Cornell University
College of Agriculture and Life Sciences

New York Berry News

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Events Calendar

December 3-6, 2013 – *Joint North Carolina Strawberry Growers Association and North American Strawberry Growers Association Conference,* Sheraton Imperial Hotel, Durham, North Carolina. Workshops on Dec. 3, full-day farm tour on Dec. 4, and educational sessions and trade show Dec. 5-6. For more information, email info@ncstrawberry.com, call 919-542-4037, or visit www.ncstrawberry.com. Exhibitor inquiries welcome.

December 10-12, 2013. *Great Lakes Fruit, Vegetable and Farm Market EXPO and Michigan Greenhouse Growers Expo*. More information: http://www.glexpo.com/.

December 17-19, 2013. *New England Vegetable and Fruit Conference*. More Information: http://www.newenglandvfc.org/.

January 21-23, 2014. *Empire State Producers EXPO*. Save the dates! More information forthcoming.

January 28-30, 2014. *Mid-Atlantic Fruit and Vegetable Convention*. Hershey, PA. Save the dates! More information forthcoming.

June 18-25, 2015 – 11th International Rubus & Ribes Symposium, in Asheville, NC, June 21-25, with preconference tour to farms and research sites June 18-20. More info to come. If you are interested in being a sponsor of this event, contact gina_fernandez@ncsu.edu.

New Super Fruit for Northern New York? Willsboro Research Farm Establishing Juneberry Nursery -

Kara Lynn Dunn, Northern NY Agricultural Development Program Publicist

Northern NY - Northern New York is getting on the Juneberry super fruit bandwagon. With funding from the farmer-led Northern New York Agricultural Development Program, one of the largest Juneberry research nurseries will be established at the Cornell Willsboro Research Farm in Willsboro, NY.

Juneberry, scientifically known as Amelanchier sp., pronounced ama-lan-cheer, is a blueberry-like fruit noted for its antioxidant and nutritional value. The fruit is rich in iron, calcium, manganese, protein and fiber.

Cornell Willsboro Research Farm Manager Michael Davis is excited to see how well juneberries will grow in the Northern New York climate and has teamed up with SUNY Plattsburgh botanist Dr. Michael Burgess to evaluate opportunities for the Northeastern U.S. production of the berries.

"Juneberries, also known as Saskatoon berries, are grown commercially in the western US and Canada. Most of the available cultivars have been developed from plants that are native to western North America. This project will focus on identifying and collecting wild Juneberries with exceptional fruiting potential that are native to the northeastern U.S.," Davis says.

"The multi-state project team is collecting wild cuttings and seeds in multiple states and Canada for a genomic database and the development of lines suitable for production in the Northeast," Davis says.

The taxonomic and evolutionary relationships between different juneberry species has been a major research focus for Burgess, and the current project is tapping into his extensive database of field notes to locate promising wild juneberry plants. Collections range from Pennsylvania and New York to Vermont, New Hampshire, and the coast of Maine.

The crop is part of North American history as native peoples often incorporated juneberries into pemmican, a high-energy mix of available meat and fruits. The name *Amelanchier nantucketensis* derives from description by botanist Eugene Bicknell of plants growing on Nantucket Island in Massachusetts in 1911.

The plants flower from March into May and produce fruit in June and July. Some Juneberry species are self-fertile and do not require another plant to reproduce.

"As a June-July harvest crop, Juneberry would generate revenues early in the growing season for producers. Juneberry could prove to be a super fruit not only nutritionally, but economically for Northern New York growers," Davis says.

The project leaders will be consulting with Jim Ochterski, executive director of Cornell Cooperation Extension of Ontario County. Ochterski has led the establishment of Juneberry plantings on more than 20 farms in the Finger Lakes and Central NY regions of the state since 2010 and has conducted consumer tastings to build market interest.

Ochterski says, "Juneberries have several advantages over blueberries. They are an early season fruit crop with self-pollinating, frost hardy flowers. The shrub tolerates a wide range of soil pH conditions and soil textures and many of the soil types unsuitable for blueberries. Juneberries are delicious fresh, full of nutrition, and preserve well."

The first commercial-scale crop from the Juneberry nursery at the Cornell Willsboro farm is expected in 2015-16.

For more information on the project: Michael Davis, Cornell Willsboro Research Farm, 518-963-7492.

The Northern New York Agricultural Development Program provides practical, on-farm research, technical assistance, and outreach on a diverse range of crops to farmers in Clinton, Essex, Franklin, Jefferson, Lewis and St. Lawrence counties. Learn more about agriculture in Northern New York and find NNYADP project results at www.nnyagdev.org.

FROM THE SWD BLOG… *Juliet Carroll, NYS IPM Program*

Do My Fruit Have SWD?

September 6, 2013. Suggested ways for checking fruit for SWD infestation, include looking for egg breathing tubes, finding leaking pinholes, and floating out the larvae.

Egg breathing tubes You'll need a good pair of eyes and 20x magnification. Fruit on which this technique works fairly well include blackberry, cherry, black raspberry, dark plum and grape varieties, and probably nectarines. Looking for breathing tubes on fruit that is fuzzy (peach, red raspberry), has a waxy bloom (plums, grapes), or is light yellow in color may not be worth the effort. Blogs with **breathing tube pictures**: SWD in plums, Monroe County – first report, and Oviposition in blackberry. **A word of caution** – I've noticed that once the egg has hatched (12 to 72 hours after laying) the breathing tubes may be shed from the fruit and, therefore, won't be visible. After hatch, what remains on plum, blueberry and other relatively thick-skinned fruit is a pinhole through which the larva periodically breathes as it pauses from feeding. The soft skin and drupelets of blackberry and raspberry collapse in response to larval feeding and the pinhole is less apparent.

Leaking pinholes On tougher skinned fruit (plum, blueberry, cherry, grape) gently squeezing the near-ripe to ripe fruit may cause a dewdrop of juice to leak through the pinholes that are associated with oviposition and larval development. Fruit that appears sound but from which leaking juices are noticed can be a sign that SWD may be developing in the fruit. Dried drops of juice seen on leaves below a fruit cluster or on fruit in the field are also signs of possible SWD infestation, especially if no bird damage, cracking or other obvious signs of damage are seen on the fruit.

Floating out the larvae The salt floatation method can be used to quickly assess larval infestation in fruit. This method works better with the soft-skinned fruit, such as blackberry and raspberry. It can be used on blueberry, though the skins may trap the larvae and possibly affect the test results. On larger fruit, such as cherry, peach, and plum, this technique may not work very well. Dissolve 1 Tbsp (~15 cc) table salt in 1 cup (~250 ml) water. Place about 100 fruit in a Ziploc bag or a crisper-type container and add the salt solution. Gently crushing the fruit may help release the larvae. After one hour, examine the salt-solution-immersed fruit for the presence of larvae (white, ~2-4 mm long). The fruit sample may be split into two parts. One part used immediately in a salt floatation test. The other part kept for 3 days to allow eggs to hatch and larvae to develop prior to doing the salt floatation test. (Keep the fruit covered during the 3-day incubation, so it is not contaminated by ambient vinegar flies, and keep it on paper towels or a sponge to absorb liquid, so the larvae don't drown.)

SWD Easily Found Now

September 5, 2013. Spotted wing drosophila adults can be seen cavorting on berries. Populations of this insect are exploding and it will become increasingly easy to see the fruit flies on berries in berry plantings. Tim Martinson, Dept. of Horticulture, Cornell University, reports finding SWD on essentially every blueberry on the three bushes in his backyard and I have seen SWD adults on blackberry fruit and day neutral strawberry fruit. It is essential to cull overripe and damaged fruit from plantings and maintain insecticide coverage to protect fruit.

Top right: A male spotted wing drosophila (SWD) on blueberry; another likely SWD is in the background.

Bottom right: A male spotted wing drosophila on blackberry can be seen near the center of the photograph. Another male stretches his wings while standing on a berry's stem at left.

SWD in Plums

August 28, 2013. I have begun examining plums collected in the Finger Lakes and Lake Ontario regions and, to date, have found evidence of oviposition only in samples collected in the Finger Lakes region. As populations of SWD build during late summer and plums ripen on the tree, fruit may be at increasing risk. Which plum varieties are at greatest risk of being infested? Those that have the softest skin and those that ripen latest will likely be most susceptible.

A micrograph of the surface of a plum showing the breathing tubes attached to a fruit fly egg nestled below the surface of the plum's skin. Only two of ten tree-ripe plums had such eggs, however, one plum had eight oviposition sites.

Steuben County – First Report

August 28, 2013. Probable SWD larvae have been found in ripe/overripe blueberry fruit by Stephanie Mehlenbacher, Steuben County Cornell Cooperative Extension. Although it is not possible to definitively identify SWD from its larval stage, the size and characteristics strongly point to SWD. Infested blueberry fruit will have tiny pinholes from which liquid will leak out of the berry; the pinholes are left from where the egg was laid inside the fruit. Traps for SWD are being monitored at this blueberry planting and have not yet caught SWD – this illustrates how **traps compete poorly with fruit once fruit ripens**.

Black Cherry Hosts SWD

August 27, 2013. The forest and woodland tree, black cherry, *Prunus serotina*, is another SWD-preferred wild host. This tree grows in forests and landscapes throughout the Northeast and is native to North America. On Long Island, recent inspections by Faruque Zaman, Suffolk County Cornell Cooperative Extension, showed that over 90% of its fruit were infested with SWD. On average, 112 adult SWD emerged after incubating 4 oz. samples of black cherry fruit in the lab. So far, black cherry is the earliest (mid-July) wild host utilized by SWD that has been identified on Long Island. Pokeweed, another known wild host of SWD, has been found to have 80% infested fruit at this time. Fruit of these two wild hosts appear to be the most preferred in late summer and early fall. At this point, we have no clear idea what proportion of the SWD population is migrating into crops from these hosts or whether SWD will overwinter from these wild hosts.

For the latest information on SWD in NY visit the SWD blog at: http://blogs.cornell.edu/swd1/.

AG NEWS

Extension Helps in Disaster Preparedness

September 12, 2013. New York – Disasters kill hundreds of people, and injure thousands more, each year in the United States. A few steps to be prepared can help to keep you and your family safe. Your local Cornell Cooperative Extension Office provides information to help you be better prepared for disasters.

September is National Preparedness Month, and Cornell Cooperative Extension is a partner in this fourth annual campaign to reach out to communities in every state and help all families be better prepared. Sponsoring the effort, the U.S. Department of Homeland Security states that, in order for a community to be prepared for a disaster, every person in that community needs to take the steps to become disaster-ready.

Known for its educators/agents in counties throughout the country, Cooperative Extension is a valuable resource concerning disaster education. Through a nationwide network known as the Extension

Disaster Education Network (EDEN), your local Extension office is readily connected to expert materials in disaster preparedness, recovery and response from Land Grant universities nationwide.

Being disaster prepared is more than just knowing what to do in case of a tornado or a fire. It's also about preparing a 72-hour disaster supplies kit for your home, office and car; developing and practicing an emergency plan for your family; understanding your community's warning systems and evacuation routes; knowing who to contact in your community for more information, and how you can get involved.

Disasters are like pop quizzes – most often they are unpredictable. If you are not prepared, they can be devastating. The more you prepare, the better you will know exactly what to do and where to go.

No matter how much you have prepared, it is important to have a resource you can rely on for disaster education. Your local Extension office can be that resource.

You can also visit http://emergencypreparedness.cce.cornell.edu/ for direct links to Extension and agency resources in New York or at the national level that can help you be disaster ready.

NRCS Enhances Web Soil Survey in New Version

The latest version of the Web Soil Survey was recently launched by USDA's Natural Resources Conservation Service (NRCS). The application provides free soils information along with soil maps, properties, and interpretations aimed at helping with land use decisions. The new version includes improved map appearance, increased Area of Interest acreage, and upgraded options for changing map properties. Web Soil Survey is now online 24 hours a day.

New Pesticide Labels Will Better Protect Bees and Other Pollinators

August 15, 2013. Washington – In an ongoing effort to protect bees and other pollinators, the U.S. Environmental Protection Agency (EPA) has developed new pesticide labels that prohibit use of some neonicotinoid pesticide products where bees are present.

"Multiple factors play a role in bee colony declines, including pesticides. The Environmental Protection Agency is taking action to protect bees from pesticide exposure and these label changes will further our efforts," said Jim Jones, assistant administrator for the Office of Chemical Safety and Pollution Prevention.

The new labels will have a bee advisory box and icon with information on routes of exposure and spray drift precautions. Today's announcement affects products containing the neonicotinoids imidacloprid, dinotefuran, clothianidin and thiamethoxam. The EPA will work with pesticide manufacturers to change labels so that they will meet the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) safety standard.

In May, the U.S. Department of Agriculture (USDA) and EPA released a comprehensive scientific report on honey bee health, showing scientific consensus that there are a complex set of stressors associated with honey bee declines, including loss of habitat, parasites and disease, genetics, poor nutrition and pesticide exposure.

The agency continues to work with beekeepers, growers, pesticide applicators, pesticide and seed companies, and federal and state agencies to reduce pesticide drift dust and advance best management practices. The EPA recently released new enforcement guidance to federal, state and tribal enforcement officials to enhance investigations of bee kill incidents.

More on the EPA's label changes and pollinator protection efforts:
http://www.epa.gov/opp00001/ecosystem/pollinator/index.html

USDA Announces Available Funding to Provide Safe Housing for America's Farm Laborers

August 14, 2013. WASHINGTON, - Agriculture Secretary Tom Vilsack announced today the availability of nearly $40 million to provide housing for farmworkers and their families. Despite budget uncertainties, USDA remains focused on strengthening the rural economy.

"USDA's Farm Labor Housing Program is the only national source of construction funds to buy, build or improve housing for farmworkers, who are critical to the tremendous productivity of American agriculture," said Vilsack. "This program is an important way that USDA helps to ensure the well-being of itinerant farm labor families. Looking ahead to the future, we will also continue to urge passage of common sense immigration reform that will create rules that work for farm workers and producers alike."

Under the Farm Labor Housing Program, loans and grants are provided to farmers, farmers associations, family farm corporations, Indian tribes, nonprofit organizations, public agencies, and farmworkers associations to develop or improve multi-family housing facilities for farmworkers and their families.

For example, USDA provided Bienestar, a nonprofit organization in Hillsboro, Ore., a grant and loan to construct a 24-unit farmworker apartment complex in Forest Grove, Ore. The complex opened in December 2012. In addition to providing new, modern two-, three- and four-bedroom apartments for residents, the facility also provides services such as English as a Second Language tutoring, and classes on computers, financial literacy, and nutrition.

Today's announcement makes available approximately $30 million in loans, $8.5 million in grants, and $951,000 in rental assistance. Applications for Farm Labor Housing assistance are due September 13, 2013. More information about how to apply is available in the August 14, 2013 Federal Register www.gpo.gov/fdsys/pkg/FR-2013-08-14/html/2013-19774.htm or by contacting any USDA Rural Development state office.

Vilsack said the nearly $40 million in grants and loans is another reminder of the importance of USDA programs for rural America. Since 2009, the Obama Administration has provided more than $137 million in Farm Labor Housing assistance to construct or renovate 2,165 apartment units for farmworkers and their families.

Secretary Vilsack said that today's announcement is another reminder of the importance of USDA programs such as Farm Labor Housing loans and grants for rural America. A comprehensive new Food, Farm and Jobs Bill would further expand the rural economy, Vilsack added, saying that's just one reason why Congress must get a comprehensive Bill done as soon as possible.

President Obama's plan for rural America has brought about historic investment and resulted in stronger rural communities. Under the President's leadership, these investments in housing, community facilities, businesses and infrastructure have empowered rural America to continue leading the way - strengthening America's economy, small towns and rural communities.

USDA's investments in rural communities support the rural way of life that stands as the backbone of our American values. President Obama and Agriculture Secretary Vilsack are committed to a smarter use of Federal resources to foster sustainable economic prosperity and ensure the government is a strong partner for businesses, entrepreneurs and working families in rural communities.

USDA, through its Rural Development mission area, has a portfolio of programs designed to improve the economic stability of rural communities, businesses, residents, farmers and ranchers and improve the quality of life in rural America. USDA has made a concerted effort to deliver results for the American people, even as the Department implements sequestration – the across-the-board budget reductions mandated under terms of the Budget Control Act.

USDA has already undertaken historic efforts since 2009 to save more than $828 million in taxpayer funds through targeted, common-sense budget reductions. These reductions have put USDA in a better position to carry out its mission, while implementing sequester budget reductions in a fair manner that causes as little disruption as possible.

FOCUS ON FOOD SAFETY

FSMA Facts

FDA FOOD SAFETY MODERNIZATION ACT

More on the Proposed Agricultural Water Standards – FDA's Proposed Rule for Produce Safety

Background

FDA's proposed rule for Produce Safety has as its foundation some of the important principles in the 1998 FDA Good Agricultural Practices (GAPs) Guide and other guidance developed in recent years by FDA and others to support safe growing and handling practices. This includes its focus on five main recognized routes of contamination for produce and its proposed requirements to prevent or reduce the introduction of pathogens to covered produce through these routes of contamination. Agricultural water is one of those. Agricultural water is a known on-farm route of produce contamination, and can be both a potential source of contamination and a means by which contamination can be spread.

FDA's proposed requirements for agricultural water outlined in the proposed produce safety rule draw upon good agricultural practices being employed by farms following standards of the California and Arizona Leafy Greens Marketing Agreement, and several state produce safety programs, such as the Tomato GAPs (T-GAP) adopted several years ago by both field and greenhouse growers in Florida. The proposal is intended to reflect best practices that many farms already employ, while taking full account of the great diversity of growing conditions and practices and the need for rules that are adaptable to this diversity and make a practical difference for food safety.

FDA acknowledges that there are numerous water sources available to farmers, including ground water sources like wells, and different surface water sources like ponds, rivers, creeks, and canals. There are also municipal and water district supplies. FDA is also aware that there are upstream land and water uses that are beyond the control of growers that may affect the quality and availability of their water; and that in some areas of the country, the choices of agricultural water sources are often limited. And finally, FDA acknowledges that how and when water is applied on the farm depends on the type of crops being grown.

In the proposal, we've tried to be flexible, and have tailored the stringency of the agricultural water requirements to the risk associated with water sources, along with how and when the water is actually used or applied. It is also important to keep in mind that this is a proposed rule. Once comments are received, FDA will need to analyze and assess those comments before a final rule is put forward.

Finally, agricultural water is one of the sections of the proposed rule for which FDA would allow for alternatives to certain specified requirements – essentially, allowing farmers to be in compliance without following certain specific standards that are outlined in the proposal if there is scientific evidence supporting the use of the farmers' alternative approaches. FDA conferred with USDA (including the National Organic Program and the Natural Resources Conservation Service), EPA, the U.S. Fish and Wildlife Service, and others to take into consideration conservation and environmental practice standards and policies established by those agencies.

FDA understands that there are some strengths as well as limitations to our proposed rule. For the proposed agricultural water standards, as for all aspects of this proposed rule, FDA needs your comments and input. This is your opportunity to help shape the rules that will apply to your operations. The comment period has been extended until November 15, 2013.

More on the Proposed Agricultural Water Standards – FDA's Proposed Rule for Produce Safety

You can go to the FDA FSMA web page for more information, www.http://fda.gov/fsma or go to www.regulations.gov to comment.

Summary of Some of the Key Proposed Requirements under Subpart E: Agricultural Water

The basic requirement is that all agricultural water must be safe and of adequate sanitary quality for its intended use. Under this proposal, agricultural water is defined as water used in activities on produce (covered under this proposal) where it is intended to, or is likely to, contact either the produce itself or surfaces that come into contact with the produce (food-contact surfaces), including water used in:

- growing, including:
  - irrigation water directly applied,
  - preparing crop sprays, and
  - growing sprouts
- harvesting, packing, and holding, including:
  - washing or cooling produce, and
  - preventing dehydration

The definition of agricultural water does **not** include indirect water application methods utilized during growing activities (i.e., water that is not intended to, or is not likely to, contact produce that is covered by the rule** or food-contact surfaces), such as furrow irrigation of fruit-bearing trees. A discussion of produce covered under the proposed rule (covered produce) is on page 4.

Assessment/Inspection of the Water System/Testing Frequency

FDA is proposing that growers inspect their water source(s) and distribution systems at the beginning of the growing season. We're also proposing you regularly inspect and maintain any water sources that are under your control as well as your distribution system(s) so they do not become sources of contamination.

Testing agricultural water would be required when it is used for certain specified purposes. Testing would be required for agricultural water applied to covered produce when it:

- is used to make treated agricultural teas,
- directly contacts the harvestable portion of the crop prior to harvest, or during or after harvest;
- directly contacts food--contact surfaces,
- is used for hand washing during and after harvest, and
- is used for sprout irrigation water

Farmers using public water systems or other water supplies under certain specified conditions, or for farmers who treat their water in accordance with the proposed rule's treatment provisions would **not** be required to test their water. Certain actions would also need to be taken if a farm has reason to believe that its agricultural water is not safe and not of adequate sanitary quality for its intended use.

Testing Frequency

In proposing testing frequencies, FDA divided untreated surface water into two categories based on their potential to be impacted by runoff and the amount of control and protection that can be provided by the farm.

- Water that is susceptible to a significant amount of runoff, for example:
  - Flowing surface waters (rivers, streams, or creeks) or
  - natural ponds, lakes
- Water where runoff drainage is minimized, for example:
  - where underground aquifer water is transferred to a surface water containment such as an on-farm constructed water reservoir.

Surface water sources in the first category are susceptible to relatively rapid changes in water quality due to the many additional external forces shaping their composition. Thus a higher frequency of testing is proposed for these water sources than for the second category.

The proposed rule would also establish testing intervals for other water sources, such as ground water, that would be less frequent than the untreated surface water testing intervals. FDA sought to present practical intervals for water testing in the proposed rule. We welcome comments on the need for testing, and the proposed testing frequencies, including any alternative approaches and examples where testing should be more or less frequent based on your experience or observations.

Standards for Testing

FDA is trying to make sure that farms are assessing the quality of their water with respect to its intended use. We're doing that by proposing two numerical standards. (see diagram)

1. No detectible *E. coli* present per 100 ml of water. This standard applies when you're using water, including ice made from that water, for an activity both during and after harvest when there is a higher likelihood that pathogens would survive. For example, this standard would apply for uses in which there is normally a short time between application of the water and consumption of the produce (wash water, water used for hand washing, and water that touches food-contact surfaces). This standard also applies to sprout irrigation water and to water used to make treated agricultural teas because both uses are likely to allow pathogens to grow if they are present in the water.

2. No more than 235 colony forming units (CFU) generic *E. coli* per 100 ml for any single water sample and a rolling geometric mean (of five samples) of no more than 126 CFU/100 ml.

   This standard applies to water used during growing produce covered by the proposed rule (other than sprouts) when it is applied in a manner that results in direct contact with the harvestable portion of the crop (for example, water used to apply pesticides or fungicides directly to tree fruit, or water used to irrigate crops by overhead spray after the harvestable portion of the crop (for example, water used to apply pesticides or fungicides directly to tree fruit, or water used to irrigate crops by overhead spray after the harvestable portion is established) or food-contact surfaces.

In either case, if you find there is more generic *E. coli* than the numerical standard prescribes, you would be required to immediately discontinue use of that source for the use subject to the standard and take specific follow-up actions, including visually re-inspecting the water source and distribution systems, making changes to the system and re-testing; or treating the water.

Farms could also use the same water source for uses without numerical standards or for a use subject to a different numerical standard that the water satisfies. For example, a farm could use water that does not meet the non-detectible *E. coli* standard but does meet the 235 CFU/100 ml standard for direct application method irrigation of covered produce other than sprouts; or use water that does not meet the 235 CFU/100 ml standard for irrigation of covered produce other than sprouts in a way that is not a direct application method (such as furrow irrigation of fruit bearing trees). Exceeding the numerical standards would *not* necessarily mean that produce you already applied the water to is contaminated, but it would indicate that there is reason for concern about your water source or how it's delivered with respect to the intended use of the water.

Treatment to Reduce Microbial Levels

Because agricultural water is used in many different ways on the farm, treatment of water (to reduce microbial levels) as a preventive control is not always necessary or warranted. The proposed basic standard for water is that it has to be safe and of adequate sanitary quality for its intended use. If you have reason to believe that the water is not safe and of adequate sanitary quality for its intended use, FDA is not proposing treatment of water as the only option.

More on the Proposed Agricultural Water Standards – FDA's Proposed Rule for Produce Safety

The proposed rule would also permit farms to make necessary changes, and to retest the water to determine if those changes were effective and to ensure that the water is safe and of adequate sanitary quality for its intended use.

FDA is not proposing wholesale treatment of all agricultural water before it enters the farm or even before the farmer has considered its adequacy and safety for the uses for which it is intended.

Alternatives to the Water Testing Requirements
The proposed rule would permit you to use alternatives to requirements for testing water and taking action based on those test results when agricultural water is used during growing of produce covered by the rule (other than sprouts) using a direct water application method. To use an alternative you would be required to have adequate scientific data or information to support a conclusion that the alternative would provide the same level of public health protection and would not increase the likelihood that your produce would be adulterated under the Food Drug and Cosmetic Act.

Farmers would not need to ask FDA if they can use such alternatives, provided they have documented adequate scientific data and information to support an alternative. That documentation could be as simple as a peer-reviewed journal article or a State Extension bulletin, as long as it is science-based.

Recordkeeping
FDA is proposing that growers be required to maintain certain records, including:

- documentation of your findings from the inspection of the agricultural water system under your control;
- scientific data or information relied on to support the adequacy of water treatment methods; treatment monitoring results;
- water testing results;
- scientific data or information you relied on to support any alternatives to requirements, and
- certain documentation from public water sources, if used.

FDA has tried to keep the recordkeeping burden to a minimum. FDA seeks comment on these proposed recordkeeping requirements.

Extended Compliance Dates
FDA is proposing to delay implementation of certain provisions, including the water quality testing requirements, well beyond the effective dates for other provisions of the final produce rule. The proposed extended compliance dates for the water quality testing, monitoring, and related recordkeeping requirements are:

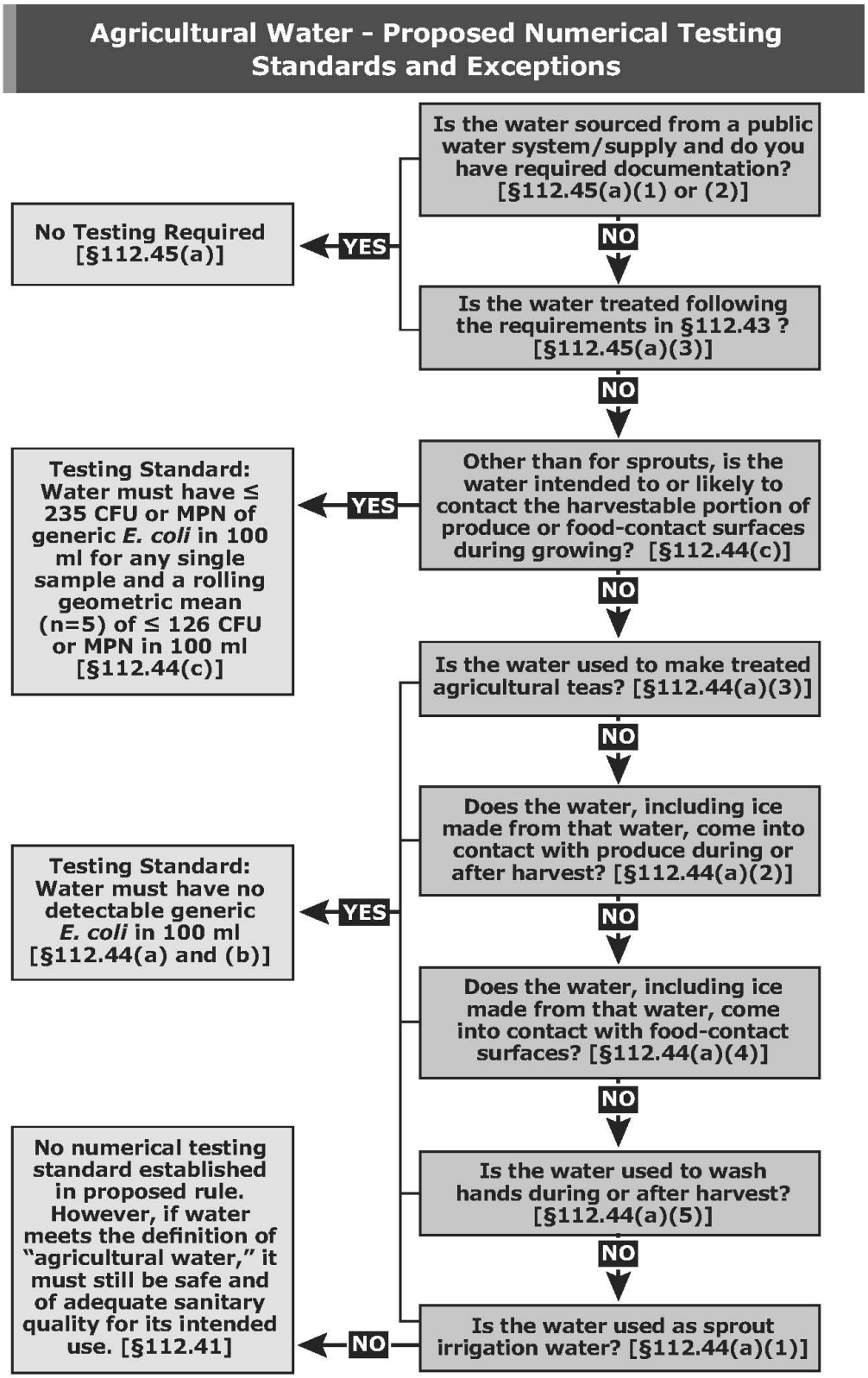
- Six years from the effective date (of the final rule) for very small businesses
- Five years from the effective date for small businesses
- Four years from the effective date for all other farms subject to the rule.

We expect these extended compliance dates to provide adequate time for industry to address issues related to agricultural water and to close some of the research gaps that exist in this area. FDA welcomes comments on this extended compliance schedule and all provisions proposed.

The proposed rule would define "produce" to mean any fruit or vegetable (including mixes of fruits and vegetables) and includes mushrooms, sprouts (irrespective of the seed source), peanuts, tree nuts and herbs. Produce, in this context, does **not include food grains, meaning the small hard fruits or seeds that are grown and processed for use as meal, flour, baked goods, cereals and oils. That means cereal grains, like wheat and corn are **not** covered by this rule. In addition, the proposed rule excludes certain commodities based on risk, that is, those that are rarely consumed raw (such as potatoes), and produce that will receive commercial processing that adequately reduces the presence of microorganisms of public health significance (such as low acid canned foods). The proposed rule would also not apply to produce grown for personal or on-farm consumption.

Updated: 8/9/13

More on the Proposed Agricultural Water Standards – FDA's Proposed Rule for Produce Safety



References/citations on this diagram are to sections of the Proposed Produce Rule
http://www.fda.gov/Food/GuidanceRegulation/FSMA/ucm350787.htm
U.S. Food and Drug Administration 2013

$MONEY TALK$

Agricultural Employers and The Wage Theft Prevention Act
On April 9, 2011, the Wage Theft Prevention Act (WTPA) took effect in New York State. This Act requires that employers provide written notice of wage rate(s) to new employees at the time of hire, as well as to current employees by February 1st of each year. The wage notice must include: the rate(s) of pay, including overtime rate (if applicable); a description of how the employee is paid (by the hour, shift, day, week, etc.); the regular payday each week; the official name of the employer and any other names used for business (DBAs); the address and phone number of the employer's main office or location; and any allowances taken as part of the minimum wage (i.e., meal and/or lodging deductions).

To assist agricultural employers in complying with this provision of the WTPA, the NYS Department of Labor's Agricultural Labor Program created the Supplement to ETA 790 (AL790.1, located at www.labor.ny.gov/formsdocs/dipa/al790.1.pdf). This supplement is for employers of H-2A guest workers and domestic workers employed on the farm who are performing the same duties and tasks as the H-2A workers. This form should be provided to employees, in addition to the ETA 790 and all of its attachments as required by federal regulations. Employers can choose to use the AL790.1 in conjunction with the ETA 790 to meet the requirements of the WTPA.

Another way for agricultural employers to comply with the WTPA is to use the Pay Notice and Work Agreement for Farm Workers (LS309). This document ensures that agricultural employers provide a written work agreement upon hire. It is also available in Spanish (LS309S). If you have H-2A guest workers on your farm but also have domestic workers that are not doing H-2A job duties, you should continue to use the LS309 or LS309S (Spanish) at least for the domestic workers that are not doing H-2A job duties.

As the State Workforce Agency (SWA), the Department of Labor is responsible for providing, in Spanish, the essential terms and conditions of each H-2A job order (ETA 790) to the SWAs in New Jersey, Pennsylvania, and Puerto Rico. These states help supply workers to agricultural employers in New York. The essential terms and conditions are compiled on a form called the AL516S. Because the AL516S may be helpful to employers who are providing notice to their workers as part of the WTPA, the Agriculture Labor Program also makes the AL516S available to H-2A farmers in New York. With this completed form, employers can provide the Spanish translations of the pay rate, job description, and other terms of employment on the notice of their choosing (AL790.1 or LS309) to their employees, upon hire and/or on a yearly basis, between January 1st and February 1st of each year.

Regardless of the form used, the notice must be signed by the employee and the employer or employer's representative ("Preparer") on the day the wage rate notice is provided to the employee. Both the employee and the employer must each receive a copy of the form with all signatures present. Please note that completing the pay notice may mean you are only partially in compliance with the WTPA, as there are other provisions, including a six-year payroll and time record retention provision.

For questions regarding any of these forms or Labor Law compliance, please contact the Agriculture Labor Specialist serving your county. You may also contact the Foreign Labor Certification Unit at ForeignLaborCert@labor.ny.gov. Find contact information for the Agriculture Labor Specialists and other information on the services for agricultural employers by visiting the Agriculture Labor Program's website at http://www.labor.ny.gov/immigrants/agriculture-labor-program.shtm.

This article was provided by the NYS Department of Labor's Agriculture Labor Program.

ON THE ORGANIC SIDE…

Organic Management of Spotted Wing Drosophila - *Emily Cook, Organic Vegetable and Fruit Extension Educator, Cornell Cooperative Extension of Ulster County*

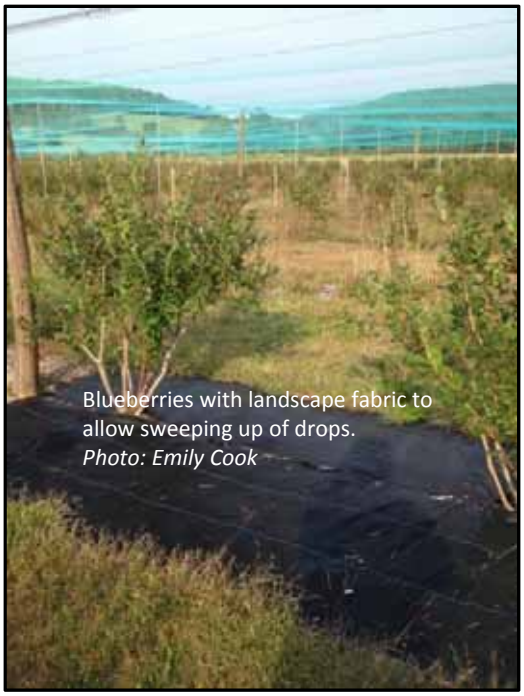
Author's note: Results of research presented in this article are extremely preliminary. Only one field trial is being conducted using the pesticides mentioned, and results represent data collected in July and August only—there is still a good part of the season left to go.

Spotted Wing Drosophila (SWD), the scourge of berry growers, is currently the greatest threat to berry production on all types of farms. Spray interval and day-to-harvest restrictions confound even the most diligent nozzle heads, and for organic farmers, management is even more difficult due to a lack of effective materials approved for use in organic systems. Two

recent field days have focused on spotted wing drosophila management. NOFA-NY and Cornell Cooperative Extension of Ulster County hosted a field day on August 26th at Westwind Orchard in Accord, NY, and farmers and Cornell researchers shared results of two grants on September 10th in the Capital District. Strategies discussed in the workshops included:

Sanitation

Clean picking of berry crops and managing drops remains the first line of defense against SWD for organic and conventional growers alike. While difficult for pick-your-own operations, eliminating sources for the flies to breed and reproduce helps control SWD populations. Infested berries should NOT be buried or placed in compost piles, most research recommends placing fruit in plastic bags and leaving them in the sun to be solarized. Hay Berry Farm experimented with using landscape fabric under blueberries so sweeping up of drops could be done easily. Some concern about excess heating due to black landscape fabric, and voles getting underneath were expressed. Some growers are directing sprays (such as Surround) onto the ground if removal of fallen berries is impractical.



Blueberries with landscape fabric to allow sweeping up of drops. *Photo: Emily Cook*

Refrigeration

Post-harvest studies at the NY State Agricultural Research Station at the Hudson Valley Lab revealed that berries held at 34° F for 48 hours decreased larval survival/hatch by approximately 50%. A post-harvest dip of the berries in a 1% crop oil solution for 5 minutes further reduced the number of larva to zero. Wetting berries post-harvest presents fungal problems, but further research on products to apply to sound fruit post-harvest would be valuable.

Trapping and Monitoring

Mass trapping of flies, with current traps, has not proven to reduce SWD populations because fruit is more attractive to flies than the yeast/sugar/flour/vinegar bait currently being used. Development of a more attractive bait (currently under research) will hopefully make mass trapping an option in the future. Trapping is a good tool for monitoring when the insect arrives, and for comparing population pressure between years and between locations. Number of flies caught in traps has not corresponded with fruit infestation levels— low trap catches can occur when fruit is 100% infested. Westwind Orchard has seen lower numbers of flies in traps this year compared to last year; a possible result of a more vigilant picking and spray schedule.

SWD Bait Recipe

12 oz. water

1 cup whole wheat flour

1 TSP dry active yeast

1 TBSP cider vinegar

a few drops dishwashing soap

Research from the Hudson Valley Lab indicates that monitoring early-fruiting, alternate plant hosts may offer the best early warning system. As fruit load diminished on Tartarian Honeysuckle, crop infestation increased dramatically. One possible use of traps is to monitor the proportion of male and female flies to predict periods of increased egg-laying which would inform spray timing. With pesticide material restrictions, spraying at the most effective time is important.

Organic Pesticides

Entrust has been found to be very effective against SWD, while Pyganic has shown poor-fair results. Entrust should be applied with an approved surfactant to improve coverage and residual time. Some evidence exists that adding sugar (1lb/100 gal. water) increases the feeding activity of SWD leading to improved efficacy of the material. Resistance to Entrust is a concern, see chart below for restrictions. Because of these restrictions, the Hudson Valley Lab has engaged in a search for organically approved materials that are effective against SWD.

Last winter, AzaGuard, an azadirachtin product, was trialed at the Hudson Valley Lab for SWD efficacy. AzaGuard controls insects in the larval, pupal, and nymphal stages by interfering with the metabolism of ecdysone. Insects typically die between larval to larval, larval to pupal, nymph to nymph molts, or during adult eclosion. AzaGuard does not kill adult flies, but may deter them from laying eggs. AzaGuard (3% azadirachtin) is OMRI approved, and a new azadirachtin product, AzaSol (6% azadirachtin) is currently in review for OMRI certification. Azadirachtin products are labeled for fruit flies, and will provide control for numerous other berry pests. There is no concern of mutational resistance with AzaGuard. See chart for material

rates. AzaGuard and Oxidate (see Botrytis control below) offer a possible material rotation for Entrust. Both materials have short residual activity, so sprays will need to be repeated at close intervals.

Improved Pesticide Application

Pesticidal control of SWD relies on frequent spraying and good spray coverage—a challenge when using a backpack sprayer. A NYFVI grant at The Berry Patch of Stonewall Hill Farm installed a fixed sprayer system in a high tunnel raspberry planting to examine the effectiveness and labor saving attributes of this mode of pest control. Instead of several hours, 5 nights a week of spraying, owner Dale Ila Riggs has reduced her spray time to about 10 minutes per application. The system, run off a small gas powered pump with a 30 gallon tank, runs each line for only 20 seconds. Water soluble spray paper reveals good coverage of the plants with the system, and SWD control has been satisfactory. Modifications of the system (placement of lines and nozzles) are required for different crops. At Westwind Farm, owner Fabio Chizzola has similarly reduced his spray time by investing in a small, tractor mounted spray tank (mounts on garden tractor) with hydraulic booms he can move for different crops. Including a non-ionic surfactant (such as NuFilm P) will increase efficacy of most products as well.

Fixed pesticide spray system in raspberries.
Photo: Emily Cook

In-row spray nozzle
Photo: Laura McDermott

Botrytis Control

Managing more aggressively for gray mold in berries may have the additional benefit of providing SWD control. In experiments at the Hudson Valley Lab over the winter, and at one un-replicated field trial location this season, Oxidate 2.0 combined with AzaGuard did provide a level of control of fruit infestation over the untreated fruit employed with or without a feeding stimulant (figure 1). Oxidate 2.0 is a new formulation of Oxidate, not believed to result in mutational resistance.

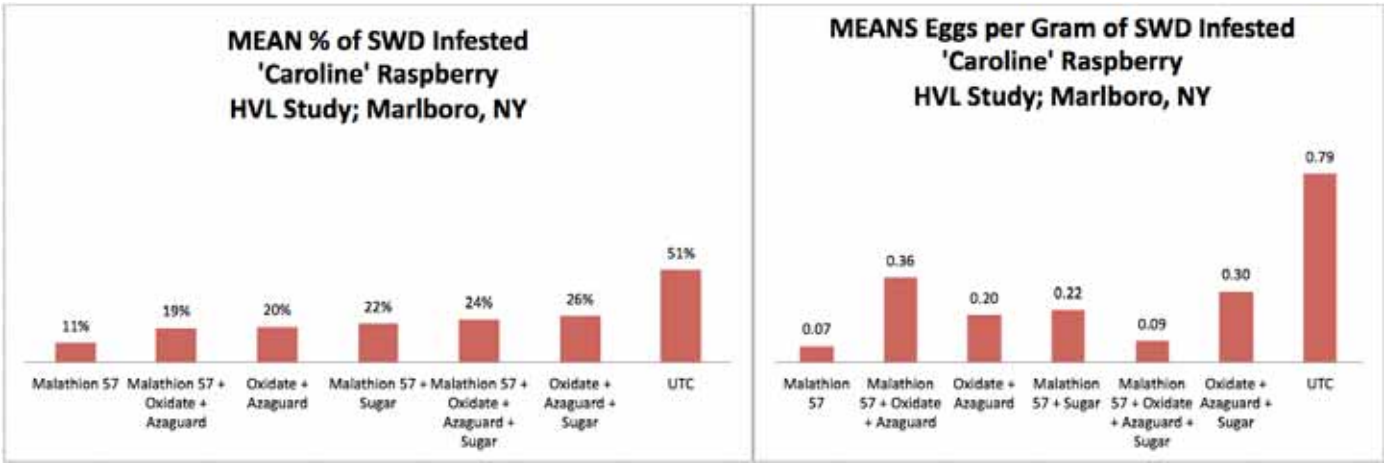


Figure 1 (*Source: Hudson Valley Lab*)

***Organically Approved Insecticides and Fungicides for Small Fruit**

Compiled by Emily Cook, Cornell Cooperative Extension, Ulster County, September 13, 2013

Product	Crop	Active Ingredient	Restrictions	Total a.i. per acre	Total applications per crop	Days to Harvest (DTH)	Re-entry Interval (REI)	Spray interval (days)	Rate/acre
Entrust SC* (liquid)(2ee)	raspberries	spinosad (spinosyn A&D 22.5% a.i)	No more than 2 consecutive applications.	29 fl. oz (0.45 lb.)	3	1	4 hr.	6	4-6 fl. oz/acre
Entrust Naturalyte* (wettable powder) (2ee)	raspberries	spinosad (spinosyn A&D 80% a.i.)	No more than 2 consecutive applications.	9 oz (0.45 lb.)	3	1	4 hr.	6	1.25-2 oz. / acre
Entrust SC* (2ee)	blueberries	spinosad	No more than 2 consecutive applications.	29 fl. oz (0.45 lb.)	3	3	4 hr.	6	4-6 fl. oz/ acre
Entrust Naturalyte* (2ee)	blueberries	spinosad	No more than 2 consecutive applications.	9 oz (0.45 lb.)	3	3	4 hr.	6	1.25-2 fl. oz./acre
Entrust SC* (2ee)	strawberries	spinosad	No more than 2 consecutive applications.	29 fl oz (0.45 lb.)	5	1	4 hr.	5	4-6 fl oz./acre
Entrust Naturalyte* (2ee)	strawberries	spinosad	No more than 2 consecutive applications.	9 oz (0.45 lb.)	5	1	4 hr.	5	4-8 fl oz/acre Dilute: 1.3-2.7 oz/100 gal
Oxidate 2.0 **	berries	hydrogen dioxide peroxyacetic acid	Highly toxic to bees and beneficials. Do not mix with copper or sulfur products.	No restriction	n/a	Green house: 1 hr Field: until dry	Green house: 1 hr Field: until dry	0	1% dilution= 1 gal /100gal water Use with non-ionic surfactant
AzaGuard**	berries; fruit	(neem oil) 3% (0.28 lb. azadirachtin/gal)	Use within 8 hrs. of mixing; do not let stand overnight. Not compatible with lime sulfur or copper	No restriction	n/a	0	0	0	10-16 fl oz/acre in combination with 0.25-1.0% crop oil and sufficient water to cover undersides of leaves.
Surround WP***	blueberries, cherries	kaolin clay	See label for mixing instructions.	No restriction	No limit	0	0	7-14	25-50 lb./acre*** (1/4 -1/2 lb. per gallon)

*Entrust combined with sugar (1/2 lb. for 25 gallons water) has shown to increase efficacy.

**Oxidate 2.0 in combination with AzaGuard has shown more efficacy than either product used alone.

*** Surround may leave residue on fruit

Exclusion Netting

Single-row exclusion netting was used at Westwind Orchard and Hay Berry Farm. At Westwind, flexible ¾" PVC conduit was hooped over a fall raspberry row and held in place on rebar stakes. Traps inside the netting had 0-2 SWD, while traps outside the netting had 15-25 flies over three consecutive weeks. Pollination was effected by the row cover, and resulting in few berries to check for infestation. Logistics for expanding single row netting to multi-row netting are under investigation.

At Hay Berry Farm, a section of blueberries was covered by 60g ProTek insect netting and secured to an existing H-Trellis with clips. Late arrival and low-population pressure of SWD interfered with collecting fruit infestation data, but data taken on fruit size and quality, and conditions under the netting provided valuable results. Fruit production under the netting was not negatively impacted by the fabric. Overall yield was slightly higher in netted plots, and berry size and Brix were similar to control plots. Temperature and light intensity were higher under the fabric.

FOCUS ON PEST MANAGEMENT

What Are We Learning About Spotted Wing Drosophila Management in Berries This Season? - *Rufus Isaacs, Steve Van Timmeren and Keith Mason, Michigan State University Extension, Department of Entomology*

The Third Growing Season Of Spotted Wing Drosophila Brings New Insights Into Its Management

August 26, 2013. Spotted wing drosophila (SWD) continues to be a significant pest in berry crops, and this season has again highlighted the need for growers to adopt intensive integrated pest management (IPM) programs to maintain fruit quality. While some producers have had challenges with this pest, most Michigan berry growers have been successful in controlling SWD. These experiences, coupled with our ongoing research, can help guide the improvement of management programs over time. This article provides an update from the experiences this summer to help inform growers to manage this pest during the rest of the 2013 season, and to help prepare for 2014.

There are some recurring themes in situations where SWD problems have developed. Below, Michigan State University Extension addresses the situations that are associated with SWD problems including what we are learning this season about insecticide efficacy. Some comments are provided on how to rectify the situation in the short- and long-term. Some of these fixes are relatively simple, while others will take time and money to resolve.

Wooded borders

SWD inhabits the wooded habitats adjacent to crop fields, developing in wild berry-bearing plants that serve as alternate hosts to SWD. We are seeing higher pest pressure at these borders than at fields away from wooded edges, and on top of this these wooded edges can be harder to treat with aerial application. In response, growers are enhancing their SWD management program with border applications to ensure that field borders are well protected. A cannon-type sprayer can be used in this way to reduce immigration of flies into crop fields.

Another approach to help reduce the risk of load rejection by processors is to pick separate loads for the parts of the field near the woods and away from woods. For machine harvesting, this only works well at fields with woods next to the long edge of the rows.

Pesticide coverage

Chemical controls can work only if they are applied in ways that protect all the berries from SWD. This requires excellent coverage of the crop, and there are multiple ways to achieve this. Growers are having success using sprayers operating from the ground and from the air, but both of these approaches have their drawbacks. Driving a sprayer through fields knocks off

berries and reduces yield, so there is an understandable temptation to skip a larger number of rows. However, even tower sprayers that have nozzles to direct spray into adjacent rows may not be able to achieve high coverage if the tractor is skipping more than a few rows at a time. While this approach has worked in the past for blueberry maggots and Japanese beetles that are active in the tops of bushes, SWD likes the shady parts of the canopy that are more challenging to penetrate with the sprayer.

Getting coverage with any sprayer design becomes more challenging as the canopy density increases, so effective control of SWD may require some changes to have well-pruned bushes, not skipping too many rows when spraying, and using higher water gallonage. Making adjustments to ensure excellent coverage may need to be part of planning ahead for 2014.

Using the most effective insecticides
From grower experiences this season and our recent research, we provide an updated list of highly effective insecticides for SWD control:

- Organophosphate Imidan
- Pyrethroids Mustang Max and Danitol
- Carbamate Lannate
- Spinosyn Delegate (or Entrust if growing organic berries)

Rotation among these insecticides is expected to provide the best opportunity for control of SWD while also minimizing the risk of resistance development. Reapplication is needed to keep high levels of crop protection, and a seven-day interval has been working well for many growers.

Malathion has worked well for some growers again this season, but if weather conditions become very hot, we caution growers against the use of this insecticide due to expected negative effect on its performance. This statement is based on the good control seen with Malathion 8F at the 2.5 pint per acre rate in our 2012 trials, compared with the much less effective performance we have seen in our 2013 trial. We suspect this difference is because of temperature, in that our 2012 trial was run when the daily maximum high temperatures were in the 70s and low 80s, whereas the 2013 trial was run when the temperatures were in the high 80s and low 90s, thereby reducing Malathion performance. Under these same hot conditions, Mustang and Danitol performed well out to seven days after treatment in our trial this year.

Reapplication after rain
If SWD have been detected and fruit are ripe or ripening, they will need to be protected from this pest. The duration of protection varies by insecticide, but it is highly sensitive to rainfall – most insecticides we have tested lose the ability to protect berries from SWD after rain. We therefore recommend reapplication after any significant rainfall, and failure to do this will leave fruit exposed to egg-laying by SWD.

This article shows that we are continuing to learn about SWD and how to combat it, but there is still more work to be done. This is an evolving area of pest management research and we welcome continued input from growers, processors and others on SWD management concerns.

For more on SWD management, check out the MSU Spotted Wing Drosophila website. *This article was published by **Michigan State University Extension**.*

Disclaimer: Not all products mentioned in the above article may be labeled for use in NY State; always check that pesticide labels include both target crop and pest prior to application.

Crumbly Raspberry Disorder Being Seen Across Michigan- *Bob Tritten, Annemiek Schilder, and Eric Hanson, Michigan State University*

Small, Misshapen, Crumbly Fall Red Raspberry Fruits Can Have Several Causes

August 23, 2013. Late last week, inquiries from fall red raspberry growers across Michigan were made asking what was happening to their raspberry crop that is beginning to ramp up in the harvest window. Growers reported seeing berries that

are much smaller than usual, misshapen and crumbling when harvested. The canes and leaves appear normal in terms of their growth and color.

Normal raspberry flowers have between 100 to 125 pistils. Each pistil is able to produce a seed and a drupelet. In normal berries, 75 to 85 drupelets usually develop. If appreciably fewer than 75 drupelets develop, the berry does not hold together and crumbles as it's pulled from the plant. Crumbly fruit usually contain fewer drupelets than normal, so they are small. The berries are of such poor quality that they are not marketable for fresh market berries, pick-your-own sales and even for the processing market.

There are many potential causes of crumbly fruit. Many times growers have difficulty sorting them out. The list of causes of crumbly raspberry disorder is long; here are a few of the most common causes suggest by Michigan State University Extension.

Poor pollination
Poor pollination causes crumbly fruit because a full complement of drupelets fails to develop. Raspberries are self-fruitful, but bees are necessary to move pollen from the anthers to the stigma for full fruit set. Inadequate numbers of bees, both native and introduced, can cause small and crumbly fruit. Careless pesticide applications can reduce pollination by killing foraging bees. Some pesticides may also repel bees for some time after applications.

Poor pollination weather can potentially limit bee activity, but raspberries are extremely attractive to bees, so weather has to be unusually poor. Extremes in daily temperatures (too cold or too hot) over several days will contribute to crumbly berries; this could affect the bees or pollen tube growth. Most often these extremes occur over a few days, so only those flowers and subsequent fruit exposed to these conditions will express crumbliness. Crumbly fruit then would be found through the whole field only at a certain height of cane or length of fruiting lateral in the case of exposure to extremes in weather.

Tarnished plant bugs
Tarnished plant bugs cause crumbly fruit by feeding on the flowers or developing fruit. As a result, some drupelets do not develop and berries are irregular in shape, small and crumbly. To prevent this damage, scout for the pest early in the season and apply appropriate controls. This pest also feeds on a variety of fruit crops. This season very few tarnished plant bugs were found by growers and scouts in any of our fruit crops.

Two-spotted spider mites
Two-spotted spider mite infections have been referenced in the literature occasionally to contribute to crumbly berries, but there is not a clear link here. This year, two-spotted spider mite populations have generally been very low.

Virus diseases
Virus diseases are a potential cause of crumbly berries. There are three known viruses; tomato ringspot virus, raspberry bushy dwarf virus and raspberry leaf curl virus. All three are systemic diseases with no cure other than removing the plants. Tomato ringspot is spread by dagger nematodes so the disease tends to start in certain locations and spread slowly to neighboring plants. Raspberry bushy dwarf virus is spread by bees carrying infected pollen. It can become widespread in plantings in a short time. Raspberry leaf curl virus is one of the most damaging viruses in raspberries and is spread by the small raspberry aphid (*Aphis rubicola*).

In the case of virus diseases, affected bushes tend to be spotty or clustered in the field and express foliar symptoms such as stunting, leaf crinkling or unusual color patterns, although plants with tomato ringspot virus often appear quite normal aside from having low vigor. In addition, the problem would become gradually worse over the season or over several years. If the plants look healthy and berry crumbliness came on suddenly and fairly uniformly, other causes are more likely.

Botrytis
Botrytis or gray mold is common on ripening raspberry fruit, but this fungus can also infect flowers if bloom occurs during rainy periods or when dew is particularly heavy such as in the fall. Bloom infections usually kill whole flowers and no fruit are set, but partial damage can also result in small crumbly fruit. Based on where we at in harvest this year, this is most likely not the problem.

Boron deficiency
Boron deficiency can also cause poor fruit set and crumbly fruit. This nutrient is particularly important for pollen germination and pollen tube growth. Deficiencies are most likely on very sandy soils. Check boron levels by submitting leaf samples for nutrient analysis. If levels are low, apply 0.5 to 1.0pounds of boron as a soil application in the spring, or 0.5 pounds B as a foliar spray prior to bloom in summer bearing varieties or in mid-summer on fall-bearing types. Be careful not to apply too much boron; excess levels can kill plants. The chances of this shortage being seen just this year and in so many locations across the state make this cause unlikely.

In our opinion, the crumbly berry disorder is most likely caused by a combination of poor pollination and extreme weather conditions (too warm or too cold during bloom). (*This article was published by **Michigan State University Extension**.)*

FEATURES

An Introduction to Sea Buckthorn - *Jim Todd, Transition Crop Specialist, Ontario Ministry of Agriculture and Food*

General Information

Latin Name *Hippophae rhamnoides* L.
Family Elaeagnaceae
Common Names Sea buckthorn, Siberian pineapple, Sea Berry, Sandthorn or Swallowthorn

Habitat
Sea buckthorn is native from northwestern Europe, through central Asia to the Altai Mountains to western and northern China and the northern Himalayas.

Historic Uses
Sea buckthorn was used in ancient Greece as a fodder for horses to promote weight gain and a shiny coat. In fact, the generic Latin name "*Hippophae*" literally translates to "shiny horse". It has been used for centuries in both Europe and Asia as food; and for its pharmaceutical properties. Anecdotal reports indicate sea buckthorn was used in ancient times to:

- Lower fevers, reduce inflammation, counteract toxicity and abscesses, and clean the lungs.
- Treat colds and coughs.
- Treat tumors and growths, especially of the stomach and the esophagus.

Current Uses

Plant Parts Used
Leaves and young branches, berries.

Functional Food
Juice from sea buckthorn berries is a common drink in many parts of Asia and Europe. The juice is very high in protein, vitamins C and E, and organic acids. The leaves, either fresh or dried, can be steeped to yield a nutritional tea. Leaves, young branches and fruit pulp can be used as animal fodder.

Medicinal
Topical application of sea buckthorn oil has been reported for skin therapy including sun, heat, chemical and radiation burns, eczema and poorly healing wounds. Russian cosmonauts used sea buckthorn cream for protection from cosmic radiation. Oil from the sea buckthorn fruit is rich in vitamin E, carotenoids, phytosterols and essential fatty acids, all of which have beneficial medicinal properties for the treatment of internal and topical maladies.

Agronomic and Environmental
Sea buckthorn is a remarkably hardy bush that rapidly develops an extensive root system capable of fixing nitrogen. Thus, it is suitable for growth on marginal soils, eventually improving them to where they can support the growth of other plants. It is quite tolerant of salt-spray adjacent to highways. Sea buckthorn has been used for:

- Soil erosion control and land reclamation projects
- Wildlife habitat enhancement (figure 1) and farm stand protection
- Ornamental bushes

Plant Characteristics

The sea buckthorns are deciduous shrubs that typically range from 0.5 to 6 m in height with equivalent spread, but may reach up to 18 m in central Asia. The staminate trees are more erect than the spreading pistillate trees. It naturally tends to sucker forming thickets if not properly maintained. They can survive temperatures as low as - 40°C, and are both drought and salt tolerant. Sea buckthorns require full sunlight for good growth and cannot tolerate shady conditions near larger trees. The branches are dense, stiff, and very thorny with both terminal and axillary twig spines. The linear or lanceolate shaped leaves, which are 3 to 8 cm long and less than 7 mm wide, are dark grey-green on the upper surface and a distinct pale, silvery-grey on the lower surface. Sea buckthorn is dioecious, with separate male and female plants. Flowers emerge prior to the leaves, are localized to the 2nd year-old wood, and occur in small racemes in the leaf axils along the entire length of the branch. Pollination of the female flowers occurs in mid-May, and is entirely dependent on wind to spread pollen from the male flowers. Fruit ripening occurs about 100 days after pollination. Sea buckthorn fruit can vary in both shape and color, but are typically globose to egg-shaped berries ranging from yellow to bright orange in color. The combination of fruit shape and size, together with the contrast between the color of the fruit and leaves, contributes to the ornamental value of this plant.

Agronomic Practices

Agricultural Zone

Woody shrub to small tree hardy to Zone 3 (- 40°C).

Seed Germination

Sea Buckthorn seeds will germinate in 3 to 10 days after stratification to break dormancy depending on germination temperature. Stratification for 90 days at 3 to 5 °C under moist conditions is required to achieve good germination when sown in the spring or in the greenhouse. Fresh seed can be sown directly in the field in the fall covered with 5 mm of soil.

Propagation

- By seed, but seedling will not be identical to female plant, and may be male.
- By softwood cutting - simple, inexpensive, and highly successful.
- By hardwood cutting - simple, inexpensive, and moderately successful.
- Root cuttings will propagate quite readily.
- By suckering - simple, inexpensive, but suckers have poor root mass and may suffer transplant shock.

Soil Type

Sea buckthorn is adapted to a wide variety of soils, and will grow on marginal land including sandy, gravely soils with poor nutrient and water retention capacities. Sea buckthorn thrives on well drained, light to medium sandy loam. It has a moderate tolerance for saline soils. A soil pH between 6-7 is optimum for this plant.

Moisture Needs

Although drought tolerant, a minimum of 400 mm of annual precipitation is required to ensure good fruit yield. Fruit set at an orchard near Wingham, ON occurred 2 weeks earlier in 2006 compared to 2005. For the period from May 1st to September 1st, both growing degree days (1516 vs. 1362) and crop heat units (2366 vs. 2162), were higher in 2005 compared to 2006, but rainfall was significantly higher in 2006 (335 mm vs. 239.6 mm). The additional rainfall in 2006 likely contributed positively to both the early fruit set and increased yield.

Spacing

Orchard design is dependent on whether the fruit will be harvested mechanically or by hand. Typical orchards have about 600 to 1000 plants per acre, with 1 male for every 7 female plants.

Harvest

When only a few trees are grown, the berries can be readily harvested by hand, requiring about the same amount of effort as harvesting raspberries. Although the thorniness of the sea buckthorn bushes can be a problem, young plants may be relatively thorn free. Some thornless varieties are currently available, and future breeding efforts should increase their

numbers. As the number of trees in the orchard increases, so does the work required for harvesting the berries. Figures from China indicate that up to 1500 person hours per hectare are required for hand harvesting. Hand harvesting at the Wingham area orchard suggests the time to hand harvest per hectare may be significantly higher than 1500 hours, especially when trying to harvest intact berries. The fruit are strongly attached, and are not easily stripped from the branches. Experienced pickers were able to harvest intact fruit at rates of 1-1.5 kg per hour. The difficulty of removing the fruit from the tree diminishes as the season progresses. Unfortunately, fruit quality also decreases over this same period, so optimum times for harvest will need to be identified for individual growing areas. Successful commercial operation of a sea buckthorn orchard will ultimately require the development and implementation of some type of mechanical harvester. Several types have been developed, including a vibratory shaker invented in Saskatchewan. As with any crop grown for nutraceutical, medicinal or culinary use, post-harvest handling of sea buckthorn berries should conform to approved Good Agricultural Practices standards. After cleaning, the berries should be processed as soon as possible, but may be either stored at low temperature (4 to 6°C), or flash frozen if immediate processing is not feasible. The shelf life of berries stored at low temperature can be up to 2 weeks. Berries maintain their shape when thawed after freezing. The fruit harvested from the Wingham orchard is currently being used in both fresh and frozen products which are sold at a farmers market near Huntsville. The fruit is processed into a variety of products, including jelly, juice extracts, nectar salsa and bread made from the pulp and seeds following juice extraction. Young leaves have been dried and ground for use as a tea.

Figure 1. One of many small birds' nests found within the Sea buckthorn shrubs.

Figure 2. Newly planted Sea buckthorn produced from runners (in foreground). This picture was taken in mid-September 2005 near Wingham, ON. The summer's buckwheat cover crop had been ploughed under and rye grass planted between rows.

Figure 3. Left Panel: Three year old sea buckthorn trees near Wingham, ON (2005). Right Panel: Four year old trees from the same orchard (2006)

Figure 4. Berry yield from 3 year old sea buckthorn trees (left picture). Maximum fruit set occurs in trees 4 years and older (right picture).

Figure 5. Pruned branch from a 4 year old tree. Berries were later removed by hand for further processing.

Figure 6. Pruned branches ready for transport to the barn for berry removal.

Figure 7. Four year old sea buckthorn orchard as seen from 200 meters. Note the abundance of berries, each of which is no more than 2 cm in length.

Other Considerations

As with any alternative crop, new growers should educate themselves on the cost of production and the market potential of sea buckthorn. Furthermore, prior to making any claims about the nutraceutical or medicinal properties of sea buckthorn,

growers must ensure that these claims fall within the regulations established by the Natural Health Products Directorate of Health Canada.

References

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Questions or comments about the New York Berry News?

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