts **(www.dec.state.ny.us/website/regs/part192.html)** to allow some currant production in New York.

Currants produce extremely high levels of antioxidants and vitamin C (4, 5), and are becoming increasingly popular according to a report from the New York Farm Viability Institute (10) **(http://www.nyfarmviability.org/press-07-26-06.htm)**. Previously, the crop profile for currants in New York State in 2000 **(www.ipmcenters.org/cropprofiles/docs/nycurrants.html)** listed total bearing acreage for currants as approximately 9 acres (9). Currently, growers such as Greg Quinn of the Currant Company LLC **(http://www.thecurrantcompany.com/)** and Curt Rhodes of R.H. Rhodes and Sons Inc. are reported to have more than 15 acres each planted to black currants (9, 10), and are continually expanding.

Practical Ecology of White Pine Blister Rust

Understanding the life cycle and ecology of WPBR and the two hosts needed for its survival has led to management practices that are effective for controlling the disease. The disease is also controlled to some extent by environmental factors and even gnats that eat the fungus present on *Ribes* leaves.

Environmental Considerations

- Hot temperatures in the summer can actually kill the infections on *Ribes* leaves preventing further spread of the disease between *Ribes* plants and preventing the development of sporidia which infect pines.
  White pines have a 20% rate of resistance to WPBR in trees from unselected seed sources. This is increased to as much as 50-75% by selecting seeds from resistant trees. There are no known cases of WPBR overcoming the resistance genes in *Ribe*s. Resistance can be lost in pines, however.
- WPBR infections must have cool temperatures in the 60 to 70 ^{o}F range and moisture for 2 weeks to produce the telial columns which produce sporidia in the fall which can infect moist pine needles and become established on the trees. In a dry, warm year infection potential is less, and in a moist cool year infection potential is greater, and even possible in the summer.
- Climate zones have been defined where pines live. They are zones 1(least likely to be infected) to zone 4 (most likely to have conditions for pines to be infected in the Fall). Arborists say that planting of susceptible *Ribes* is least problematic for pines in zones 1 and 4 since in zone 4 they will not become infected, and in zone 1, pines shouldn't be planted due to the high probability that they will become infected from wild *Ribes*.
- Sporidia produced on telial columns on *Ribes* leaves travel from the *Ribes* to pines in Fall normally only travel about 1,000 feet maximum. Pine seedlings are the most at risk, and a border of 1000 feet free from susceptible *Ribes* plants is recommended for nurseries and Christmas trees.

- 99% of infections on pines take place on the lower 9 feet of the trees. Infections that develop at least one foot from the trunk cause death of the branch, but the cankers do not grow back to the trunk.
- Gooseberries seldom have infections that develop spores that can infect pines.

Management Practices to Protect Pines

- Plant a high population of pine seedlings and rust will rogue susceptible trees. Excess trees are thinned out later.
- Plant trees in microclimates less likely to have dew in the Fall. Plant in zones 1 and 4.
- Plant immune *Ribes* varieties and pines from seed selected from resistant trees.
- Plant trees in areas with overstories to avoid free moisture and infections.
- Plant *Ribes* at least 1000 feet from pines.

White Pine Blister Rust Management Trials in Geneva

Now that currants are back on the table, is WPBR still an issue? There are a lot of excellent currant and gooseberry varieties, but not all of them are rust immune. Although we didn't mention it above, WPBR is also devastating to the currant host. Planting highly rust susceptible varieties is still not allowed in NY, but even some of the resistant varieties get some WPBR infection. Over the past seven years, the Geneva experiment station has conducted WPBR management trials on currants and gooseberries across a range of susceptibility to WPBR. Early work focused on conventional pesticide programs and timing while more recent work focused on the management potential of organic and biopesticide programs. A bulleted results summary of our trials follows Highly rust susceptible currant varieties:

- Can be successfully managed using a 4-5 applications of DMI or QoI fungicides. Unfortunately, the 2ee for Nova 40W (DMI) is still in effect, but the 2ee does not apply to the replacement product Rally 40WSP. Cabrio EG is the remaining registered material for WPBR in currants.

- Can be managed to low level of infection using a 4-5 application program biopesticides and organic fungicides including materials such as Serenade Max, ProPhyt 4L, and JMS Organic Stylet oil.

Rust resistant to less susceptible currant and gooseberry varieties:

- Can be rust free using a 4 application program of DMI or QoI fungicides (Nova 40W and Cabrio EG see above).
- Can be rust free using a 4-5 application program biopesticides and organic fungicides including materials such as Serenade Max, ProPhyt 4L, and JMS Organic Stylet oil.

References:

1. Barney, D. L. 2000. Commercial production of currants and gooseberries in the inland northwest and intermountain west of the united states: opportunities and risks. Hort Tech. 10:557-561.
2. Benedict, W. V. 1981. History of white pine blister rust control-A personal account. U.S. Dep. Agric. For. Serv. FS-355.
3. Carlson, C. 1978. Non-effectiveness of *Ribes* eradication as a control of white pine blister rust in Yellowstone National Park. Rpt. 78-18. USDA For. Serv. N. Reg., Missoula.
4. Davis, J. L., and Mathis, C. 2005. Antioxidant-Loaded Fruits in: Feature Archive WebMD.
5. Halvorsen, B. L., Holte, K., Myhrstad, M. C. W., Barikmo, I., Hvattum, E., Remberg, S. F., Wold, A.-B., Haffner, K., Baugerd, H., Andersen, L. F., Moskaug, J. ¿, Jacobs, D. R. J., and Blomhoff, R. 2002. A Systematic Screening of Total Antioxidants in Dietary Plants. J. Nutr. 132:461-471.
6. Maloy, O. C. 1997. White pine blister rust control in North America: A case history. Annu. Rev. Phytopath 35:87-109.
7. Mashburn, E. 2000. *Ribes*: A view from the other side. Hort Tech. 10:565-566.
8. McKay, S. 2000. State regulation of *Ribes* to control white pine blister rust. Hort Tech. 10:562-564.
9. Pritts, M., McKay, S., Wilcox, W., and English-Loeb, G. 2000. Crop Profile for Currants in New York. Cornell University, Ithaca.
10. Rhodes, C., and Smith, D. R. 2006. Black currants: New crop life for the NY farmer. in: New York Farm Viability Institute Website Press Releases.

(Reprinted with permission from: Proceedings of 2009 Empire State Fruit and Vegetable EXPO and Becker Forum, February 11-12, 2009.)

HIGH TUNNEL BLACKBERRIES AND RASPBERRIES

Marvin Pritts, Professor, Dept. of Horticulture, Cornell University, Ithaca, NY 14853

The price of raspberries and blackberries doubles during the off season as fruit must be imported from the Southern Hemisphere to meet demand. However, new technology is allowing local growers to realize higher prices for blackberries and raspberries produced as late as November.

We have examined 3 strategies for producing these fruits beyond the normal season using high tunnels. In all cases, fruit quality in the tunnel has been much improved compared to the outside where percent marketable fruit can be 20 – 40% higher.

1) Grow primocane-fruiting raspberries and blackberries under late-covered high tunnels to extend the fruiting season into the fall.

Primocane-fruiting raspberries and blackberries are grown throughout the season in an uncovered tunnel. Some plants are pinched in June when they are about 3 feet tall in order to delay flowering. In late August or early September, the tunnel is covered. Plants begin fruiting then. Outside plants succumb to frost in early October, but those within the tunnel continue fruiting for another 4 – 5 weeks. If plants experience extreme cold under the tunnel, they can be covered with row cover for one or two nights until temperatures warm again.

Yields from fall-crop-only raspberries have been quite high, between 2,000 – 3,000 half-pints per 30 X 96 ft. tunnel. Canes are mowed to the ground after harvest and the cycle repeats. Heritage, Caroline, and Josephine have performed well in this system. We are currently examining the performance of Prime-Jan primocane-fruiting blackberry, with the intention of producing these fruits in September and October.

2) Accelerate primocane-fruiting raspberries by growing them under a continuously-covered tunnel.

We grew Heritage raspberries under a continuously-covered tunnel. In addition, we covered individual rows with row covers or small plastic hoops for a short time in early spring to provide even more heat. Production was compared to uncovered plants.

We found that, although some treatments accelerated flowering and fruiting, the difference with field-grown plants was not that dramatic. Yields were mostly unaffected between the various covering treatments and with field-grown plants. Mite populations were very high in the tunnel, however, and probably reduced potential yield. The other difference with field-grown plants was that primocanes grew exceptionally tall in the covered tunnels, so tall that they were difficult to harvest.

Since these canes were so tall, we did not remove them after fall harvest, but overwintered them to obtain a spring crop on what were then very long floricanes. These floricanes produced significant yield, about 30 – 40% of what the previous fall crop produced. Yield potential was even higher, but new primocanes interfered with the harvest of floricanes. In addition, mites were still a problem on these canes, and berries were smaller with the summer crop. However, it could be worth keeping primocanes through the winter to obtain a summer harvest.

3) Overwinter tender blackberries and black raspberries under a continuously-covered tunnel.

Many caneberries cannot tolerate the winters of Upstate New York. Blackberries with excellent flavor exist, but they often are not fruitful in our climate. We have found that blackberries and black raspberries grow and fruit exceptionally well under tunnels. Despite the fact that temperatures fluctuate more inside than outside a tunnel and that temperatures within are just as cold as those outside, the plants tolerate this quite well. This is likely due to less desiccation from cold, dry winter winds within a tunnel. Blackberries and black raspberries are much more tolerant of mites and hot temperatures than red raspberries, so they grow exceptionally well under tunnels.

Yield differences between outdoor and covered blackberries have been dramatic. Although we get very little production from most blackberries grown outdoors, it appears that we have full crops inside the tunnels. Doyle, Ouachita, Triple Crown and Chester have performed well for us. Black raspberries responded less than blackberries to the tunnel environment.

A detailed description of high tunnel berry production can be found at:
http://www.fruit.cornell.edu/Berries/bramblepdf/hightunnelsrasp.pdf.

(Reprinted with permission from: Proceedings of 2009 Empire State Fruit and Vegetable EXPO and Becker Forum, February 11-12, 2009.)

VIRUS DISEASES OF SMALL FRUIT: TIPS FOR AVOIDING AND ASSESSING PRESENCE OF VIRUSES IN BLUEBERRIES AND RASPBERRIES

Kerik D. Cox and Marc Fuchs, Assistant Professors, Dept. of Plant Pathology and Plant-Microbe Biology, Cornell University, NYSAES, Geneva, NY 14456

Blueberry and Raspberry Viruses in New York

In recent years, there have been several outbreaks of berry virus diseases in NY occurring as far north as Oswego County to as far south as Tioga County. Moreover, our program at NYSAES has received more suspected berry virus samples in 2008 than any of the previous seasons. The majority of suspected berry virus disease samples were for blueberries and raspberries, which is understandable since they are both perennial crops. Fortunately, the majority of the samples received were clearly not virus diseases and represented miscellaneous isolated horticultural anomalies. Such samples provided a clear impetus for more extension education on virus problems to address producer concern. At the same time, there have been two severe berry virus outbreaks that we will use as the basis for this education.

Since 2006, the majority of the outbreaks in NY blueberries have been *Tobacco ringspot virus* (TRSV) and *Tomato ringspot virus* (ToRSV) epidemics restricted to the field in which they occurred. When contracted these viruses are quite devastating to the planting. TRSV and ToRSV compromise fruit production considerably and can lead to plant death as the infection becomes systemic. The disease spreads fairly slowly as the vector of both viruses is the (1/16th inch long) soil-borne dagger nematode, *Xiphenema americanum*. Although this nematode migrates best in sandier soils with large pore sizes, it is not uncommon to find it already distributed across a mature planting due to the fact that it can feed on numerous plant species, including fruit trees, small fruits, vegetable, ornamentals and weeds.

In NY raspberries we have only observed two virus outbreaks in recent years: one outbreak of crumbly berry and one of *Raspberry bushy dwarf virus* (RBDV). Crumbly berry is also caused by ToRSV and transmitted by the same nematode vector as in blueberries. Infected raspberries can range from slightly stunted to completely healthy looking. The most striking and diagnostic symptom of the virus is the production of small fruit, which crumble apart when touched. ToRSV infection prevents the maturation of fruit drupelets, which is the reason for drupelet disassociation on contact. Recently, an outbreak of RBDV was reported and confirmed in NY. This disease typically causes stunting and shoot proliferation in red raspberries, hence the name bushy dwarf. Virus infection can cause aborted drupelets and a crumbly berry symptom in some varieties, but will not hinder pollen production. What makes this disease exceptionally harmful is the fact that RBDV is pollen borne and seed transmitted, meaning that nearby healthy plants can become infected during pollination. Because of this mode of transmission, this virus can spread much more rapidly than ToRSV in raspberry plantings.

How to distinguish viruses from other problems

Because of the devastating nature of virus diseases in plants and the fact that there is no cure in a fruit planting, it becomes important to be able to distinguish virus problems from other subtle but similar looking horticultural problems. The reason that viruses look so similar to horticultural problems is due to the fact that virus infection primarily upsets the plant physiology in similar ways to a nutrient deficiency or toxicity. For example, if a virus infection and nutrient deficiency disrupts chloroplast production, they would both cause affected regions of leaves to appear discolored. This being said, there are several things one can look for to see if virus infection is a likely culprit of the symptoms problem. Below is a list of considerations regarding virus development in a fruit planting:

1. Number of shoots and leaves expressing virus-like symptoms: Do not be alarmed by the presence of a few crumbly bramble fruits, or interveinal or patterned chlorosis on one or two leaves or shoots on a cane or bush. Indeed, symptom distribution can be patchy throughout an individual plant, but only one or two strange looking leaves or shoots is not cause for alarm all by themselves.
2. Intensity of virus-like symptoms: Although virus infected plants can be asymptomatic, poor fruit production, or lack thereof is not reason enough to suspect a virus infection. In the infected plantings that were visited, symptoms were spectacular enough as to be certain to the untrained eye.
3. Timing of symptom appearance: Virus tissue titers are often greatest during the height of plant tissue production at spring time, and as such, virus symptoms will be most readily apparent during peak biomass production. Hence, the sudden appearance of bizarre symptoms at the end of the summer during the beginning of senescence is not likely to be a virus problem. Young tissue that failed to mature during the season due to poor nutrition can look quite spectacular.
4. Symptom distribution pattern: Viruses are usually patchy in distribution during their initial inception. This is due to the restricted movement and habitation patterns of the virus.
5. Symptom distribution pattern across varieties: Varieties vary in susceptibility and response to virus infection. Symptoms are usually clustered or differentially expressed in different varieties. Uniformly distributed

symptoms across plants, blocks, and varieties are more likely to be due to abiotic causes like a nutrition regime, unless every plant is already virus-infected at planting.

How to avoid and get rid of viruses

Since viruses are absolute parasites, there are no chemical pesticides that can be applied to control them. Even if there were effective chemical controls, the viruses are protected within the host tissue. The best defense is to avoid them. Unfortunately, vectors are less avoidable but they can be sampled and treated for prior to planting in the case of nematodes. More unfortunately, planting stock can arrive at your doorstep already infected with viruses. Hence, it is most important that one only purchases planting material from established nurseries in areas where virus certification programs are implemented.

Once, a plant has a virus, it has the virus for life. The only way to get rid of the virus from your planting is to remove and destroy the infected plants. You cannot just remove the symptomatic plants as the neighboring plants may be recently infected, but do not have high enough virus titers to display symptoms. For most virus diseases of blueberries and raspberries, it may be important to remove the entire block or planting to make sure you get rid of the problem. It is risky to your continued operations and neighboring operations to leave the crop in the ground in the hope of getting another harvest.

How can NYSAES help berry producers?

NYSAES has the infrastructure, equipment and expertise to conduct virus testing for any number of berry crops and viruses. Given the prevalence of ToRSV in NY, it would be pertinent to conduct a statewide survey of blueberries and raspberries for viruses. Such survey could be conducted as a collaborative effort between growers, Cornell extension specialists, IPM coordinators and plant pathologists at NYSAES. With the equipment and infrastructure on hand, the only necessary support would consist of resources for sample collection and processing and test reagents.

References:

1. F. L. Caruso and D. C. Ramsdell. 1995. Compendium of Blueberry and Cranberry Diseases. APS Press. 87 p.
2. Pritts, M. and Hancock, J. 1992. Highbush Blueberry Production Guide. NRAES-55. Cornell cooperative Extension, Ithaca, NY, 200p.
3. Pritts, M. and Handley, D. 1989. Bramble Production Guide. NRAES-35. Cornell cooperative Extension, Ithaca, NY, 200p.
4. M.A. Ellis, R.H. Converse, R.N. Williams and B. Williamson. 1991. Compendium of Raspberry and Blackberry Diseases and Insects. APS Press. 100 p.
5. Schilder, A., Isaacs, R., Hanson, E. and Cline, B. 2004. A pocket guide to IPM scouting in highbush blueberries. Michigan State University Extension Bulletin E-2928. 127 p.

(Reprinted with permission from: Proceedings of 2009 Empire State Fruit and Vegetable EXPO and Becker Forum, February 11-12, 2009.)

BEST MANAGEMENT PRACTICES FOR SMALL FRUIT: - STRAWBERRY SURVEY SAID…

Rebecca Harbut, Cathy Heidenreich, Laura McDermott, and Marvin Pritts, Department of Horticulture, Cornell University CALS, Ithaca, NY 14853

This is the fourth and final article in a series detailing results of a NYS Berry Grower Survey conducted November 2007, as part of the 2007-2009 NYFVI Berry Production Efficiency Project. Survey participants were asked to identify management practices giving them the best production efficiency for various small fruit crops. Best management practices information collected from 89 growers across 37 NYS counties was tabulated, summarized, and then shared through this series. Currants and gooseberries were highlighted in the December 2008 issue. Blueberries were the crop for discussion in January's issue; brambles (raspberries and blackberries) in the February issue. This final article discusses strawberries.

Our thanks to the New York Farm Viability Institute, the New York Berry Growers Association and Cornell University CALS Department of Horticulture for their support of this project.

Planting Establishment

The successful establishment of a strawberry planting depends on pre-planning. Choosing the appropriate site and understanding the history of that site will help potential growers avoid long-term problems with poor drainage and soil borne diseases. Access to high-quality water for irrigation and frost protection is also a must. Land with slopes greater than 5% are erodible and difficult to manage. Sites with a 3-5% north or east facing slope tend to have the least problems with spring frost damage and winter injury. Growers surveyed mentioned the importance of using cover crops prior to

planting to reduce weed problems and improve soil tilth. The lack of this type of pre-planning and site consideration was mentioned as being a significant factor in failure by one strawberry grower.
When questioned about techniques that worked well during planting, 36% of growers recommended planting dormant plants early in the spring compared to 6% of growers that recommended using plug plants. Due to the variation in potential planting times, suggested calendar dates range from Mid-April to mid-May. Those using plugs were planting in late May to mid-June.

Twenty-one percent of growers said that drip and/or overhead irrigation were extremely important for a successful installation and one grower mentioned that frequent watering during the entire 1st season was very important. One grower surveyed was dipping dormant plants in a Hydro-Gel solution that coats the roots to encourage water absorption and discourage root desiccation. Three growers mentioned the importance of setting the plants at the appropriate depth and allowing enough room to accommodate the long root system. This can be a challenge when first setting up a transplanter.

The majority of growers surveyed favored the traditional matted row, but 18% of growers were happy with growing strawberries on plastic mulch. The mulch must be laid using a mulch laying implement. Mulch layers stretch the mulch tight around a raised bed or on the ground and the edge of the mulch is covered with soil. This insures that the mulch will stay in place during the growing season. A grower accurately noted that laying the mulch after planting is not a practical approach.

Some other plant establishment "tips" from growers include adding kelp or soluble starter fertilizer at planting. Whether from an organic or inorganic source, it has not been definitively shown that adding N at planting significantly improves plant vigor and yield.

Weed Management

Growers responded to the topic of weed management in greater numbers than in any other category of the survey. Seventy-two growers had input about what worked well and what didn't work when managing strawberry weeds. Forty-nine percent of the growers used herbicides in one form or another to help control weeds and thought that this approach worked well, but 24% of responses said that certain herbicide treatments did not work. The registered herbicides were fairly well represented between pre-emergent and post-emergent materials. Happily, there are several more herbicides available now than in 2007 when the survey was done. Fourteen percent of responders said 2,4-D applied in late fall did a good job controlling broadleaf weeds.

Seven percent of responders indicated that well-timed cultivation, heavy mulching and black plastic provided an adequate amount of weed control, but 9% of the growers reported that relying on cultivation did not work well for them. Shallow cultivation is recommended on a weekly basis after the renovation process.

One grower is using the soil fumigant Vapam in the fall to reduce the risk of soil diseases and weed problems. A second grower has moved to an annual production system due to the weed problem.

An integrated approach to weed management is the most effective way to manage weeds in a perennial system. Rotations, hand weeding, mulching, hoeing and cultivation are necessary supplements to chemical weed control. Pre-plant preparation, which was mentioned by just one grower, should be an integral part of all berry farmers weed management plans.

Production Systems

Just less than 50% of the berry farmers surveyed indicated that the matted row production system was their preferred production system. Six percent of the growers surveyed said that plasticulture systems worked well, but 15% listed plasticulture as a production system that worked poorly. The only other production system that was specifically mentioned was the ribbon row from one grower that did not like the system.

The big advantage to a matted row system is that the initial establishment cost is low, due to the lower density of plants. Despite the initial economy, the labor invested in keeping this low density planting weed free during the first season can be quite high. Additionally the matted row system may result in a very dense planting that is hard to pick from and may be more pest prone. This is especially true if the rows are not aggressively narrowed at renovation, a fact echoed by several growers.

Two growers mentioned that they were using a slightly tighter spacing than the standard 18" within the row. These growers are planting at 12-15" within the row and leaving only 3' between rows. This means the farmer will work hard at keeping the matted row narrow, but that effort may pay off as research has shown that more numerous narrow rows are more productive on a per acre basis than a planting with fewer wide rows. Despite this research, it does not appear that NYS berry growers are embracing the ribbon row system, which is a very high density system where within row spacing is

3-6" and between rows is 3'. Raised beds are recommended for this system. Plant density in a ribbon row system varies from 29,000-58,000 plants per acre compared to a traditional matted row system that has 7,260 plants per acre. Ribbon row systems are not deflowered during the first year so that runnering is suppressed. Fruit can be harvested during the first season, and this adds to the attraction of the high density system.

Seventeen percent of growers responding to this question mentioned cultivation practices that were important to the success of their production system. These growers were using cultivators with discs in order to toss a little soil over the top of the strawberry crowns. Others mentioned that cultivating while also sweeping runners into the matted row was an easy, labor efficient way to fill in the planting. Growers mentioned trickle irrigation as important to their success and strawberry rotations of 2-3 years were also recommended.

Methods that did not work for a few growers were the stale seed bed and rye planted between the rows. Research shows great promise for both of these herbicide reducing methods, but growers should manage no-till systems with great care. For more information about recent work with pre-plant techniques, visit the August 2008 NYBN at http://www.nysaes.cornell.edu/pp/extension/tfabp/newslett/nybn78a.pdf.

Early season berry planting.

Berries on plastic mulch.

Floating row cover to speed early spring flowering.

Planting needing renovation/weed management.

Strawberry planting with permanent rye drive rows

Planting strawberries into killed sod.

Fertility

Strawberry nutrition and fertilization are important to the success of a strawberry planting, but they are not well understood. This was somewhat reflected in the variety of responses to the survey. The most commonly listed "misapplication" of nutrients was when early spring applications of nitrogen are mentioned. Twenty-two percent of responses mentioned that they applied some form of N in early spring. Studies have shown that this can result in an increase in gray mold and mites as well as a reduction in fruit quality. The best time to apply N to a bearing strawberry field is immediately after fruiting (during the renovation process in a matted row system). Nitrogen should be supplemented in late summer to maintain N availability throughout the fall.

Three growers mentioned that when preparing the site for planting, they incorporate manure based compost at a rate of 5-10 tons per acre. This practice is perfectly acceptable as long as the compost is not added any less than 90 days from harvest. This recommendation is part of the Good Agricultural Practice (GAP's) guidelines. It is a mandatory rule for all growers seeking GAP's certification and is strongly advised for any strawberry grower selling berries for fresh consumption. Compost and manure help improve soil structure as well as release N as the solid organic components decompose. Growers should realize that in most situations insufficient N is released from manure or compost to meet the total nutrient requirements of the strawberry plant.

A typical N fertilization regime is listed in NRAES-88, The Strawberry Production Guide. This standard program consists of 30# actual N per acre 4 weeks after planting followed by 40# actual N/acre in early September during the planting year. In Year 2 and thereafter (depending upon results from the foliar analysis) 70#/acre of actual N should be applied immediately after fruiting followed by 30#/acre in early September. It appears from the survey responses that most growers are getting close to the recommended amount of N, but timetables for the applications vary from the standard. As long as N is not being applied before fruiting, or too late in the season to be a help, slight differences in the application time shouldn't be a problem.

CaNO3 was the nitrogen source that 21% of respondents mentioned specifically. The N in CaNO3 is readily available plus it does not volatilize and has a low salt index making it a nice material for new plantings. Urea was mentioned specifically by 2 growers and ammonium nitrate by one grower, although not every respondent specified the form of N that they were using. Urea is the least expensive form of nitrogen available but it can volatilize which is why incorporation is recommended. Volatilized ammonia can blacken strawberry leaves.

Twenty-two percent of responding growers are fertilizing their strawberries either occasionally or entirely through a drip-irrigation system. Fertigation is an effective way of providing micronutrients to plants as the application is more uniform and less fertilizer is required. The amount of fertilizer to apply depends upon many factors, but a starting point would be 4#/acre/week, although growers should keep careful records and be prepared to alter this if necessary. One grower gave the following account of his fertigation plan: "We use liquid N and inject 6 #/ac beginning in mid-May and drop back to 2# N/ac at each irrigation during the planting year. During the fruiting year, we keep the rates up, and augment with a 20-20-20 water soluble fertilizer at 5#/ac rates." This follows a general recommendation of 10#/acre/week of N between mid-July and mid-September of the fruiting year. With all fertigation materials, care should be taken as combinations of certain nutrients can form precipitates which can plug emitters.

Only 1 grower mentioned using foliar fertilizer treatments on occasion to augment N and Ca in his fertility plan. Using foliar fertilizer to augment, but not provide the basis of the nutrition for the planting, is a good way to proceed.