NEW YORK BERRY NEWS
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Cornell University
College of Agriculture and Life Sciences

# New York Berry News

**Cornell University Berry Team**

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## *Website Makeover Connects Fruit Growers with Cornell Resources*

*Craig Cramer, Communications Specialist, Dept. of Horticulture: and Juliet Carroll, Fruit IPM Coordinator, NY State IPM Program*

Thanks to a total makeover, the Cornell Fruit website (fruit.cornell.edu) makes it even easier for commercial fruit growers to find the information they need.

"We've totally reorganized and updated the site – adding new content, plus making it a more useful portal to information that will help you stay profitable while protecting the environment," says Juliet Carroll, Fruit IPM Coordinator for the New York State IPM Program. Carroll led a team of Cornell faculty, Extension educators and others who revamped the site.
Three sections – tree fruit, grapes and berries – help you quickly zero in on what you're looking for. Each fruit section covers production, pest management and post-harvest topics.

"We've also made key resources – those you use most often – very easy to find," notes Carroll. These include Cornell's pest management guidelines, organic production guides, food safety information, farm labor resources and more. Find resources on marketing, business management, labor and worker safety, enology and value-added opportunities for all crops through dedicated web pages.


A new blog-driven news and events section helps you stay up to date. Find newsletters available from local and regional Cornell Cooperative Extension fruit programs on one page and subscribe to the ones that fit your needs.

"We also worked with the New York State Horticultural Society to extract more than 200 articles from the New York Fruit Quarterly journal dating back to 2000. And we link to those individual articles from appropriate sections of the website," notes Carroll. The site makeover was made possible, in part, by a Smith-Lever grant and Cornell Cooperative Extension.

"Whether you are a new or experienced grower, if you are looking for a 'one-stop shop' for information, this site is the place to start," she adds.

## Upcoming Berry Events

**January 31 – February 2, 2012.** *Mid-Atlantic Fruit and Vegetable Convention*, Hershey, PA. For more information call William Troxell at 717-694-3596 or visit http://www.mafvc.org.

**February 4, 2012.** *Introduction to Commercial Berry Growing,* 248 Grant Avenue, Auburn, NY 13021. Details follow.

**February 6-8, 2012.** *North American Strawberry Growers Association (NASGA )Annual Meeting and Conference,* Harrah's Las Vegas, Las Vegas, NV. For more information visit http://www.nasga.org or call Kevin Schooley at the NASGA office 613-258-4587.

**February 14-17, 2012. 2012** *Hudson Valley Commercial Fruit Growers' School*, Holiday Inn, Kingston, NY. Berry session Thursday, Feb. 16, 2012. Details follow.

**February 18 to 22, 2012.** *7th International Strawberry Symposium*. Beijing, China. http://www.iss2012bjchina.org.cn.

**February 27, 2012.** *Cornell 2012 Winter Grower Meeting*, Niagara County CCE Training Center, 4487 Lake Ave., Lockport, NY 14094. AM Program – For Fresh Market vegetable growers. PM Program – For Small Fruit growers. Lunch Provided, agenda & registration info in next issue (February) or online soon at http://www.fruit.cornell.edu/news_events/index.htm.

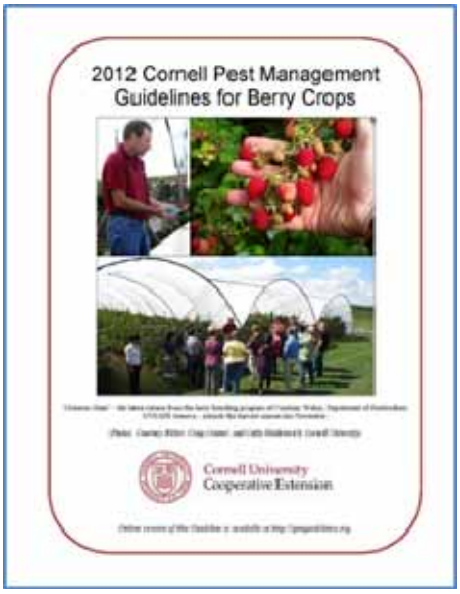
**February 29 to Mar 2, 2012**. *US Highbush Blueberry Council Spring Meeting,* Sheraton Fisherman's Wharf, San Francisco, CA. For more information: http://www.blueberry.org/calendar.htm#Meetings

**March 13, 2012.** *Commercial Berry Grower Update,* Binghamton, NY. Details follow.

## 2012 Cornell Pest Management Guidelines for Berry Crops Now Available

**M***ichael Helms, Cornell University Pest management Education Program*

The 2012 edition of the *Cornell Pest Management Guidelines for Berry Crops* is now available.




This annual publication provides up-to-date pest management and crop production information for blueberry, bramble (raspberry and blackberry), strawberry, ribes (currant and gooseberry), cranberry, elderberry, and Juneberry (Saskatoon) production in New York State.

Supplemental information on wildlife management and harvesting, handling, and transporting berry crops is also included.

This publication has been designed as a practical guide for berry crop producers, crop consultants, ag chemical dealers, and others who advise berry crop producers.

In addition to the annually revised pesticide and crop production information, two new items have been added to the 2012 edition of the *Berry Guidelines* that will be beneficial to berry producers:

Resistance management codes for pesticides mentioned in the guide and
A new chapter discussing new and emerging pests of concern for berry crops.

The 2012 *Cornell Pest Management Guidelines for Berry Crops* can be obtained through your local Cornell Cooperative Extension office or directly from the Pesticide Management Education Program (PMEP) Educational Resources Distribution Center at Cornell University.

To order from PMEP, call (607) 255-7282, send an email to patorder@cornell.edu, or order on-line at http://psep.cce.cornell.edu/store/guidelines. Cost for the *Guide* is $26, shipping included.

## Commercial Berry Grower Update

**March 13th, 2012**

*Cornell Cooperative Extension of Broome County, 840 Upper Front St., Binghamton, NY 13905*

Cost: $30 per person. 4.5 DEC credits available in the following categories: 1a, 11 & 22. To register or for more information, contact Carol at clf62@cornell.edu or (607) 772-8953.

**Program:**
8:30am: **Registration & Light Breakfast**

9:00am: **Welcome**

## Commercial Berry Grower Update (continued)

9:15am: **Water Management & Irrigation for Small Berries and Brambles** – *Dr. Larry Geohring, Cornell University*
Climate change and rising energy costs will challenge the productivity, profitability, and sustainability of commercial berry production. This presentation will address water management requirements of small berries and brambles with respect to potential changing climatic conditions, and what commercial growers should consider to address these issues. Efficient methods of irrigation technology such as drip irrigation will be discussed, along with information on how to compare rising energy and pumping costs.

10:00am: **Soil & Nutrient Management** – *Dr. Marvin Pritts, Cornell University*
This session will address the major considerations for soil management in berry crops, with an emphasis on nutrition. The following will be addressed: soil physical properties, soil biological properties, soil chemical properties, sampling and testing, principles of supplying nutrients to berry crops, and expectations regarding plant response to fertilizer and lime.

10:45am: **Weed Management in Strawberries/Blueberries** – *Dr. Marvin Pritts, Cornell University*
Weeds are perhaps the greatest challenge for berry growers. Managing them requires considerable planning and strategic use of multiple tools. This session will review strategies for managing weeds, and discuss approaches to control particular problematic weeds, including herbicides.

11:30am: **Organic berry guides and TracBerry record-keeping software from the NYS IPM Program** – *Dr. Juliet Carroll, NYS IPM Program*
Learn how to obtain the Organic Blueberry and Strawberry Production Guides and TracBerry software. Details about the content of the organic guides will be presented. Growers will gain an understanding of the steps involved in certifying their farms for organic production and protecting their crops from pests with pesticides and biologicals that are allowed in organic production. TracBerry software for keeping spray records and generating spray reports, such as the Applicator Record and the USEPA Central Posting Form, will be demonstrated. Growers will gain an appreciation of the importance of accurate records and how easy it is to use TracBerry software.

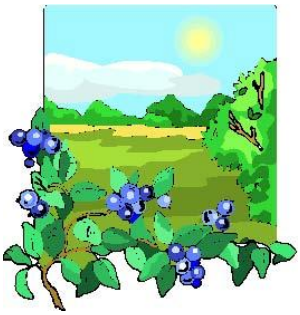
12:15pm: **Lunch, provided**

1:00pm: **Effective Sprayers for Berry Crops** – *Dr. Andrew Landers, Cornell University*
The best pest controls in the world don't work if they don't reach their target, and it's surprising how many sprayers out there are a load of rubbish! Dr. Landers will discuss characteristics of sprayers that work well and why they work. He'll also show examples of innovative sprayer technology for small scale berry production.

1:45pm: **Disease Management Update: Root Diseases** – *Dr. Kerik Cox, Cornell University*
The presentation will focus on root diseases of blueberries, raspberries, and strawberries in the field production settings. Diseases relevant to and reported in NY production operations will be used as model systems to illustrate production-relevant information. Specific topics to be covered will include diagnosis and management considerations for root diseases of blueberries, raspberries and strawberries.

2:30pm: **Variety Updates** – *Dr. Courtney Weber, Cornell University*
Variety choice in berry production has broad implications in production systems, marketing and pest management decisions. Standard strawberry, raspberry and blueberry varieties will be discussed as well as new varieties that may have application in NY growing conditions. Pest management considerations regarding particular susceptibility and resistance to insect and disease pests of individual varieties will be discussed. Seasonal differences between pest management and marketing opportunities will be emphasized in relation to fruit quality and yield considerations when choosing berry varieties for fresh market and/or processing.

3:15pm: **Arthropod Pest Management for Small Fruit Crops** – *Cathy Heidenreich, Cornell University*
This talk will provide a brief overview of the key arthropod pests of berry crops with an emphasis on strawberries, raspberries and blueberries. It will cover aspects of pest biology and ecology, damage symptoms and impact, and alternative management tactics (e.g. chemical, biological, and cultural control). Key pests to be covered include tarnished plant bug, strawberry sap beetle, raspberry cane borer, raspberry crown borer, spider mites, Japanese beetle, cranberry fruitworm, blueberry maggot. It will also include information on 2 new pests - spotted wing drosophila and brown marmorated stinkbug. In addition to specific pest information, it will also review some of the important key concepts of integrated pest management.



# Introduction to Berry Growing

## Saturday, February 4, 2012
## 9:00 am to 11:30 am
## Cornell Cooperative Extension Cayuga County
## 248 Grant Avenue, Auburn, NY 13021

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:**

- Marketing
- Startup costs
- Site Selection
- Preparation and layout
- Cultivar selection and planting
- Crop production and management
- Labor and profitability

**Topics include:**

- Nutrient management
- Weed, insect and disease management
- Trellising
- Irrigation and more

**Fee: $15.00 per family.**

To register or for additional information, contact Cornell Cooperative Extension at 315.255.1183.

**"Please contact the Cornell Cooperative Extension Cayuga County office if you have special needs or are unable to pay."**

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## Registration Form for Introduction to Berry Growing

Saturday, February 4, 2012 CCE Cayuga County, 248 Grant Ave., Auburn, NY

**Fee: $12 per family**

Name: _____
Please Print Clearly

Address: _____

Phone number (in case of cancellation): _____

Number attending: _____ Total amount enclosed: $ _____

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

Cornell University
Cooperative Extension
Cayuga County

Attn.: Peggy Lillie
CCE Cayuga County
248 Grant Avenue
Auburn, NY 13021

Cornell University
Cooperative Extension

Hudson Valley Regional Fruit Program

# 2012 Hudson Valley Commercial Fruit Growers' School

*An Educational Program for Tree Fruit, Berry and Grape Growers*

## February 14-17, 2012

Holiday Inn of Kingston
503 Washington Avenue, Kingston, NY 12401

*Presented by: Cornell Cooperative Extension Hudson Valley Regional Fruit Program of Columbia, Dutchess, Orange and Ulster Counties*

### You save $10 per day if you pre-register by February 6, 2012!

**To pre-register, complete and mail this form with your check or credit card information to "Cornell Cooperative Extension, 232 Plaza Road, Kingston, NY 12401. Attention – Fruit School"** (note our address has changed). It must reach us by February 6, 2012 to receive the pre-registration discount. Please register at the event if your payment will not reach us by 2/6. Contact Carrie Anne at (845) 340-3990 for information.

NAME: _____

BUSINESS NAME: _____

ADDRESS: _____

TELEPHONE: _____

E-MAIL: _____

***Please indicate number of people attending each session:***

**Tuesday, February 14, 2012: - Tree Fruit Session and Trade Show**

____ attending X $35 (includes lunch & Trade Show, $45 if purchased at door) = $_____
____ attending X $30 (no lunch, $40 if purchased at door) = $_____

**Wednesday, February 15, 2012: - Tree Fruit Session**

____ attending X $35 (includes lunch, $45 if purchased at door) = $_____
____ attending X $30 (no lunch, $40 if purchased at door) = $_____

**Thursday, February 16, 2012: - Berry Session**

____ attending X $35 (includes lunch, $45 if purchased at door) = $_____
____ attending X $30 (no lunch, $40 if purchased at door) = $_____

**Friday, February 17, 2012: - Grape Session (PLEASE NOTE GRAPE SESSION PRICE DIFFERENCE)**

____ attending X $45 (includes lunch, $55 if purchased at door) = $_____
____ attending X $40 (no lunch, $50 if purchased at door) = $_____
Total = $_____

**Payment Options:**

**Enclosed is a check** (made payable to CCEUC ) _____

***or***

**Charge my:** MasterCard_____ Visa _____ Expiration Date (month/year) _____

Name on Credit Card _____

Credit Card Number (print clearly) _____

Zip Code of Card Holder _____ Card Holder Signature _____

**The Holiday Inn is offering a special $89.00 room rate for this conference. Reservations must be made by February 14, 2012 to obtain this rate. Call 845-338-0400 and mention Cornell Fruit Growers' School.**

## Agenda - Thursday, February 16, 2012 – Berry Session

**8:00 – 8:50 AM** **Registration. Sign DEC Recertification Credit rosters.**

**9:00 – 9:05 AM** **Announcements**
Steven McKay, *Cornell Coop. Extension HVRFP, Hudson, NY*

**9:05 – 10:00 AM** **Using Trac Software: The Basics**
Dr. Juliet Carroll, *NYIPM Program, Geneva, NY*

- Opening Trac, Enabling Macros and Saving Files
- Protecting Your Software and Hidden Rows
- Updating Trac from the Previous Year, Excel Shortcuts and Trac Tips
- Setting Up Your Information in Trac – Name, Address, Applicators, SiteLists
- ChemTable, Inventories and Tank Mixes
- Keeping Records in Trac, SprayData, FertData and HarvestData
- EPA WPS Central Posting Form, Applicator Records
- Creating and Printing Reports with Trac

**10:00 – 10:10 AM** **Break**

**10:10 – 11:15 AM** **Advanced Features of Trac Software**
Dr. Juliet Carroll, *NYIPM Program, Geneva, NY*

- More about SiteLists
- Advanced ChemTable Features
- Customizing Trac Software
- Create Report Files to Submit Electronically
- Working with Data, Filtering and Sorting
- Where to Access Technical Support

**11:15 – 12 Noon** **Preparing a Food Safety Plan for Your Farm**
Mike Fargione, *Cornell Coop. Extension HVRFP, Highland, NY*

**12:00 – 1:00 PM** **Lunch and networking**

**1:00 – 1:30 PM** **Financial Recordkeeping Tools**
Laura McDermott, *Cornell Coop. Extension CDVSFP, Hudson Falls, NY*

**1:30 – 2:00 PM** **Processed Products Recordkeeping**
Steven McKay, *Cornell Coop. Extension HVRFP, Hudson, NY*

**2:00 – 2:30 PM** **Composting and Mulches**
Steven McKay, *Cornell Coop. Extension HVRFP, Hudson, NY*

# USDA News

## Funding for On-Farm Energy, Organic, High Tunnel and Air Quality Conservation Initiatives

*Syracuse, December 30, 2011* - All four initiatives offer technical and financial assistance through the Natural Resources Conservation Service's (NRCS) Environmental Quality Incentives Program (EQIP). The On-Farm Energy, Organic and Seasonal High Tunnel initiatives are available statewide, but the Air Quality funding is limited to counties with serious air quality concerns. The links below will take you to the information you need to sign-up for any of these initiatives.

NRCS accepts applications for financial assistance on a continuous basis throughout the year. This year, there will be 3 ranking periods for the initiatives: February 3, March 30 and June 1. The Air Quality Initiative has two ranking dates which end February 3 and March 30. At the end of a ranking period, NRCS ranks all submitted proposals for funding consideration. NRCS will notify all applicants of the results of the rankings and begin developing contracts with selected applicants.

**Initiative Overviews**

*On-Farm Energy Initiative* - NRCS and producers develop Agricultural Energy Management Plans (AgEMP) or farm energy audits that assess energy consumption on an operation. NRCS then uses audit data to develop energy conservation recommendations. Each AgEMP has a landscape component that assesses equipment and farming processes and a farm headquarters component that assesses power usage and efficiencies in livestock buildings, grain handling operations, and similar facilities to support the farm operation. More information http://www.ny.nrcs.usda.gov/programs/eqip/energy.html

*Organic Initiative* - NRCS helps certified organic growers and producers working to achieve organic certification install conservation practices for organic production. New for fiscal year 2012, applicants will be evaluated continuously during the ranking periods. Applications meeting or exceeding a threshold score may be approved for an EQIP contract before the end of the ranking period. Applications rating below the threshold score will be deferred to the next period. A new threshold score will be established at the beginning of each ranking period. This new scoring process allows organic producers to implement conservation practices in a timelier manner. More information: http://www.ny.nrcs.usda.gov/programs/eqip/organic.html

*Seasonal High Tunnel Pilot Initiative* - NRCS helps producers plan and implement high tunnels, steel-framed, polyethylene-covered structures that extend growing seasons in an environmentally safe manner. High tunnel benefits include better plant and soil quality, fewer nutrients and pesticides in the environment, and better air quality due to fewer vehicles being needed to transport crops. More than 4,000 high tunnels have been planned and implemented nationwide through this initiative over the past two years. More information: http://www.ny.nrcs.usda.gov/programs/eqip/high_tunnel.html

*Air Quality Initiative* - NRCS helps producers address air quality concerns on their operations. Assistance includes establishing cover crops, planting windbreaks, implementing nutrient management practices and applying other conservation measures that mitigate and prevent air quality problems. Conservation practices installed through this initiative reduce airborne particulate matter and greenhouse gases and conserve energy. More information: http://www.ny.nrcs.usda.gov/programs/eqip/air_quality.html

## Conservation Stewardship Program Sign-up Extended to January 27

*January 12, 201, Syracuse, NY* - USDA Natural Resources Conservation Service Chief Dave White announced that the cut-off date for the current Conservation Stewardship Program (CSP) ranking period has been **extended to January 27, 2012**. Producers who maintain a high level of conservation on their land and agree to adopt higher levels of stewardship are eligible for CSP payments.

"We want to make sure that people who want to be considered for CSP during this first ranking period have the time they need to complete their applications," White said. "CSP is a very popular program and I encourage interested producers to apply at their local NRCS office as soon as they can."

CSP is offered in all 50 states, Tribal lands and the Pacific and Caribbean areas through continuous sign-ups. Administered by NRCS, CSP provides many conservation benefits including improved water and soil quality, enhanced wildlife habitat and conservation activities that address the effects of climate change.

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Producers are encouraged to apply for CSP throughout the year to be considered for current and future application ranking periods. Those who **apply by January 27, 2012**, may be eligible for current available funding. Eligible lands include cropland, pastureland, rangeland and nonindustrial forestland.

A CSP self-screening checklist is available to help producers determine if CSP is suitable for their operation. The checklist highlights basic information about CSP eligibility requirements, contracts obligations and potential payments. It is available from your local NRCS office and the NRCS New York Conservation Stewardship Program Web page.

## NRCS Announces $31.5 Million Available in Disaster Assistance to Communities in New York

*Syracuse, N. Y., January 19, 2012* - Agriculture Secretary Tom Vilsack announced an important package of disaster assistance to help farmers, landowners, communities and others recover and rebuild after the natural disasters of Irene and Lee. Funding is provided by the Natural Resources Conservation Service's Emergency Watershed Protection Program (EWP) as well as the Farm Service Agency's Emergency Conservation Program (ECP).

In New York, the Emergency Watershed Protection (EWP) program has $31.5 million available to local units of government for addressing public safety and restoration efforts on public, private and Tribal lands. When funding is allocated to a project, NRCS works with a project sponsor to contract the heavy construction work, spurring creation of jobs. Typical projects funded under EWP include the protection of threatened infrastructure from continued streambank erosion and stream down-cutting.

"We look forward to working with the local sponsors to restore these critical natural resource systems and help make these communities whole again," said Peter Wright, EWP Program Manger. He gave the assurance that NRCS's interdisciplinary teams would follow Federal law in evaluating the possible impacts the work might have on natural resources, cultural resources and the socioeconomic effects associated with the possible alternatives.

Local sponsors, such as a city, town, county, or Tribe may apply for assistance. EWP funding bears up to 75 percent of the construction costs. The remaining 25 percent must be obtained by the local sponsor and can be in the form of cash or in-kind services.

**Local units of government interested in applying for the funding are encouraged to submit a letter of request by January 31, 2012.**

To apply, a project sponsor must submit a formal letter to the NRCS State Conservationist requesting EWP assistance. You can view an example request letter: ftp:/ftp-fc.sc.egov.usda.gov/NY/Programs/ewp/sample_application_for_ewp_assistance_letter.pdf.%20. Once the letter has been received, NRCS will visit the damaged site to make an eligibility determination and to complete a Damage Survey Report. All projects undertaken through EWP must have a project sponsor. Project sponsors are encouraged to review the New York EWP Sponsors Guide (ftp://ftp-fc.sc.egov.usda.gov/NY/Programs/ewp/ewp_sponsors_guide_ny.pdf) and become familiar with the EWP program requirements.

For more information about the EWP program, local units of government are encouraged to contact the local NRCS office or visit the New York NRCS website at http://www.ny.nrcs.usda.gov/programs/ewp/index.html

## USDA to Measure the Economic Well-Being of American Farms

January 5, 2012. Albany, New York – The U.S. Department of Agriculture's National Agricultural Statistics Service (NASS) will spend the next several months contacting farmers and ranchers across the nation to conduct the Agricultural Resource Management Survey (ARMS). The results of this survey will serve as a baseline for numerous federal policies and programs that affect U.S. farms and farm families.

"ARMS is our primary tool for gauging the financial condition and production practices on American farms and ranches," said King Whetstone, director of the NASS New York Field Office. "By participating in this survey, New York farmers directly impact the decisions that affect them, their families and their operations."

NASS conducts ARMS jointly with USDA's Economic Research Service. In an effort to obtain the most accurate data, the federal agencies will reach out to nearly 35,000 producers nationwide, including 245 in New York, between January 23 and April 6. The survey asks the producers to provide data on their operating expenditures, production costs and household characteristics.

# USDA News

"Decision makers from all facets of U.S. agriculture will use the collective information from ARMS to answer questions and make important decisions concerning the economic viability of American agriculture, the rural economy and other emerging issues," explained Whetstone "That's why it is imperative for all farmers contacted by NASS to provide responses and help shape the future of U.S. agriculture."

As with all NASS surveys, information provided by respondents is confidential by law. NASS safeguards the confidentiality of all responses, ensuring no individual respondent or operation can be identified.

The economic data gathered in ARMS will be published in the annual *Farm Production Expenditures* report on August 2, 2012. All NASS reports are available online at www.nass.usda.gov.

NASS provides accurate, timely, useful and objective statistics in service to U.S. agriculture. The agency invites you to express your thoughts and provide occasional feedback on our products and services by joining a data user community. To join, sign in at http://usda.mannlib.cornell.edu/subscriptions and look for "NASS Data User Community."

## Agriculture Secretary Vilsack Announces Blueprint for Stronger Service to Increase Efficiency in USDA Operations

*Streamlined, Modernized Department Central to 21st Century USDA*

WASHINGTON, Jan 9, 2012 – The U.S. Department of Agriculture (USDA) must be built to meet the evolving needs of a 21st century agricultural economy, Agriculture Secretary Tom Vilsack said Monday in presenting USDA's Blueprint for Stronger Service, a plan that helps producers continue to drive America's economy by streamlining operations and cutting costs.

"The USDA, like families and businesses across the country, cannot continue to operate like we did 50 years ago," said Vilsack. "We must innovate, modernize, and be better stewards of the taxpayers' dollars. We must build on the record accomplishments of farm communities in 2011 with a stronger, more effective USDA in 2012 and beyond."

The Blueprint for Stronger Service is based on a Department-wide review of operations conducted as part of the Administration's Campaign to Cut Waste, launched by President Obama and Vice President Biden to make government work better and more efficiently for the American people. The agency took a hard look at all USDA operations, from headquarters to field offices. The end result is a plan that will create optimal use of USDA's employees, better results for USDA customers, and greater efficiencies for American taxpayers.

"As part of the Campaign to Cut Waste, the President and I asked all Cabinet Secretaries to make tough choices within their departments to save taxpayer money, eliminate government waste, and allow us to invest in the programs and services the American people need. This announcement by Secretary Vilsack is another example of how this can be done," said Vice President Biden. "By undertaking a thorough and thoughtful review of his Department, Secretary Vilsack has saved taxpayers millions in travel and printing

costs and is consolidating more than 700 different cell phone contracts into about 10. What's more, the Department is finding significant savings by consolidating more than 200 offices across the country while ensuring that the vital services they provide are not cut."

"In the past few decades, U.S. agriculture has become the second most productive sector of the American economy, thanks to farmers adopting technology, reducing debt, and effectively managing risk," said Vilsack. "These are lessons from which we can all learn. As we continue to invest in rural communities across the country, USDA has heard from producers about reducing red tape and the need to modernize its services. Today, we are answering the challenge by announcing a series of efforts to help us continue to streamline operations, make the best use of taxpayer resources, and provide the best possible service to the American people."

The USDA will close 259 domestic offices, facilities and labs across the country, as well as seven foreign offices. In some cases, offices are no longer staffed or have a very small staff of one or two people; many are within 20 miles of other USDA offices. In other cases, technology improvements, advanced service centers, and broadband service have reduced some need for brick and mortar facilities.

## USDA News

When fully implemented, these actions along with other recommended changes will provide efficiencies valued at about $150 million annually-and eventually more based on future realignment of the workforce-and will ensure that USDA continues to provide optimal service to the American people within available funding levels. These actions and plans to close or consolidate facility, office and lab operations will impact USDA headquarters in Washington and in 46 states and 1 U.S. territory.

Farm Service Agency (FSA): Consolidate 131 county offices in 32 states; more than 2,100 FSA offices remain throughout the United States Foreign Agricultural Service (FAS): Close 2 country offices; more than 95 FAS offices remain throughout the world Animal and Plant Health Inspection Service (APHIS): Close 15 APHIS offices in 11 states and 5 APHIS offices in 5 foreign countries; more than 560 APHIS offices remain throughout the United States and 55 remain throughout the world Rural Development (RD): Close 43 area and sub offices in 17 states and U.S. territories; approximately 450 RD offices remain throughout the United States Natural Resources Conservation Service (NRCS): Close 24 soil survey offices in 21 states; more than 2,800 NRCS offices remain throughout the United States Food Safety and Inspection Service (FSIS): Close 5 district offices in 5 states; 10 district offices remain throughout the United States Agricultural Research Service (ARS): Close 12 programs at 10 locations; more than 240 programs remain throughout the United States Food, Nutrition and Consumer Services (FNCS): Close 31 field offices in 28 states; 32 FNCS offices will remain throughout the United States

In addition, USDA is implementing a series of other changes that will save taxpayers' money while eliminating redundancies and inefficiencies. The Blueprint for Stronger Service details 133 recommendations that affirm processes already in place, as well as 27 initial improvements, and other, longer-term improvements. The initial improvements include the following:

Consolidate more than 700 cell phone plans into about 10; Standardize civil rights training and purchases of cyber security products; and Ensure more efficient and effective service to our employees by moving toward more centralized civil rights, human resource, procurement, and property management functions, creating millions of dollars in efficiencies without sacrificing the quality of our work.

The Secretary detailed the changes in a speech today at the American Farm Bureau Federation's 93rd Annual Meeting, where he also highlighted the impressive achievements of American agriculture over the past three years. Currently, U.S. agriculture is experiencing its most productive period in history thanks to the resiliency, resourcefulness, and efficiency of American producers. The Blueprint for Stronger Service will allow USDA to continue the investments that help to make this possible.

Detailed fact sheets on the Blueprint for Stronger Service can be found here, by USDA Mission Area: Farm and Foreign Agricultural Services (FFAS); Food, Nutrition, and Consumer Services (FNCS); Food Safety; Marketing and Regulatory Programs (MRP); Natural Resources and the Environment (NRE); Research, Education and Economics (REE); and Rural Development. For more, please visit www.usda.gov/strongerservice

# NASGA News

**Contact Information:**

Kevin Schooley

Executive Director

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Phone: 613 258-4587

Fax: 613 258-9129

Email: info@nasga.org

**http://www.nasga.org/**


It's a brand New Year, and you need to ensure that this year will be bigger and better!

Strawberries don't grow themselves-you've got to be pretty smart and pretty hardworking to be sure of a great crop (and then hope for good weather)! So what are you doing to get smarter?

Treat yourself to this year's **Annual Conference of the North American Strawberry Growers Association in Las Vegas!**

The conference will be held **February 6-8** (and you can reserve your rooms at **Harrahs** at our **special $39 rate** for as many days as you want between Feb. 5 and Feb. 10--see Hoover Dam, the Grand Canyon, and, yes, Las Vegas!)

We will have highlights of a number of farm operations around the country, and we have a great speaker line up.

Confirmed speakers include **Marvin Pritts**, Cornell University, **Kirk Larson**, University of California, **David Handley**, University of Maine, **Gail Nonnecke**, Iowa State University, **Jim Luby**, University of Minnesota **Rufus Isaacs**, Michigan State University and **Kim Lewers** USDA- ARS.

See additional information below, or go straight to the source on our website by clicking these links:

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# USHBC News

## National Blueberry Research and Promotion Program to Continue

The U.S. Department of Agriculture has announced that highbush blueberry producers and importers have voted to continue the Blueberry Promotion, Research and Information Order.

USDA's Agricultural Marketing Service (AMS) conducted the referendum from July 5 to July 26, 2011. Eighty-eight percent of eligible voters, representing 98 percent of the volume of blueberries produced or imported by those voting, support continuing the program. With a majority of votes and a majority of the volume, the referendum passed.

Research and promotion programs are self-help programs, funded through industry member assessments and administered by board members selected by the Secretary of Agriculture. They allow commodity groups to conduct promotion, market and production research, and new product development for the benefit of their industries. Visit www.ams.usda.gov/FVPromotion for more information about research and promotion programs.

## U.S. Highbush Blueberry Council Seeks Nominees for Regional Member Positions

January 4, 2012. The U.S. Highbush Blueberry Council (USHBC) is seeking nominees to fill Regional Member and Alternate positions. The nomination period will begin on January 13, 2012. Current USHBC Regional Member and Alternate terms for the Western, Midwest, Northeast and Southern regions will expire on December 31, 2012.

Potential nominees are required to complete a USHBC nomination application and forward their application on to the USHBC office no later than February 17, 2012. Nominations are to be received directly from growers in each of the four regions. Nomination applications will be mailed directly to growers throughout the United States. Applications are also available on line at the USHBC website www.blueberry.org., or can be requested by contacting the USHBC office by phone at (916) 983-0111 or by fax at (916) 983-9022. Eligible producer nominees are those who produced 2,000 pounds or more of highbush (cultivated) blueberries in the United States during the period of January 1, 2011 to December 31, 2011.

Once the nomination period is closed, a ballot will be prepared for each region listing all nominees for that specific region. Regional ballots will then be mailed to growers on April 20, 2012. The voting period will be open for 35 days and close on May 25, 2012.

Those receiving the most votes for each producer seat will be recommended to the Secretary of Agriculture as Regional Council Members. Those who earn the second most votes for each position will be recommended as the Regional Alternate. The names of those who receive the third and fourth most votes will be sent on to the Secretary for consideration as well. Council Members and Alternates will serve a term of three years beginning January 1, 2013. Members can serve for a maximum of two consecutive terms.

The USHBC has adopted a diversity outreach plan to attempt to achieve a diverse representation on the Council. USHBC programs are open to all individuals without regard to race, color, national origin, sex, religion, age, disability, political beliefs, sexual orientation, genetic information, parental status, and marital or family status. It is USHBC policy that membership on the Council and its committees reflect the diversity of individuals served by its programs.

To accomplish this objective, the USHBC will strive to attain representation of growers and other industry participants from diverse backgrounds on the Council and USHBC committees. To this end, the USHBC strongly encourages women, minorities and persons with disabilities to seek nominations to the USHBC and to participate in Council and USHBC committee activities.

blueberries
U.S. HIGHBUSH BLUEBERRY COUNCIL
80 Iron Point Circle, Suite 114 Folsom, California 95630
Phone (916) 983-0111 Fax (916) 983-9022 Web Site www.blueberry.org

**Contact Information:**

Mark Villata
Executive Director
80 Iron Point Circle, Suite #114
Folsom, California
95630-8593

**http:// www.blueberry.org/**

# USHBC News

Producers and importers of highbush blueberries approved the establishment of the USHBC through a referendum conducted by the USDA Agricultural Marketing Service in the year 2000. Results of this referendum, announced on July 13, 2000, showed that 68% of those who voted favored implementation of the Blueberry Promotion, Research and Information Order. Those who voted in favor represented 73% of the volume of cultivated blueberries represented in the referendum.

As required every five years by the USDA, a continuation referendum on the USHBC was conducted in 2006 with the Council receiving a strong endorsement from the industry. Results from the 2006 referendum show that 87% of those who voted favored continuation of the order. Those who voted in favor represented 94% of the volume of cultivated blueberries represented in the referendum.

A second continuation referendum was conducted in 2011 with the Council again receiving a strong endorsement from the industry. Results from the 2011 referendum show that 88% of those who voted favored continuation of the order. Those who voted in favor represented 98% of the volume of cultivated blueberries represented in the referendum.

The USHBC program was formally established in August of 2000. The program is funded by an assessment of $12 per ton on domestic highbush (cultivated) blueberries and $12 per ton on fresh and processed imported cultivated blueberries. Market promotion activities funded through the USHBC program began in January of 2002.

## USHBC Industry Relations Committee Seeks Importer, Exporter and Public Member Candidates

January 5, 2012. The U.S. Highbush Blueberry Council (USHBC) will make recommendations to the Secretary of Agriculture for the USHBC Importer, Exporter and Public Member positions following the Council meeting on March 2, 2012. The USHBC Industry Relations Committee is seeking nominees to be considered for the USHBC Importer, Exporter and Public Member and Alternate positions on the Council. Nominees are being sought for the three-year term that begins on January 1, 2012.

The USHBC Industry Relations Committee will present a slate of nominees to the USHBC Executive Committee in late January. The Council will then make final candidate selections at the USHBC Spring Meeting on March 2, 2012. At this meeting, the Council will recommend to the U.S. Secretary of Agriculture a final candidate for member and alternate, along with two additional candidates for each of these three positions for consideration by the Secretary for final appointment.

Blueberry industry members interested in being considered for the USHBC Importer (1 member position), Exporter (1 member position) or Public Member (1 member position) and Alternate positions are encouraged to contact the USHBC office **no later than Friday, January 27, 2012** by phone at (916) 983-0111, or by email to mvillata@ushbc.org.

## USHBC and NABC Spring Meeting

February 27 - March 2, 2012. San Francisco, California. More information or to register: http://www.ushbc.org/meetings/sf-2011/sf-2011.htm.

blueberries SM
Little Blue Dynamos SM

# New York Berry Growers Association News

## It's Time To Buy Hay For The Horses – *Dr. Marvin Pritts, Chair, Department of Horticulture, Cornell University*

***Note from Dale Ila Riggs, President, NYS Berry Growers Association: Some of you may recognize that we ran this article from Dr. Pritts last year. The need is even greater this year, and expected to grow. Please strongly consider his words and support yourself by supporting the industry by joining the Berry Growers Association today.***

Researchers are under more pressure than ever before to find funds outside of the university to do their work. Traditionally, funding has come mostly from the state. In New York, the state has provided salary dollars for faculty and technicians, money from the NY Farm Viability Institute, some modest grant programs like IPM, and matching commodity money from certain groups (e.g. grapes and turf grass). However, as state resources diminish, these funds are disappearing, sending researchers scrambling for money to support their programs. The state is no longer providing technicians for faculty, and the number of graduate students has been reduced dramatically. Essentially, the state pays the faculty salary, and that's it. Faculty are expected to find groups outside of the university to provide the operational money for research. The federal government has stepped up to some extent, but their money is mostly conditional on grower groups providing matching funds. It is now more critical than ever that grower groups demonstrate that they value research by providing some of their own money for scientists. No longer will taxes cover the cost of doing research.

Fortunately, the state is still paying the salaries of faculty, so money contributed by growers for research can leverage a Ph.D. level scientist without directly paying their salary. As a former administrator told a grower group, "You provide the hay – we'll provide the horses." From a grower's perspective, the biggest bang for the buck can come from 1) providing faculty with summer help to do some of the labor- intensive tasks involved with growing and harvesting berries and 2) putting up money to help gain a federal match.

Although individual contributions to a faculty program are welcomed, they are most effective when pooled with other contributions so a significant sum (i.e. $5,000 - $7,000) can be directed to a project or program. (This is about what it costs to pay for a summer helper.) Your NYS Berry Growers Association is the most effective way to pool resources with others and direct them to activities that benefit you right here at home. No overhead, no cut off the top, just your dollars going directly to buy hay for the horses.

## "Meet the Board" Dave Coulter, Coulter Farms LLC, Lockport, NY

Dave Coulter is a partner at Coulter Farms LLC in the town of Cambria in Niagara County. Coulter Farms grows about 85 acres of fruits and vegetables. Sweet corn is the largest crop by acreage, but the farm also has a variety of berry crops including about 6 acres of bearing strawberries, two acres of summer raspberries, and a couple hundred blueberry bushes. Other crops include sweet cherries, peaches, tomatoes, squash, pumpkins, cauliflower, peppers and an assortment of vegetables. The sales are through three primary channels: wholesale to stores and other farm markets, their farm market and their U-Pick. They established a web site this year, CoulterFarmsLLC.com, which Dave maintains.

Dave returned to the farm full time in 2009 after taking an early retirement from Eastman Kodak. The farm was established in 1889 by Dave's great grandfather. It was operated as a diverse farm with cows, pigs, chickens and vegetables until the animals disappeared in the 1950's. Dave's farm career started with 200 strawberry plants in the early 1960's. By the time he was ready to leave college the strawberry project had grown to several acres. As grandpa had retired Dave worked the farm through his high school and college years and then partnered with his Dad and Uncle to keep the farm active until Dad moved back to the farm in


*"New York State Berry Growers Association*

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http://www.hort.cornell.edu/grower/nybga/

# New York State Berry Growers Association

Chairperson-Dale Riggs-(518) 733-6772 Treasurer-Anthony Emmi-(315) 638-7679

Executive Secretary-Paul Baker- (716)807-6827 fax (716)219-4089
goodberries@roadrunner.com
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E-Mail Address_____ County_____

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Ribes _____ Vegetables_____ Fruit_____

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Research Fund Donation _____

_____

TOTAL ENCLOSED _____

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## New York Berry Growers Association News *(continued)*

1978. Dad transformed the farm into its current state over the next 30 years. Before Dave could retire his Dad passed away and Dave's involvement changed significantly once again. Dave and his cousin Jeff Hall are currently partners in the farm operation and evaluating their alternatives as they strive to demonstrate the viability of a small family farm in today's challenging business environment.

Dave felt 2011 was a challenging year for Coulter Farms. "Our largest field of berries was drowned in the wet spring. Our corn plantings were down significantly since some of the intended fields were too wet to plant. And then in July we saw less than an inch of rain, necessitating continuous irrigation. Obviously many NY growers had even more severe weather issues this year than we did. The problems we are working on with our berries include diseases with strawberries, upgrading our old raspberry planting and competing with the birds for our blueberries (and cherries.) For our berry crop Jewels are the wholesale standard, but we've been challenged finding appropriate "virgin" ground. While crop rotation has been acceptable for disease control in many other varieties we have not been successful with Jewels. There are so many new varieties with improved characteristics it's hard to keep up, but we sample the new offerings to look for the best matches with our soils and customers. We make use of the Cornell Guidelines in our fruits and vegetables and look to organizations like the Farm Bureau and the Vegetable and Berry Growers Associations to represent us in these trying times."

Dave joined the NYSBGA board in 2009. His dad Jim was a founding member of the organization.

# On the Organic Side...

## On the Organic Side...

**Cultural Practices for Disease Control in Brambles** – *Mike Ellis and Mizuho Nita, Ohio State University*

Cultural practices are the major means of control for several important bramble diseases. The use of any practice that reduces or eliminates pathogen populations or creates an environment within the planting that is less conducive to disease development must be used. The following practices should be carefully considered and implemented whenever possible in the disease management program.

**Use Virus-Indexed Planting Stock** Always start the planting with "Healthy" virus-indexed nursery stock from a reputable nursery. The importance of establishing plantings with virus-indexed nursery stock cannot be overemphasized, since the selection of planting stock and planting site are the only actions a grower can take to prevent or delay the introduction of most virus diseases. Plants obtained from an unknown source or neighbor may be contaminated with a number of pathogens that experienced nurserymen work hard to control.

**Site Selection** Proper site selection is critical to developing a successful disease management program. Establishing a planting on a site that is conducive to disease development is a critical error. Such plantings may be doomed to failure, regardless of the amount of pesticide a grower uses. The following considerations should play a major role in the disease management program.

*Soil drainage* - Soil drainage (both surface and internal drainage) is an *extremely important* consideration when selecting a planting site. Planting brambles on poorly or even marginally drained sites is a poor management decision. For example, poorly drained soils that are frequently saturated with water are highly conducive to the development of Phytophthora root rot, *especially in red raspberries.* Even in the absence of plant disease, wet soils are not conducive to good plant growth and productivity. Any practice such as tiling, ditching, or planting on ridges that aids in removing excessive water from the root zone will increase the efficacy of the disease management program. Once the planting is established, it is difficult, if not impossible to improve soil drainage.

*Site Exposure (Air Circulation and Sunlight Exposure)* - Avoid sites that do not have full exposure to sunlight, such as shaded areas near woods or buildings. In addition, sites with poor air circulation that tend to accumulate still, damp air should be avoided. Planting rows in the direction of the prevailing winds will help promote good air circulation and rapid plant drying. The primary reason for the above considerations is to ***promote faster drying of canes, foliage, and fruit.*** Most plant pathogenic fungi and bacteria require water on plant surfaces in order to penetrate and infect the plant. Any practice that reduces wetness duration (speeds drying time) of susceptible plant parts is beneficial to the disease management program.

*Previous Cropping History* - Avoid establishing plantings on sites that have a previous history of problems with Verticillium wilt, either in previous plantings of brambles or other susceptible crops. In general, it is not a good practice to plant brambles immediately after solanaceous or other Verticillium-susceptible crops, such as tomatoes, potatoes, peppers, eggplant, melons, strawberries and other related crops. Certain common weeds, such as black nightshade, redroot pigweed, lamb's-quarters, and horsenettle will also support growth of the Verticillium fungus, and fields with a high population of these weeds should also be avoided. This is particularly important if Verticillium wilt is known to have been a problem on the site in the past. The fungus that causes Verticillium wilt can survive in soil for very long periods of time (at least 14 years in California). If a site is known to have had a problem with Verticillium wilt within the last 5 to 10 years it should probably not be used for establishing plantings of Verticillium-susceptible bramble cultivars unless the soil is fumigated before planting.

Most brambles are susceptible to Verticillium wilt and when the disease becomes established within the planting, it can be devastating. Resistance to Verticillium wilt in the cultivars currently grown in the Midwest is not available. In general, black raspberries are significantly more susceptible than red raspberries, and (in general) blackberries are the least susceptible.

If the site has a previous history of Phytophthora root rot, either in previous bramble plantings or other per-

***About the Author:***

Mike Ellis is professor of plant pathology at Ohio State University. In addition to his responsibilities in research and teaching Mike is a State Extension Specialist with The Ohio State University Extension. It is his duty to provide the most reliable and current information available on diagnosis and control of fruit crop diseases to Ohio fruit growers and other interested clientele.

## On the Organic Side...(continued)

ennial fruit crops, it should probably be avoided. *Phytophthora spp.* (like Verticillium) can also survive in soil for extended periods of time. It is important to remember that Phytophthora root rot is usually associated with poorly drained (wet) sites and improving soil drainage is one of the principal means of control. If nematodes have been a problem in previous crops or they are suspected to be a problem on the site, a soil analysis to determine the presence of harmful nematodes should be conducted. Nematodes are most likely to be a problem on the lighter (sandy) soils. Nematode sampling kits and instructions on taking samples can be obtained through your Extension office. Infested sites may be treated with an approved nematicide before planting if sampling indicates a need to do so.

*Proximity (closeness) to established bramble plantings and wild bramble plants* - Ideally, a new planting should be isolated as far as possible from old established plantings or wild bramble plants that serve as reservoirs for diseases and other pests. The benefits of using virus-indexed plants to establish a new field are greatly reduced if the fence row around the planting or woods directly adjacent to the planting contains wild, virus-infected or orange rust-infected plants. The same is true if a new planting is established next to an old planting that has disease problems. Currently no information is available on exactly how far away from an established planting or weeded area is "Far enough". The distance of 600 to 1000 feet is used commonly in Extension literature; similarly, the New York State virus certification program requires that nurseries in the program use a minimum distance of 1,000 ft. It is probably safe to say "The farther the better".

**Crop Rotation (Replanting Brambles)** When replanting brambles on the same site, the practice of crop rotation must be considered. Due to the buildup and persistence of soilborne plant pathogens, replanting brambles on the same site is not recommended without the use of crop rotation. Soil fumigation is not an option in organic production systems. At present, data describing how long a rotation is required before replanting brambles on the same site is not available. In fact, this requirement is probably different for every different planting site. Once again, the safest recommendation is probably "the longer, the better", particularly if the site has a history of soilborne diseases.

All soilborne diseases, however, are not the same. For instance, Verticillium wilt generally becomes a problem only after populations of the Verticillium fungus slowly build up to high levels. Thus, if no brambles or other susceptible crops are grown for a suitable period (probably at least 5 years), the fungus population declines and brambles can be reintroduced and grown for a number of years before the population builds back up to damaging levels. This same principle is true for many harmful nematodes, but it is not true for Phytophthora root rot. The Phytophthora fungi reproduce very rapidly under proper environmental conditions, so even a low population can rebuild to damaging levels within one or two seasons. Crop rotation will not eliminate all problems associated with soilborne diseases. It should always be integrated with other control measures, such as the choice of resistant or partially-resistant cultivars, improvements in drainage, etc. Where other control measures cannot be used (for instance, the site cannot be adequately drained), it is not advisable to replant brambles.

**Avoid Excessive Fertilization**
Fertility should be based on soil and foliar analysis. The use of excessive fertilizer, especially nitrogen, should be avoided. Sufficient fertility is essential for producing a crop, but excessive nitrogen can result in dense foliage that increases drying time in the plant canopy, i.e., it stays wet longer. Research has shown that excessive use of nitrogen can result in increased levels of Botrytis fruit rot (gray mold).

**Control Weeds In and Around the Planting**
Good weed control within and between the rows is essential. From a disease-control standpoint, weeds in the planting prevent air circulation and result in fruit and foliage staying wet for longer periods. For this reason, most diseases caused by fungi are generally more serious in plantings with poor weed control than in those with good weed control. Furthermore, some disease-causing organisms (Verticillium wilt fungus, crumbly berry virus) can build up on certain broadleaf weeds in the planting. Any practice that opens up the canopy in order to increase air circulation and reduce drying time of fruit, foliage and young canes is generally beneficial to disease control. Controlling wild brambles (which are weeds) near the planting is also important because they can serve as a reservoir for several important diseases and insect pests.

**Sanitation (Removal of Overwintering Inoculum)**
The fungi that cause anthracnose, cane blight, spur blight, Botrytis fruit rot, cane and leaf rust and several other important diseases overwinter within the planting on canes infected during the previous year. Pruning out all old fruited canes and any diseased new canes (primocanes) immediately after harvest and removing them from the planting breaks the disease cycle and greatly reduces the inoculum. All infected pruning waste should be removed from the field and destroyed. If you are attempting to minimize fungicide use, good sanitation (removing old fruited canes) is critical. If old fruited canes cannot be removed before winter, they should *definitely* be removed before new growth starts in the spring. For fall bearing raspberries, such as Heritage, all canes are cut off each

## On the Organic Side...(continued)

year. Removing all cut canes from the planting will aid the disease management program. If it is impossible to remove pruned canes from the field, they should be chopped in place as quickly as possible with a flail mower to speed decomposition before new canes emerge.

*Plant population and canopy management*
Any practice that alters the density of the plant canopy and increases air circulation and exposure to sunlight is generally beneficial to disease control. Optimizing between-row and within-row spacings and maintaining interplant spacings through judicious cane thinning throughout the life of the planting is desirable. Ideally, rows for red raspberries should not be over 2 feet wide and should contain about 3 or 4 canes per square foot. Control of plant vigor, particularly through avoidance of high levels of nitrogen and careful use of cane vigor control techniques, can greatly aid in improving the canopy density. Specialized trellis designs for various Rubus spp. can further improve air circulation and increase exposure to sunlight, as well as increase harvest efficiency. Trickle irrigation, as opposed to overhead sprinkler irrigation, greatly reduces the wetting of foliage and fruit and the risk of splash dispersal of several important fungal pathogens.

Removing young fruiting shoots (before they exceed 4 inches in length) from the lower portions of canes (approximately the lower 20 inches) will remove fruit that might become soiled. This practice also removes shoots that disproportionately contribute to shading and poor air circulation in the canopy.

For information on methods for cane vigor control, trellis designs and optimum spacing requirements, the following book is very useful: Raspberry and Blackberry Production Guide, edited by Lori Bushway, Marvin Pritts and David Handley. It can be purchased from: Northeast Regional Agricultural Engineering Service, 152 Riley-Robb Hall, Cooperative Extension, Ithaca, NY 14853. Phone: 607-255-7654.

**Inspect the Planting Frequently and Rogue Out (Remove) Diseased Plants**
Plants showing symptoms of virus diseases, rosette, or orange rust must be removed and destroyed immediately, including the roots, whenever they are found. These plants may bear fruit, but it will be of poor quality. The longer these plants remain, the greater the chances that other plants will become infected. Viruses and the orange rust fungus are systemic and can move to adjacent plants via root grafts. Because of this possibility, use a flag to mark the locations where diseased plants are removed so the adjacent plants can be checked frequently for new symptoms.

For **orange rust**, it is particularly important to inspect the planting early in the growing season. The planting should also be inspected on a routine basis (at least once a week) from the time growth starts in the spring through harvest. New leaves of early spring growth on orange rust infected plants are chlorotic (yellowish), shoots are bunched and spindly. They are easy to identify in the spring. It is important that infected plants be identified and removed prior to the development of the "Orange rust" pustules on the leaves. If these pustules are allowed to develop, they will produce large numbers of aeciospores which will spread the disease. If infected plants are not removed early in the spring, they become more difficult to identify later in the growing season. Early spring is also a good time to inspect for virus diseases. Symptom expression of many viruses is more obvious during cool growing conditions. The higher temperatures of mid-to late summer often reduce virus symptoms making infected plants difficult, if not impossible, to detect.

**Adjust Production Practices to Prevent Plant Injury and Infection**
Many plant pathogens take advantage of wounds in order to penetrate and infect the plant. Therefore, any practice that minimizes unnecessary physical damage to the plant is beneficial to the disease management program. Cane blight and bacterial crown gall are two important pathogens of brambles that enter the plant almost exclusively through wounds. The use of sharp pruning tools will help minimize damage to canes during pruning operations. Prune only when necessary (avoid cosmetic pruning of primocanes) and avoid pruning during periods when plants are wet or immediately before wet weather is forecast. Most plant pathogens require water on the surface of plant tissues before they can penetrate the plant. Providing proper cane support through trellising or otherwise tying the canes will aid greatly in avoiding abrasions from sharp spines and wind whipping of plants during windy conditions. Proper spacing between rows and the use of the proper size equipment will also prevent plant damage.

**Proper Harvest, Handling and Storage of Fruit**
Proper harvesting and storage methods are critical components of the disease management program. It is of little value to produce high-quality fruit in the field if it is bruised or crushed during harvest or permitted to rot during storage. Raspberry and blackberry fruit are ***very perishable***. Even under the "Best conditions" these tender fruits are extremely susceptible to physical damage and post-harvest rots. The following practices need to be considered well in advance of initiating the harvest. The proper implementation of these practices will aid greatly in providing your customers with the best quality fruit possible.

## On the Organic Side...(continued)

**a)** Handle all fruit carefully throughout all phases of harvest, transport and sale. Bruised or crushed (leaky) fruit are much more susceptible to fungal infection and rot than firm, intact fruit.

**b)** Harvest all fruits as soon as they are ripe. During periods of warm weather, harvest may require picking intervals as short as 36 to 48 hours. Pick early in the day before the heat of the afternoon. Overripe fruit in the planting will attract a number of insect pests and provide a source for inoculum buildup of fruit rotting fungi.

**c)** It is highly desirable to combine harvesting and packing into one operation. This prevents unnecessary handling and additional physical injuries.

**d)** If possible, train pickers to remove damaged or diseased berries from the field. Some growers have programs where they pay the picker as much, or more, for damaged berries picked into separate containers, than for healthy berries. This is a good sanitation practice that reduces inoculum levels of fruit rotting-fungi in the field. Providing hand-washing facilities in the field so pickers can periodically clean their hands, should be helpful in reducing the movement of fungus spores that are encountered by touching rotten (diseased) berries.

**e)** Pick into shallow containers. Ideally, fruit should be no more than 3 to 4 berries deep; this greatly reduces bruising and crushing the fruit, which results in juice leakage that encourages the development of fungal fruit rots.

**f)** Refrigerate fruit immediately after harvest. Fruit should be cooled as close to 32°F as possible within a few hours after harvest. This temperature should be maintained throughout storage and, if possible, throughout shipment and sale. If you do not have refrigeration, fruit should be placed in the coolest place possible. Never allow the fruit to sit in the sun.

**g)** Avoid condensation of water on fruit after it is removed from cold storage. This is best accomplished by enclosing it in a waterproof over-wrap before it leaves the refrigerated area. The over-wrap should be kept in place until the fruit temperature has risen past the dew point.

**h)** Sell the fruit immediately ("Move it or lose it"). Many berries produced in the Midwest are sold to pick-your-own customers or directly at farm markets, and are not refrigerated prior to sale. Customers should be encouraged ("educated" to handle, refrigerate, and consume or process the fruit immediately in order to assure the highest quality possible. We must remember that even under the best conditions, raspberry and blackberry fruits are very perishable.

## On the Organic Side...(continued)

**Bramble disease control strategies**

| Disease Control Considerations` | Viruses[a] | Verticillium Wilt | Orange rust | Cane blights[b] | Powdery mildew | Fruit rot |
|---|---|---|---|---|---|---|
| Good air/water drainage | - | - | - | ++ | + | ++ |
| 500+ ft from wild brambles | ++ | - | - | - | - | |
| Rotation | +[c] | ++[d] | - | - | - | - |
| Cultivar tolerance or resistance | ++[c] | ++[f] | ++[g] | - | + | - |
| Avoid adjacent plantings | ++[j] | - | ++ | - | + | - |
| Eliminate wild brambles | ++ | - | ++ | - | + | - |
| Disease-free stock | ++ | ++ | ++ | ++ | + | - |
| Aphid control (vectors) | ++ | - | - | - | - | - |
| Rogue infected plants | ++ | - | ++ | - | - | - |
| Speed drying (weeds, pruning) | | - | ++ | ++ | - | ++ |
| Prune 3 days before rain | - | - | - | ++ | - | |
| Dispose of diseased pruned canes | - | + | + | ++ | - | - |
| Maintain plant vigor | - | - | - | ++ | - | - |
| Fungicide sprays | - | - | ++ | ++[h] | ++[i] | - |
| Harvest before overripe | - | - | - | - | - | ++ |
| Fruit storage conditions | - | - | - | - | - | ++ |

Key: ++ = most important controls; + = helpful controls; - = no effect.

[a] Viruses: Mosaic (rasp.), Leaf Curl (raspberry, with blackberry symptomless), Ringspot (red raspberry), and Streak (purple and black raspberry).

[b] Cane blights: anthracnose, cane blight, spur blight, and Botrytis blight.

[c] Rotation effective for ringspot virus only; 2 years of grass crop (e.g. corn) with excellent weed control before planting red raspberry should eliminate

## On the Organic Side...(continued)

need to fumigate for *Xiphinema*, a nematode vector.

[d] Rotation for *Verticillium* wilt: Avoid fields planted to susceptible crops (tomatoes, potatoes, eggplant, peppers, strawberries, raspberries, stone fruit) within the past 5 years. Avoid fields with history of Verticillium wilt unless soil is fumigated.

[e] Virus resistance, tolerance, and immunity: Mosaic-Blackberries are not affected; black and purple raspberries are more severely affected than red raspberries. Of purple and black raspberries, "New Logan", "Bristol", and "Black Hawk" are tolerant; "Cumberland" is susceptible. Of red raspberries, "Milton", "September", "Canby", and "Indian Summer" are Resistant because aphid vectors avoid them. Leaf Curl- Blackberries are symptomless; all raspberries are affected. Tomato Ringspot-Red raspberries are affected. Streak - Black and purple raspberries are affected.

[f] Verticillium tolerance: Most blackberries are resistant; red raspberries are more tolerant than black raspberries. "Cuthbert" and "Syracuse" red raspberries appear to be resistant under field conditions.

[g] Orange Rust resistance: Red raspberries are immune. Other brambles are affected. Of blackberries, "Eldorado", "Raven", "Snyder", "Ebony King", "Choctaw", "Comanche", "Cherokee", and "Cheyenne" are reported resistant.

[h] Fungicide program for cane blights: The lime-sulfur spray (delayed dormant) is most important for anthracnose and cane blight. i Fungicide program for powdery mildew: Sulfur will provide good control of powdery mildew. j Keep blacks and purples away from reds because mosaic virus can spread from reds and is more severe on blacks and purples; Keep all reds away from blackberries because blackberries can be a symptomless carrier of leaf curl

[i] Fungicide program for powdery mildew: Sulfur will provide good control of powdery mildew.

[j] Keep blacks and purples away from reds because mosaic virus can spread from reds and is more severe on blacks and purples; Keep all reds away from blackberries because blackberries can be a symptomless carrier of leaf curl

*(Excerpted and reprinted with permission from: OSU Organic Small Fruit Disease Management Guidelines .)*

## Focus on Food Safety

### GAPs Training and Workshops

*Develop Your Own Farm Food Safety Plan*

Cornell Cooperative Extension, New York State Department of Agriculture and Markets, and National GAPs Program personnel collaborate to conduct 2-day workshops to help fresh produce growers learn about GAPs and write their own farm food safety plans. After attending the 2-day workshop, growers are invited to a mock audit during the growing season so they know what to expect from a third party audit.

**Workshop Dates and Locations for 2012** (Check website for program and registration information: http://www.gaps.cornell.edu/eventscalendar.html.

**March 14 & 15, 2012** —Albany area

**March 28–29, 2012** —Syracuse, NY

### How to Keep Your Fruit Clean and Safe: Good Agricultural Practices for Berries

- *Elizabeth A. Bihn, Ph.D., National GAPs Program, Cornell University, 630 W. North Street, Geneva, NY, 14456;* eab38@cornell.edu; 315.787.2625

*About the author: Elizabeth A. Bihn is a Senior Extension Associate in the Department of Food Science at Cornell University. Betsy received her B.S. in Zoology from the Ohio State University, M.S. in Horticulture from the University of Florida, and Ph.D. in Food Science from Cornell University. Since 1999, she has been the program coordinator for the National Good Agricultural Practices (GAPs) Program.*

# Focus on Food Safety

*The goal of the National GAPs Program is to reduce microbial risks to fresh fruits and vegetables through a comprehensive education and extension program for growers and farm workers. Betsy is also the Project Director for the new Produce Safety Alliance (PSA) created to assist growers with GAPs understanding and implementation prior to the release of the FDA produce safety regulation. Betsy has written many extension publications used by fresh produce growers to develop farm food safety plans and implement food safety practices. Her current projects include the GAPs Online Produce Safety Course offered through the National GAPs Program to provide access to training for growers in rural locations who may not be able to attend in-person trainings. Betsy also has been an instructor for GAPs training programs conducted by the Joint Institute for Food Safety and Applied Nutrition and has presented many extension talks and workshops throughout the U.S. and internationally. Links to the National GAPs Program trainings and educational materials can be found at www.gaps.cornell.edu.*

Envision the best berry you have ever tasted. It likely had good color, nice shape, and when you ate it, it was juicy and sweet with just the right amount of tangy acid to balance the sugar. Whether or not the berry was safe to eat or was contaminated by bacteria, viruses or parasites, likely never crossed your mind. That is the sensation all consumers and all your customers want to have, absolute enjoyment associated with eating fresh, tasty, and safe berries. Now ask yourself, do high quality, tasty berries grow themselves? As farmers, do you simply sit in your house 10 months out of the year watching TV, knitting, or resting waiting for a great harvest to present itself, than gleefully walk to the field to reap the harvest? The obvious answer to both of these questions is no. Now consider why any farmer would take food safety for granted without ever having considered the risks involved or effort needed to produce safe fruit. The production environment as well as some common practices used in the production of berries can introduce food safety risks and need to be understood in order to be controlled. There is no such thing as zero risk when the fruit is eaten raw as is the case with most berries, but there are steps that can be taken to limit and reduce risks.

The first step to understanding risks on your farm is to consider your production practices including land selection, soil amendments before and during production, water use including irrigation and protective spray mixing, containers used for picking and packing, and any person involved in production, packing, and distribution. There are other facets that can be considered such as the sanitation of transportation vehicles, coolers, and display stands as well as the presence of wild and domestic animals in the production fields. Does field location, inputs, or practices introduce any microbiological, chemical or physical risks? Is your field downhill and downwind from a large dairy operation where manure run-off could enter your field? Have you used river water to frost protect your berries in late May when fruit has already started to develop or may be close to harvest? Does hand washing have anything to do with berry production or operating a pick your own operation? These are just a few questions that can help you assess your operation. If it is unclear what types of risks field location, inputs, and practices might introduce, there are many ways learn about produce safety. Aside from attending the food safety session at the Northeast Vegetable and Berry Conference, you can visit several extension program websites including the National Good Agricultural Practices Program at Cornell University at www.gaps.cornell.edu or the University of California, Davis, GAPs Program at http://ucgaps.ucdavis.edu/.

There are many other Land-Grant University (LGU) sites that can be found by key word searching "GAPs" or "Good Agricultural Practices". In addition to websites and educational materials found on these websites, many LGUs provide in-person GAPs trainings. During the 2011-12 winter, Cornell Cooperative Extension , New York State Department of Agriculture and Markets, and National GAPs Program personnel will offer four (5) two-day food safety trainings throughout New York State. These trainings include an in-depth consideration of risks during fresh produce production as well as time for each participant to develop and write their own unique farm food safety plan. The dates and locations of these trainings are posted at www.gaps.cornell.edu. Those unable to make a training but still interested in developing their own farm food safety plan can consult A Food Safety Plan (Template) for You at http://safety.cfans.umn.edu/ available from the University of Minnesota.

Motivation to understand and implement food safety practices goes beyond the desire to grow, harvest and sell safe berries. Many wholesale fresh produce buyers require verification of food safety practices before they purchase fruits and vegetables from a grower. Buyers require the farms to have a written food safety plan that has been implemented including record keeping sheets that document practices. Some buyers also require farms to have third party audits to verify their food safety plan and practices are in place and implemented properly. In addition to buyer requirements, the Food Safety Modernization Act requires the U.S. Food and Drug Administration (FDA) to develop a fresh produce regulation. The draft regulation is scheduled to be released in early 2012 and will focus on practices used during fresh fruit and vegetable production. Having a written and implemented farm food safety plan

## Focus on Food Safety

is not just good for the safety of the fresh produce you grow, but is also good for business with the ever increasing food safety pressure in the marketplace.

Lastly, there are many resources available to not just help you learn about GAPs but also implement and document them. A review of the websites above as well as others will help you locate record keeping sheets and other materials such as worker training video. A few specific educational materials are listed at the bottom of this summary. If you need help getting started, contact your local extension educator, knowledgeable farm consultant, or the National GAPs Program. The newly formed Produce Safety Alliance (PSA) is working on a nationwide curriculum to help farmers understand and implement GAPs as well as prepare for the upcoming FDA regulation. The PSA has working committees that are open to participation by all those interested in this issue and information can be found at www.producesafetyalliance.cornell.edu. The PSA is particularly interested in having farmers participate in their working committees since farmers understand the most about production and the challenges involved in understanding and implementing GAPs. There are many ways for fresh produce growers to stay informed, engaged, and involved, so take advantage of opportunities to improve your food safety knowledge and practices.

A few resources available through the National GAPs Program at www.gaps.cornell.edu:

***Grower Self-Assessment of Food Safety Risks*:** 196 page risk assessment guide with worksheets and information on how to evaluate your operation
***Food Safety Begins on the Farm: A Growers' Guide*:** 28 page food safety booklet
***Field Hygiene Poster Series*:** hand washing, toilet paper disposal, field toilet usage
***Fruits, Vegetables, and Food Safety: Health and Hygiene on the Farm*:** training video that covers farm hygiene practices and may provide the foundation for an on-farm worker training program

*(Reprinted with permission from: Proceedings of the New England Vegetable and Fruit Conference, December 13-15, 2011.)*

### How Will New Food Safety Rules Impact Your PYO and Pre-Picked Markets? - *Elizabeth A. Bihn, Ph.D., National GAPs Program, Cornell University*

Spoiler Alert! The answer to the question that is the title of this talk is…It depends! If that is all you needed to know feel free to attend a different session, but if you are interested in produce safety, the impact upcoming regulation might have, and how you can manage food safety practices on your farm to stay competitive, then this is the session for you. Below is a summary of some of the things that have impacted produce safety and the implementation of food safety practices on farms. Some farmers feel that food safety practices are not necessary on their farms or feel they will not be impacted by regulation because their operations are too small. This session will address these notions and lots of other produce safety issues.

In 1998, the Food and Drug Administration (FDA) published the *Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables* that outlined Good Agricultural Practices (GAPs) and their importance to fresh produce safety. Over the past thirteen years, fresh produce growers have been motivated to adopt formal food safety practices such as GAPs mostly because wholesale buyers have demanded it. Consumers who buy directly from farms have been less demanding about understanding and verifying the farms food safety practices, so farms that direct market have been less likely to embrace a formal food safety program. This does not mean that small farms are less safe, since the only way to determine this is to understand food safety risks and evaluate farm practices with these risks in mind. It does mean that many small farm owners have not taken the time to review their farm practices to determine the impact they have on safety. This is a concern because farms could be using practices that are risky with no intention to understand or address the food safety risks. As food producers, all farmers should have a basic understanding of food safety and be willing to assess their practices to assure they are doing what they can to produce safe food.

On January 4, 2011, the Food Safety Modernization Act (FSMA) was signed into law by President Obama. The US FDA is scheduled to release a draft produce safety regulation early in 2012. Prior to this regulation, fresh produce has not been regulated for safety. Guidance from the FDA, such as the *Guide* mentioned above, has been voluntary. Looming federal regulation as well as changes within the produce industry has resulted in many growers reviewing their need to be engaged in produce safety. A subject of much discussion for small farm owners is the Tester Amendment included in the FSMA. Understanding how the Tester Amendment may impact farms is important for all fresh produce farm owners. Whether it is produce safety regulations or produce-associate foodborne illnesses, fresh produce growers should understand the implications and how they affect their operations.

# Focus on Food Safety

The newly formed Produce Safety Alliance (PSA) is funded by the FDA and the United States Department of Agriculture to provide fundamental, science-based, on-farm food safety knowledge to fresh fruit and vegetable farmers with an emphasis on small scale operations. The PSA is developing a nation-wide food safety curriculum to help produce growers understand and implement food safety practices such as GAPs as well as prepare for the upcoming FDA regulation. Those interested in produce safety can join the working committees or simply sign up for the general listserv to stay informed of PSA activities at www.producesafetyalliance.cornell.edu. Participation in the PSA is one way for farmers to stay informed and prepared for the new regulation.

Pick Your Own (PYO) and pre-picked markets often straddle the line between direct and wholesale markets resulting in different pressure and requirement to adopt food safety practices. PYO operations usually function as direct markets. Customers come to the farm, pick the product, pay the farmer, and go home. Pre-picked markets also can be direct to consumer, with the farmer harvesting the commodities and selling them directly to the customer, but pre-picked operations are not limited to direct marketing. Some pre-picked markets do sell to local retailers such as grocery stores interested in providing "locally grown" products or to other wholesalers. Some farms provide both PYO and Pre-Picked options, so they may serve both direct and wholesale markets. This may impact their need/desire to implement food safety practices and may even complicate the process. This workshop will discuss regulatory issues, changes in industry expectations, and how PYO and Pre-Picked Markets can address their produce safety needs. Knowledge is power and understanding the changing landscape of produce safety will help growers successfully navigate and implement practices that make sense for them and their markets.

*(Reprinted with permission from: Proceedings of the New England Vegetable and Fruit Conference, December 13-15, 2011.)*

## Produce Safety Alliance December Update

First of all, we would like to extend a big thank you to all those who have made this year such a productive one for the Produce Safety Alliance. With 168 dedicated working committee members, 20 fearless steering committee co-chairs, and 15 very supportive executive committee members, we are truly fortunate to have such great resources, contacts, and unbounded knowledge at our finger tips. We have made significant progress in all the committees since our first teleconference held in May 2011. Since that time, we have hosted 49 committee meetings and gained a wealth of valuable information, all documented in what we affectionately call "The Monster Doc". Currently, working committees 1-6 are wrapping up their teleconferences and the topics that they were tasked with discussing. We will be publishing final reports from these committees shortly after the New Year for review by the Executive and Steering committee members. Working committees 7-10 are still making great strides in their discussions related to the outreach, training, and certification aspects of the curriculum. There is still time to join the working committees, as WC's 7-10 will continue to meet after the New Year. Please visit the website (http://producesafetyalliance.cornell.edu/working.html) to view the committee objectives and access the application form.

**Dynamic Distribution**
The PSA's working committee (WC) members are scattered throughout 34 states across the country. See the PSA's membership reach by checking out our membership map! If your state is not represented, consider bringing your thoughts to the PSA by joining a WC.

**Current Events in Produce Safety: December 2011**
It is anticipated that the new Produce Safety Regulation of the FDA's Food Safety Modernization Act (FSMA) will arrive early next year. Until then, you can follow updated reports of FSMA on the FDA's website at: http://www.fda.gov/Food/FoodSafety/FSMA/default.htm.

**Resource Reminders**
The calendar is continually updated online with committee meeting dates and times. (http://producesafetyalliance.cornell.edu/calendar.html).

In addition, WC meeting notes are available for download as they are received (http://producesafetyalliance.cornell.edu/wk-notes.html).

Lastly, we wish everyone a happy and healthy holiday season. As always, please do not hesitate to contact myself or Betsy Bihn (eab38@cornell.edu) if you have any questions. We look forward to continuing a great partnership with all of our members and moving forward with the PSA curriculum development.

# Focus on Pest Management

## Pest Management Update

*Radiant SC Now Approved for Suppression of SWD in Strawberries*

The NYS Department of Environmental Conservation has recently approved the following 2(ee) recommendation for New York State. Radiant SC (EPA Reg. No. 62719-545) is approved for use on strawberry against the unlabeled pest spotted wing drosophila.

Radiant SC may be used as part of an integrated program for suppression of SWD in strawberries at a rate of 6 – 10 fl oz/A. Use the higher rate for moderate/severe infestations and/or larger plant volume. Begin applications at first signs of adult activity. Due to the occurrence of multiple generations in a growing season, repeated applications may be required. Follow resistance management recommendations on the product label.

Note: Applicators must have a copy of the 2(ee) label in their possession at the time of application. The label may be found at: http://pmep.cce.cornell.edu/regulation/2ee/unlabeled_pest/small_fruits/strawberries/insecticides/index.html.

## Raspberry Root Diseases - *Kerik D. Cox, Assistant Professor, Dept. of Plant Pathology and Plant-Microbe Biology, Cornell University*

**Understanding the Root Diseases of Brambles**

Root diseases are particularly devastating and frustrating to manage in small fruit production operations. This is especially the case for established operations because the most effective management practices must be implemented prior to planting. The pathogens causing root diseases are all soilborne and remain protected within the soil. In addition, the most diagnostic symptoms are also below ground, which prevents one from recognizing the problem at a time when action could be taken to save the planting.

In the region, the set of root diseases and disorders affect both raspberry also effects other crops such as strawberry. Hence, identifying the characteristics of these problems will help one understand their role in seasonal plant decline in several small fruit crops. This set of root diseases and disorders include:

Winter Injury: Decline from winter injury occurs when plants aren't well insulated against freezing during winter or when young tissue isn't protected against frost in the spring. Plants stressed by disease or abiotic factors prior to dormancy will be more susceptible to winter injury. Winter injury can result in reduced in vigor and productivity, or kill plants outright. Winter injury to the roots can be diagnosed by cutting longitudinally through the crown of dying (not dead) plants. Initially, the cortex of affected roots and crown tissue will appear brown while the vascular tissue remains white and healthy. By contrast, most root diseases will preferentially affect the vascular tissue, and decay in the cortex occurs by secondary pathogens. During the season, winter injured plants will send up new canes that remain healthy through the season. By comparison, a root disease will cause decline of canes throughout the season. Cold injury during spring freezes is more frequently observed in the region and is quite diagnostic. The vascular connections in young floricanes become damaged causing them wilt and die during the spring while hardier primocanes flourish. This causes a planting to appear to have row tops of dead shoots, but healthy crowns and row bottoms.

Drought Injury: Periods of drought may injure plants or predispose them to winter injury or diseases. Drought for even a few weeks can cause young leaves to wilt and developing fruit to shrivel. Fine roots may die off and impaired root function may cause the plants to appear as if they are affected by a root disease. In addition, the use of fertilizers, herbicides, and pesticides (e.g. captan) during a drought may result in unexpected injury either from the association of drought conditions with heat, or the excessive need for the plants to uptake the water often used as a carrier in chemical applications. When excavated, a plant suffering from drought will have roots that are dry and sinewy, but still have white vascular tissues and cortex.

*Phytophthora* root rot: *Phytophthora* is an aquatic pathogen that prefers cool weather and free moisture (e.g. wet spots in the field). During *Phytophthora* infections, fine/lateral roots will decay first leaving only large primary roots. When the roots and crown are sectioned longitudinally, the affected tissues will be chocolate to reddish brown. As infection progresses and the plant dies, secondary decay fungi will rot the cortex of roots and the crown. Following plant death, infective propagules remain in dead plant tissue and the soil. These are capable of causing infections in later seasons after replanting. In general, red raspberry varieties are more susceptible to *Phytophthora* root rot than purple and black raspberry varieties.

*Verticillium* wilt: *Verticillium* wilt has the most distinctive symptoms of the root diseases presented here, and is easiest to diagnose. In raspberries, the youngest canes will wilt first beginning from the base to the tip. On such canes, the petioles will remain attached with the oldest leaves at the base looking scorched and youngest leaves at the tip looking stunted, but often still green. Infected raspberry canes may also have bluish streak-shaped lesions within infected canes. In general, purple and black raspberry varieties are more susceptible to *Verticillium* wilt than red raspberry varieties.

# Focus on Pest Management

**The Role of Root Diseases in Plant Decline during 2010 and 2011**
In 2010, the early season was warm and dry, but considerable rainfall occurred from late July through September. There were many reports of small fruit plant decline, especially in strawberries and high tunnel raspberries. Unfortunately, the majority of the samples diagnosed by this program had progressed to a stage of decline where it was impossible to confirm root disease as the cause. Some samples provided clear indications of *Verticillium* wilt and signs of *Phytophthora* infected tissues, but others were simply winter injury. In 2011, the early season and late season had considerable rainfall with near flooding in some regions. Between these two periods there was a 1.5 month stretch of drought (i.e. < 1.0" of rain). There were numerous reports of *Phytophthora* root rot, but the majority became manifest in the presence of the drought when root function was most critical. During this period, we received reports and samples of chemical injury from fertilizer and pesticide use on drought stressed plants. In late season, there were more reports of *Phytophthora* root rot likely resulting from overly susceptible plants that had suffered from drought stress.

**Preparing for Root Diseases and Decline in 2012**
Given the potential for high disease pressure and environmental stress in late 2010 and 2011, there could be considerable root disease in small fruit plantings in 2012. In plantings with severe plant decline in low-lying wet areas, a phosphorous fungicide program may be warranted to prevent additional loss to *Phytophthora*. In addition to diseases, winter injury could be more severe in 2012. Plants with high levels of disease (even foliar diseases like leaf spot) or recovering from drought stress as they enter dormancy may be more susceptible to winter injury in 2012. In order to avoid plant decline in 2012, producers should ensure plant insulation during winter and scout during spring and early summer for the first signs of plant decline (e.g. wilting). If recognized early enough, the extent of losses could be mitigated.

**Literature**

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Ellis, M.A., Converse, R.H., Williams, R.N., and Williamson, B. 1991. Compendium of Raspberry and Blackberry Diseases and Insects. APS Press. 100 p.

*(Reprinted with permission from: Proceedings of the New England Vegetable and Fruit Conference, December 13-15, 2011.)*

## Brrrr, Black Root Rot in Strawberries - *Annemiek Schilder, Michigan State University Extension*

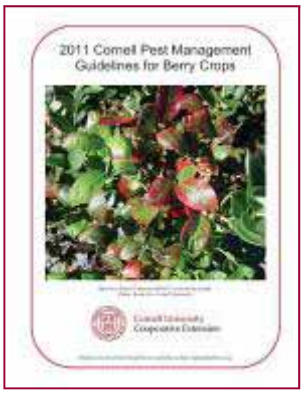
*Having an integration of multiple control methods is the best approach to managing black root rot in strawberry fields.*

**What is Black Root Rot?**
Black root rot is a widespread disease of annual as well as perennial, matted-row strawberries, decreasing productivity and longevity of the crop. Yield losses of 30 to 50 percent are common and the productive life of strawberry fields is reduced. Black root rot is characterized by the following symptoms.

- Much smaller root system than normal
- Root system less fibrous than healthy plants
- Fewer feeder roots
- Dark patches on roots or blackening of entire roots

When roots are cut open, the center (stele) may still be healthy. This is in contrast to red stele, where the central core of the root is reddish-brown while the rest of the root is lighter in color.

Black root rot does not affect the crown, which should be creamy-white in younger crowns; older crowns may be pink to reddish-brown inside due to stress. Affected plants are less vigorous and produce fewer runners. Since their root systems are compromised, severely infected plants may wilt and die, especially during hot and dry weather. This usually happens around harvest. Black root rot symptoms are generally not evident until the year after planting and then gradually in-




**PIMS**

Product, Ingredient, and Manufacturer System:

http://pims.psur.cornell.edu/

OMRI

http://www.omri.org/omri-lists

**Berry Diagnostic Tool**

http://www.fruit.cornell.edu/berrytool/

## Focus on Pest Management

crease from year to year. However, establishment problems in new plantings may occur when black root rot-infected transplants are used.

**What Causes Black Root Rot?**
Black root rot is often referred to as a disease complex, since various fungi, nematodes and abiotic factors have been implicated in disease development. The pathogens most frequently isolated from affected roots are fungi such as *Rhizoctonia fragariae, Cylindrocarpon, Pythium* and *Fusarium* species. Various nematodes, particularly the root lesion nematode, *Pratylenchus penetrans,* are often also found, although it should be kept in mind that nematodes move away from roots that are almost dead. To detect the presence of nematodes, one has to sample roots and soil from plants that are in moderate decline. The composition of the pathogen complex is influenced by soil type and environmental conditions. Nematodes prefer sandier soils since it is easier for them to swim among the soil particles. Nematodes restrict root growth by feeding directly on roots and cause wounds that can predispose roots to invasion by fungal pathogens. In a survey of black root rot fields in Michigan, most had root lesion nematodes (*Pratylenchus penetrans*), whereas needle nematodes (*Longidorus* spp.), root knot (*Meloidogyne* spp.), dagger (*Xiphinema* spp.), pin (*Pratylenchus* spp.), and ring (*Criconemoides* spp.) nematodes were less common.

Physical stresses such as soil compaction, water logging, drought, freezing injury, herbicide injury and fertilizer burn have been reported to increase the incidence of the black root rot. In a study in New York, the factors most highly correlated with severe black root rot were age of the planting, lack of crop rotation, compacted or fine-textured soils, high rates of the herbicide Sinbar (terbacil), and flat vs. raised bed culture. Soil compaction can be a particular problem in pick-your-own fields and on heavier soils. Another study looked specifically at Sinbar found that it did not increase black root rot, even when applied at four times the regular rate. Duration of strawberry production in a particular field is probably the best predictor of the level of black root rot as the disease tends to build up over time.

**Black Root Rot Management**
In annual strawberry production systems, pre-plant fumigation is used for the control of black root rot and other soil-borne diseases, such as Verticillium wilt. In perennial systems, fumigation is less common. With the phasing out of methyl bromide, which damages the ozone layer, numerous other compounds have been evaluated as alternatives. Telone-35 (1,3 dichloropropene + chloropicrin) appears to be an effective alternative to methyl bromide for pre-plant fumigation. While recommended for control of black root rot, pre-plant fumigation has sometimes been associated with increased levels of disease over time. This may be explained by the elimination of all soil life, including beneficial microorganisms, which would otherwise compete with black root rot pathogens. Without their suppressive effect, pathogens introduced with planting material and through movement of infested soil have free reign and can build up to damaging levels. It also emphasizes the importance of using clean planting material in controlling black root rot.

An effective cultural strategy to control black root rot is crop rotation. A rotation of three to five years is recommended to reduce black root rot pathogens to manageable levels. Beneficial effects can be seen even after one year of growing rotation crops, but these wear off quickly. Certain crops, like marigold, and sorghum-sudan grass have shown promise in reducing lesion nematode populations. For strawberry black root rot control, rye, sweet corn, squash and pumpkin, and Cole crops (kale, mustard) are beneficial. In field trials in Michigan, we found a pumpkin and broccoli rotation to be effective at reducing nematodes, particularly when the broccoli residues were incorporated in the soil and tarped with plastic to trap gasses released during breakdown of the organic matter. This is called “biofumigation.” Alternatively, if it is possible to compact the surface after incorporation of crop residues, that may be a partial substitute for tarping. Improved soil aeration and drainage encourage healthy root development and may also help reduce black root rot as well as *Phytophthora* diseases (i.e., red stele) on heavier or waterlogged soils. Drainage can be improved by the use of raised beds and sub-soiling or deep plowing in case of a clay hardpan.

There are no commercial strawberry cultivars with high levels of resistance to black root rot, probably because of the multiple pathogens involved in the disease complex. However, some strawberry cultivars from Nova Scotia (Cabot, Cavendish, Bounty and Brunswick) have field tolerance to black root rot. The reason why they perform well in black root rot fields is that they have been selected on non-fumigated soil. It appears their vigorous root growth allows them to keep up with root pathogens that are nibbling on and destroying the roots.

The addition of organic amendments, such as composts, may be another useful alternative. However, compost may be expensive and not all composts are good for strawberries. Composts have to be mature with a low salt concentration and no herbicide residues or they could be detrimental. In studies in New York and Maryland, manure-based composts stimulated growth and yield of strawberries grown in non-fumigated soil. The beneficial effect may not be due as much to disease control as to some stimulatory effect of the compost on the growth of strawberry plants. Other beneficial effects of composts are increased organic matter and nutrient content of the

## Focus on Pest Management

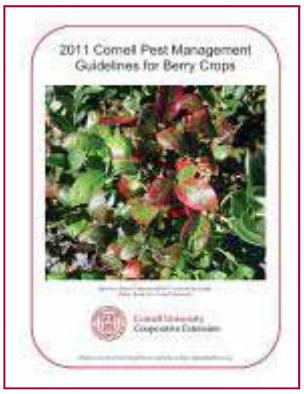
soil and improved soil structure and aeration. Compost may be applied in the planting row only to reduce cost.

Biological control (the use of beneficial organisms to control pests and pathogens) may also hold some promise for black root rot management. The commercial biofungicide PlantShield (also sold as RootShield) (*Trichoderma harzianum*) suppressed black root rot when applied as a pre-plant transplant root dip or as a drench in greenhouse and also to some extent in field trials. The product Tenet (*Trichoderma* spp.) applied as a soil drench to plants three times (at green-up, bloom, and at renovation) also improved bed fill of black root rot infected plants. The efficacy of individual products will likely depend on environmental conditions and which pathogens are predominant at a particular site.

The fungicide Abound (azoxystrobin) has shown promise as a transplant root dip as well as in drench applications in established fields (at green-up, bloom, and at renovation). This fungicide is labeled for these applications and has been shown to protect roots from infection. Phosphorous acids products (ProPhyt, Phostrol, Vigor-Cal-Phos) applied as foliar sprays also improved plant health. These highly systemic products are known to be effective against Oomycete root pathogens, such as *Pythium* spp. and may induce resistance to a broad spectrum of pathogens.

The best approach to management of black root rot relies on the integration of multiple control methods, including the use of crop rotation, clean planting material, composts, tolerant cultivars, fungicides, and biocontrol agents.

*(Reprinted from: MSU Extension News, August 2011. Dr. Schilder's work is funded in part by MSU's AgBioResearch.)*




**PIMS**

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**Berry Diagnostic Tool**

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# Managing Fertility in Bramble Crops

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Basic Soil Fertility Concepts

Managing plant and soil fertility in bramble crops is important for optimum production. Nutrient management is not an easy proposition as it varies from farm to farm, and even from site to site on the same farm. Soil variability, along with differences in management practices and weather make it impossible to have a menu driven protocol for farmers to follow. Farmers need to make changes according to specific situations and in order to do that they need to know the basics of nutrient management as it pertains to bramble crops.

The nutrient availability of soils is less understood by farmers than the physical differences between soil types i.e. water and nutrient retention. Soil nutrient tests are used to measure the plant-available nutrients in the soil. They do not measure the total nutrients in the soil, which often is significantly higher than what is available. The type of soil influences how much nutrients are available. If soil particles are small (clay), soil nutrient availability is higher, but those same soils often hold onto the nutrients more tightly, blocking availability of nutrients that are actually plentiful.

Nutrients are available to plants as individual ions with either a positive charge (cation) or a negative charge (anion). The charge impacts how the ion behaves in the soil, for instance ammonium ($NH_4+$) is retained by soil adsorption and nitrate ($NO_3-$) is often leached despite the fact that both of these forms of N are available to plants. As the plant absorbs the ammonium cation, it excretes one H+ proton so that there is a neutral charge in the plant. As those positively charged protons accumulate in the soil, the soil pH (a measure of soil acidity) drops and thus alters the availability of other plant nutrients. This is when lime and sulfur come into use. Bramble crops need a soil pH of 6.0 – 6.5, forgiving really, but when even the type of fertilizer one uses could alter the ability of the plant to access nutrients it becomes clear that soil fertility management is a challenging endeavor.

Diagnosing Nutrient Problems

Visual diagnosis is the most common means of detection of fertility problems, but it is the least reliable. Plant symptoms like poor plant vigor, pale leaf color, and distorted fruit are also symptoms of some pest and cultural problems as well as the result of many different nutrient deficiencies or toxicities. Designing a nutrient program by visual symptoms alone will likely be ineffective. Instead, growers should become familiar and comfortable with laboratory analyses. Consistent use of soil tests and foliar analysis can reveal the information necessary for good nutrient management.

- Soil Tests estimate the amount of nutrients available to plants. In order to be effective, soil test samples must be taken correctly. Farmers should be mindful of soil changes within a field and understand that in those cases, two soil tests should be done. Soil tests should be conducted in the fall of the year prior to planting. This allows nutrients and other amendments to be added and incorporated adequately before planting begins. Nitrogen is the exception to this rule. Soil test results from one lab to another cannot be compared because the extraction methods vary. Similarly, the extraction methods used for macronutrients are not appropriate for estimating levels of micronutrients, and often micronutrients cause the most problem in bramble plantings.
- Plant Tissue Testing measures the exact amount of nutrients in the plant part that was submitted at that point in time. Recommendations are based on the levels of these nutrients at specific times of the year. Depending upon the lab that you choose, sufficiency levels for a relatively "minor" crop like brambles may or may not be based on known ranges for raspberries/blackberries. However, if you refer to known sufficiency ranges separate from your lab, you can ensure that you are basing your management on research supported data. See Table 1. for sufficiency ranges.
- Plant sap testing is a new way to track N availability without waiting for results, but this does require time and regularity.

A combination of soil testing and tissue analysis along with good visual observation of the crop response to fertilizer is the best approach to assessing nutrient status. Growers should test the soil prior to planting and make amendments according to recommendations. When the plant reaches maturity, conduct a foliar tissue test a minimum of every other year. Conduct soil tests every 3 years. Be alert for problems or changes that occur to the crop during the growing season.

Nutrients Required for Optimum Growth

Nitrogen makes up 2-3% of bramble plant dry matter. According to Table 1, if bramble leaf nitrogen is less than 1.9% N the plant is deficient and likely not very productive. Signs of N deficiency are yellow leaf color and/or tips of older leaves turning red. N toxicity is a problem if the tissue test reveals greater than 3% N resulting in plants that appear too vigorous, with few flower buds.

In newly planted fields, Calcium Nitrate is the fertilizer of choice because it has a readily available form of N that does not volatilize. In established fields ammonium nitrate supplies a quick Nitrate response and a slow release response due to the ammonium. This material has become less available than in the past, due to its explosive characteristics. Urea then is the least expensive N source, but it is subject to volatilization unless incorporated. Foliar urea can only be used in small doses, less than 2 pounds per acre of actual N. For information on N guidelines for berries, refer to Table 2.

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| Table 1. Sufficiency ranges for foliar nutrient level in bramble leaves in midsummer (perennial systems).* | | | |
|---|---|---|---|
| **Nutrient** | **Deficient below** | **Sufficient** | **Excess** |
| **N %** | 1.9 | 2.0-3.0 | 4.0 |
| **P %** | 0.20 | 0.25-0.40 | 0.50 |
| **K %** | 1.3 | 1.5-2.5 | 3.5 |
| **Ca %** | 0.5 | 0.6-2.0 | 2.5 |
| **Mg %** | 0.25 | 0.6-0.9 | 1.0 |
| **S %** | 0.35 | 0.4-0.6 | 0.8 |
| **B (ppm)** | 23 | 30-70 | 90 |
| **Fe (ppm)** | 40 | 60-250 | 350 |
| **Mn (ppm)** | 35 | 50-200 | 350 |
| **Cu (ppm)** | 3 | 6-20 | 30 |
| **Zn (ppm)** | 10 | 20-50 | 80 |

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* Raspberry and Blackberry Production Guide: For the Northeast, NRAES-35

| Table 2. Nitrogen guidelines for raspberries* | | | |
|---|---|---|---|
| Age of Planting (yrs) | Amount/Timing (actual N) | N source | Comments |
| Summer-bearing | | | |
| 0 | 25-35 lb/A 4 weeks after planting | Calcium nitrate | Avoid touching plants with fertilizer after planting |
| 1 | 35-55 lb/A May, or split between May and June | Urea, ammonium nitrate | Use higher amount on sandier soils or if using irrigation |
| 2+ | 40-80 lb/A May or split between May and June | Urea, ammonium nitrate | Use higher amount on sandier soils or if using irrigation |
| Fall bearing | | | |
| 0 | 25 lb/A 4 weeks after planting and in August | Calcium nitrate | Avoid touching plants with fertilizer after planting |
| 1 | 50-80 lb/A split between May and June | Urea, ammonium nitrate | Use higher amount on sandier soils or if using irrigation |
| 2+ | 70-100 lb/A split between May and June | Urea, ammonium nitrate | Use higher amount on sandier soils or if using irrigation. Adjust in response to leaf analysis |

* Raspberry and Blackberry Production Guide: For the Northeast, NRAES-35

The other macro nutrients critical to bramble growth and development are Phosphorus (P) and Potassium (K). Uptake of both of these nutrients is primarily through diffusion, so the increased advantage of a large plant root mass will aid uptake.

Berries tend to have a low demand for P relative to other crops, and given that soil pH impacts P availability – pH needs to be close

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to 6.5 - most fields in the Northeast are not deficient. Too much P however, can interfere with micronutrient uptake. When applying P through a drip system, be aware that many sources of P are incompatible with other fertilizers.

Brambles have a relatively high demand for K and the availability of the K in the soil is very dependent on soil chemistry. Increasing soil organic matter will help to increase the exchange capacity of the soil. Pre-plant incorporation of K is the most effective, while fertigation can be used to supply potassium during the season to established plantings. Potassium levels in leaves tend to fluctuate during the season dropping as crop load increases. Adding K during the season is sometimes necessary. Potassium sulfate or potassium magnesium sulfate are the best sources of potassium for brambles. Muriate of potash is inexpensive, but it has chloride in it that causes problems with brambles.

*More specific information about micro nutrients and soil management can be found in the Raspberry and Blackberry Production Guide – NRAES-35.*

*(Reprinted with permission from: Proceedings of the New England Vegetable and Fruit Conference, December 13-15, 2011.)*

## Highbush Blueberries - Planting, Early Care, and Nutrition

Cathy Heidenreich, Cornell University

Commercial blueberry plantings are most successfully established when careful attention is paid to site selection and preparation, planting, early care and nutrition.

**Planting**

*Where* - By way of review, highbush blueberry sites should be those that offer full sun, excellent air and soil drainage, proper soil pH (optimum 4.5 to 5.0, range 3.8 to 5.5), soil organic matter content of 3% or higher, and soil calcium content of less than 2,000 lb./A.

Selected sites should be well-prepared in terms of pre-plant weed management, pH modification and soil amendment prior to planting. Amendments should be incorporated to a soil depth of 8".

*When* - Planting may be done in early spring as soon as soil can be worked, and after danger of severe freeze/frost damage is past. Alternatively, plants may be established in fall on lighter soils with good drainage, provided plants are mulched after planting. Fall planting may be problematic however, on soils prone to frost heaving.

*How* – The blueberry root system is a shallow dense mat, thus planting holes should be wider than deep! Bare root plants should be set so the root/shoot juncture is at or slightly below (0.5") the soil surface. Make a slight mound of soil in the center of the planting hole. Set plant on top, spreading roots out in all directions. Soil should be firmed over the roots to prevent desiccation/exposure.

Containerized plants should be set with the root ball mass slightly below the soil surface level (0.5"). Loosen roots from root ball gently, spreading them in all directions. If plants are root bound, cut 4 upward slits in root ball base with sharp knife, then gently spread root ball out in 4 directions. Note: Failure to do this with pot bound plants may result in plant death in subsequent years when above ground foliage can no longer be sustained by a root mass that has not grown out beyond the original root mass. These plants may collapse and die under water stress conditions. Be sure the root ball surface is well-covered to prevent potting medium from being exposed/drying out.

Replace half the original soil excavated with supplemental organic matter when backfilling the planting hole. Alternatively, supplemental organic matter may be incorporated into the top 6 to 8 inches of soil prior to planting (i.e. a 2" layer of sawdust). Supplemental organic matter improves soil moisture, nutrient holding capacity and soil texture as well as facilitating root penetration. Organic material options include peat moss, composted sawdust, cranberry leaves, and wood chips. Mushroom compost should be avoided as it is not pH compatible with blueberries (very alkaline). Peat moss should be incorporated at the rate of 1 gallon *well-moistened* peat per plant. Peat bales are purchased dry to avoid excessive weight. They should be placed at regular intervals between planting rows in the field prior to planting. Slit the tops and saturate bales with water several days before planting.

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They require 1.0" to 1.5" water per week in form of precipitation or irrigation. The quality of irrigation water provided is also important. It should both low in total dissolved solids (<0.1%) and pH (<6.0).

*Weed Management* – Manage weeds to reduce competition for nutrients and water during the establishment period. In-row weed management is especially critical at this stage. Keep a 3 ft. area around young plants weed free through the summer. This may be accomplished using various methods: a mulched strip, hand weeding, herbicides. A mulched strip should be 4 feet in width. A layer of landscape fabric or water penetrable weed barrier may be applied under the mulch. Cover the 4 ft strip with 3 to 5" of mulch such as wood chips, bark, sawdust, straw, or chopped corn stalks. Between-row weed management techniques include frequent shallow mechanical cultivation, mulch, or row middle cover crops. Remember if cultivation is used to manage between row weeds that care must be taken to avoid any disruption of the root zone. Row middle cover crops are another option for between row weed management (Table1). Research at the Pennsylvania State University indicates hard fescues are an excellent choice for this purpose. They perform extremely well as permanent sod covers as they are slow growing (= less mowing), relatively non-competitive (non-spreading), and tough enough to withstand traffic. Hard fescues are best established in fall vs. spring.

**Table 1: Characteristics of Row Middle Cover Crops**

| Cover Crop | Water Use | Establishment | Vigor | Durability[a] | Seeding rate (lb/A) | Seeding time (month) | Requirements[d] N-P-K lbs/A & pH |
|---|---|---|---|---|---|---|---|
| Creeping red fescue | M[c] | VG[b] | L[c] | VG[b] | 70 | Apr-May or Aug -Sept | 60-80-40 & 6-7 |
| Chewing fescues | M | G | L | VG | 75 | Apr-May or Aug -Sept | 60-80-40 & 6-7 |
| Hard fescues* | M | F | L | E | 80 | Apr-May or Aug -Sept | 60-80-40 & 6-7 |
| White (ladino) clover | H | F | M | F | 15 | Apr-May | 10-80-60 & 6-7 |
| Tall fescue | MH | G | H | E | 75 | Apr-May or Aug -Sept | 50-60-40 & 5-7 |
| Sudangrass hybrids | H | VG | VH | P | 80 | June-Aug | 80-40-40 & 5-7 |
| Kentucky bluegrass | M | G | M | G | 75 | Apr-May or Aug -Sept | 60-80-40 & 6-7 |
| Perennial ryegrass | M | G | M | G | 85 | Apr-May or Aug -Sept | 60-80-40 & 6-7 |
| Annual ryegrass | M | G | M | P | 60 | Apr-May or Aug -Sept | 60-80-40 & 6-7 |
| Rye (*S. cereale*) | H | VG | H | P | 110 | May-Sept | 30-60-30 & 5-7 |
| Buckwheat | H | VG | H | P | 75 | May-Aug | 30-40-30 & 5-7 |
| Oats | H | VG | H | P | 100 | April or Aug | 30-60-30 & 6-7 |

[a] tolerance to foot traffic or equipment operations [b] E = excellent; VG = very good; G = good; F = fair; P = poor. [c] VH = very high; H = high; MH = moderately high; M = moderate; L = low. [d] Nutrient requirements may be met by some soils without amendments. Consult soil test before applying fertilizers. Avoid balanced fertilizers high in chloride. *(Source: Mid-Atlantic Berry Guide for Commercial Growers 2010-2011)*

*De-flowering* - Gently rub off flower buds on newly set plants as they appear. This may be done by closing the palms of your hands over the flower clusters and gently rubbing them together. This practice will keep plants vegetative during the first season after planting to hasten establishment. This practice may be continued into year 2 if necessary for good establishment.

**Nutrition**

Pre-plant soil analysis and soil amendment based on test results is critical to successful blueberry planting establishment. Blueberry nutrition does not stop there however.

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*pH adjustment* - If soil pH is under adjustment monitor pH semi-annually using a field pH test kit (DIY, $10). Collect 10 or more separate top soil samples (to 8" depth) at various locations across the planting for a better understanding of the soil acidification process underway: Apply 200 lb/A sulfur spring and fall until the desired pH is reached.

*Soil analysis after planting*- Periodic soil testing (every 2 to 3 years or as needed) is advisable for blueberry plantings. These tests estimate the available phosphorus, potassium, calcium and magnesium in soil. Soil test results and pH are used in conjunction with leaf analysis to check for possible deficiencies or excesses and develop the best fertilization strategy for the planting.

*Leaf analysis* – Annual leaf analysis is recommended for optimizing blueberry plant nutrition. It's a means of accurately identifying nutritional problems difficult to diagnose by soil testing or observation of bush appearance (plants can be deficient without showing visible symptoms in the field). Leaf analysis helps identify and correct potential nutrient deficiencies before growth and/or yield is impacted by providing estimates of nitrogen availability along with other macro and micro nutrient content in leaves.

The recommended procedure for leaf analysis is as follows: Collect 1 leaf sample per every 10 acres of planting. Each sample should be composed of 30 to 50 leaves collected from different bushes in sampling area. Collect middle leaves on current season shoots just before or during harvest. Leaves from different varieties or the same varieties on different soil types should not be combined; do not combine leaves from plants of different ages. Avoid including leaves from abnormal, weak or unhealthy plants; these should be sampled and analyzed separately.

Wash leaves by swirling in dilute detergent solution for several seconds then rinse with distilled water. Air dry leaves completely on a table top or counter. Pack dried leaves in brown paper bags for shipping to the lab for analysis.

Plantings with results below a deficiency level are likely to respond to nutrient applications. Those with results slightly below the sufficient range would not be expected to respond to nutrient applications but should continue to be monitored (Table 2). Results showing one or more of the deficiencies boron, copper, iron, manganese and/or zinc may indicate problems with soil pH. For information on fertilizer sources of major nutrients and suggested micronutrient sources see Chapter 11 - Nutrient Management in: *NRAES-55 Highbush Blueberry Production Guide.*

**Table 2: Deficient, sufficient, and excessive nutrient concentrations in blueberry leaves.**

| Nutrient | | Deficient below | Sufficient | Excessive above |
|---|---|---|---|---|
| **N** | (%)* | 1.70 | 1.7 – 2.1 | 2.3 |
| **P** | (%) | 0.08 | 0.1 – 0.4 | 0.6 |
| **K** | (%) | 0.35 | 0.4 – 0.65 | 0.9 |
| **Ca** | (%) | 0.13 | 0.3 – 0.8 | 1.0 |
| **Mg** | (%) | 0.10 | 0.15 – 0.3 | 0.4 |
| **S** | (%) | -- | 0.12 – 0.2 | -- |
| **B** | (ppm)* | 20 | 30 – 70 | 200 |
| **Cu** | (ppm) | 5 | 5 – 70 | -- |
| **Fe** | (ppm) | 60 | 60 – 200 | 400 |
| **Mn** | (ppm) | 25 | 50 – 350 | 450 |
| **Zn** | (ppm) | 8 | 8 - 30 | 80 |

*(%) = percent dry weight of blueberry leaf; (ppm) = parts per million. (*Source: NRAES-55 Highbush Blueberry Production Guide*)

Blueberry plantings generally need nitrogen applications on an annual basis. Unlike other plants, blueberries are sensitive to applications of nitrate nitrogen forms (No 10-10-10!). The ammonium form of nitrogen such as ammonium sulfate, ammonium nitrate, urea or other organic sources are preferable. If soil pH is not under adjustment, urea is the recommended ammonium nitrogen form for blueberries. It is high in nitrogen (46%) and generally less expensive per unit N. It also provides some control of mummyberry disease when applied in spring. Urea should be applied during cool, wet weather or immediately be followed by irrigation to reduce loss due to volatilization. If pH is still under adjustment, ammonium sulfate is the best choice as it provides some added measure of soil acidification.

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**Table 3: Recommended annual rates of nitrogen (lb/A) in typical Northeastern or Midwestern blueberry plantings.**

| Planting Age (years) | Actual Nitrogen (lb/A) | Urea (lb/A) | Ammonium Sulfate (lb/A |
|---|---|---|---|
| Planting year | -- | -- | -- |
| 2 | 15 | 35 | 75 |
| 3 | 20 | 45 | 95 |
| 4 | 27 | 60 | 130 |
| 5 | 35 | 80 | 170 |
| 6 | 45 | 100 | 215 |
| 7 | 55 | 120 | 260 |
| 8 | 65 | 145 | 310 |

(*Source: NRAES-55 Highbush Blueberry Production Guide*)

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**Questions or comments about the New York Berry News?**

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