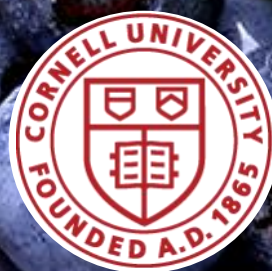


VOLUME 7, ISSUE 10

AUGUST 2019

BERRY NEWS



Berry 'To Do' List

—ALL CROPS—

- **Spotted Wing Drosophila** populations are rapidly increasing. Please monitor your berries.
- **Foliar leaf analysis** should be done now and into mid-August.
- **Birds** are a constant problem especially as drier weather sets in. Netting, distress calls, laser lights, scare eyes etc. will be needed in order to keep the damage at an acceptable level.



—RASPBERRIES & BLACKBERRIES—

- The photo of raspberries in tunnels was taken on August 6th while I was in Canada on a tunnel berry tour. This production system is called 'long cane' production – VERY productive but labor intensive.
- Scout for **Crown borers and cane borers**, both of which may be causing cane collapse.
- Scout for **two-spotted mites** – especially if you have raspberries in tunnels. Mites love this hot, dry weather we've been having. Predatory mites really do work—you just need to get them applied before the infestation hits—which is why scouting is so important.

*Long Cane raspberry production in Quebec.
Photo by L. McDermott.*

(Continued on page 2)

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—BLUEBERRIES—

- Blueberry harvest is in full swing. Heat spikes are hastening ripening but cooler nights will really help improve flavor.
- **Powdery mildew** is promoted by warm summers with limited rain and high relative humidity. In blueberries, powdery mildew is mostly present on the lower leaf surface in contrast with other plants. The fungus overwinters on infected leaves and probably in bark. Powdery mildew usually is of little concern unless the disease becomes an annual problem and begins to cause early defoliation.
- I think that we have a **much bigger problem with cane canker diseases** than we are realizing. I'm seeing all kinds of phomopsis in plantings. Not all are the typical summer flagging. Lots of smaller tip injury with cankers that are sporulating and causing problems. Canker diseases will infect stressed plants. Make sure that your nutrition is appropriate – both soil tests and foliar tissue tests are important – and the window for sampling is NOW.
- Lots of other diseases popping up besides powdery mildew. **Leaf rust** is discussed on page 4-5, and **mummyberry** on page 5-6.

—STRAWBERRIES—

- Review the checklist in this newsletter for new short day (June bearing) plantings.
- Make sure to sample renovated plants for **foliar nutrition** as leaves emerge and expand.
- Scout for **strawberry root weevil** and **black vine weevil** notching

as plants regrow during August. Look for adult notching but also very poor regrowth in fields.

- **Potato leafhopper** damage especially on new plants, can really slow a planting down.
- Scout for **spider mites** especially in new plantings if dry weather continues.
- Day Neutrals beginning to fruit. Fertilize – between 3-5# of actual N per week – moving towards 5-7# N as the fruit starts to ripen.



Tabletop planting of Day Neutral strawberries. This is a labor saving method of production being used in Quebec. Photo by L. McDermott.

Short Day (June-Bearing) Strawberry Growers Checklist

Adapted from the North Carolina State Strawberry Growers Checklist

- ☐ Critique the 2019 season: How were your week-by-week sales? How did 2019 sales compare with last year? What about your prices?
- ☐ What can you do about opening earlier in 2020?
- ☐ Do you want to switch to change your production system? If so – how?
- ☐ Do you need to adjust your plant order downward to better manage production peaks?
- ☐ Carefully assess the performance of your main strawberry varieties in the 2019 season, and decide by no later than November which varieties you will plant this fall, and how much acreage of each variety?
- ☐ Submit your plant order as soon as possible. Calculate about 10% more plants than you would need.
- ☐ What other changes do you need to make for next year? Are you satisfied with the productivity of your current fields? A possible rotation to another site may be beneficial if your overall yields were lower than expected in 2019.
- ☐ Get soil pH tested and do liming in fall to make spring planting easier. 6.2 is the target for strawberries.



Destructive Plant Pest Thwarted by Two Native Fungi

Krishna Ramanujan, Cornell Chronicle, April 2019

Cornell-led research reports that two local fungal pathogens could potentially curb an invasive insect that has New York vineyard owners on edge.

The spotted lanternfly feeds on more than 70 plant species, including grape vines and apple trees.

Now, the paper, “A Pair of Native Fungal Pathogens Drives Decline of a New Invasive Herbivore,” (<https://www.pnas.org/content/116/19/9178>) led by Eric Clifton, a postdoctoral researcher in the lab of Cornell professor of entomology and co-author Ann Hajek, describes how two unrelated fungi, *Batkoa major* and *Beauveria bassiana*, have been decimating spotted lanternfly (*Lycorma delicatula*) populations near Reading, Pennsylvania.

“The finding is important because these naturally occurring pathogens could be used to develop methods for more environmentally-friendly control of this damaging invader,” Hajek said.

“It’s a great example of how a major new invasive herbivore can be suppressed by native pathogens,” Clifton said. “Nobody stepped in to do this; it all happened naturally.”

Native to China, Taiwan and Vietnam, the spotted lanternfly was first discovered in southeastern Pennsylvania in 2014 and has spread to seven more states (see map on page 4—<https://nysipm.cornell.edu/sites/nysipm.cornell.edu/files/shared/images/SLF-Known-Distbn.jpg>). Adult insects occasionally have been sighted in New York, but there are no signs yet of large populations. Entomologists and growers believe it’s just a matter of time before spotted lanternflies settle in New York, which boasts a nearly \$5 billion grape, grape juice and wine industry, and also stands as the country’s second-largest apple producing state. In Pennsylvania, spotted lanternflies have damaged at least a half-dozen vineyards from 2017 to 2018. While there are no reports of spotted lanternfly infecting apple orchards in the U.S., the insects have damaged apples in Korea.

In late 2017 Clifton and Hajek began responding to reports of fungi killing the insects in Berks County, Pennsylvania. In early October 2018, they investigated a site near an apple orchard. “It was clear anywhere you walked, you’d see dozens of lanternflies killed by *Beauveria* on the ground, and then you’d see cadavers all over the trees killed by *Batkoa*,” Clifton said. At the same time, they have just one ant, one stonefly, and a beetle killed by *Beauveria* and no other insects killed by *Batkoa* in the area.

Back at the lab, the researchers used genetic techniques to identify the two fungi. They found that 97% of lanternflies on tree trunks were killed by *B. major*, while on the ground 51% of cadavers were killed by *B. bassiana* and the rest by *B. major*.

Very little is known about *B. major*. “This fungus is more difficult to grow in the lab than *Beauveria bassiana*,” Clifton said. In nature, insects pick up spores of *B. major* on contact, and the fungus then enters the insect’s body through weak spots in the outer cuticle or “skin”. This fungus tends to anchor its dead insect host to a plant or

tree as the spores start to develop on the outer body and the infective spores are then shot off. Spores are produced for a short period of time, and after spores have spread and infected new lanternflies, traces of them in the environment are hard to find. Hajek intends to study *B. major* further in the future.

B. bassiana, a soil fungus, has been heavily researched. It belongs to an entirely different order of fungi from *B. major*,

though the two infect insects in a similar manner, through surface contact, and both kill insect hosts.

The success of invasive species has been partly attributed to a lack of natural enemies. Conversely, Clifton suspects that one reason these two fungi infect spotted lanternflies but not other local insects is that the lanternflies lack the immunity that has evolved in local species, though more research is needed to verify the theory.

Clifton and Hajek plan to search the area for other insects known to be susceptible to these fungi, collect soil samples from the area, quantify the density of these fungi and test biopesticides based on *B. bassiana*. Some have already been approved by the Environmental Protection Agency.

“If you like apples, if you like grapes and wine, if you like beer (which requires hops, another plant eaten by spotted lanternflies), spotted lanternflies can attack those, and that has growers worried,” Clifton said.

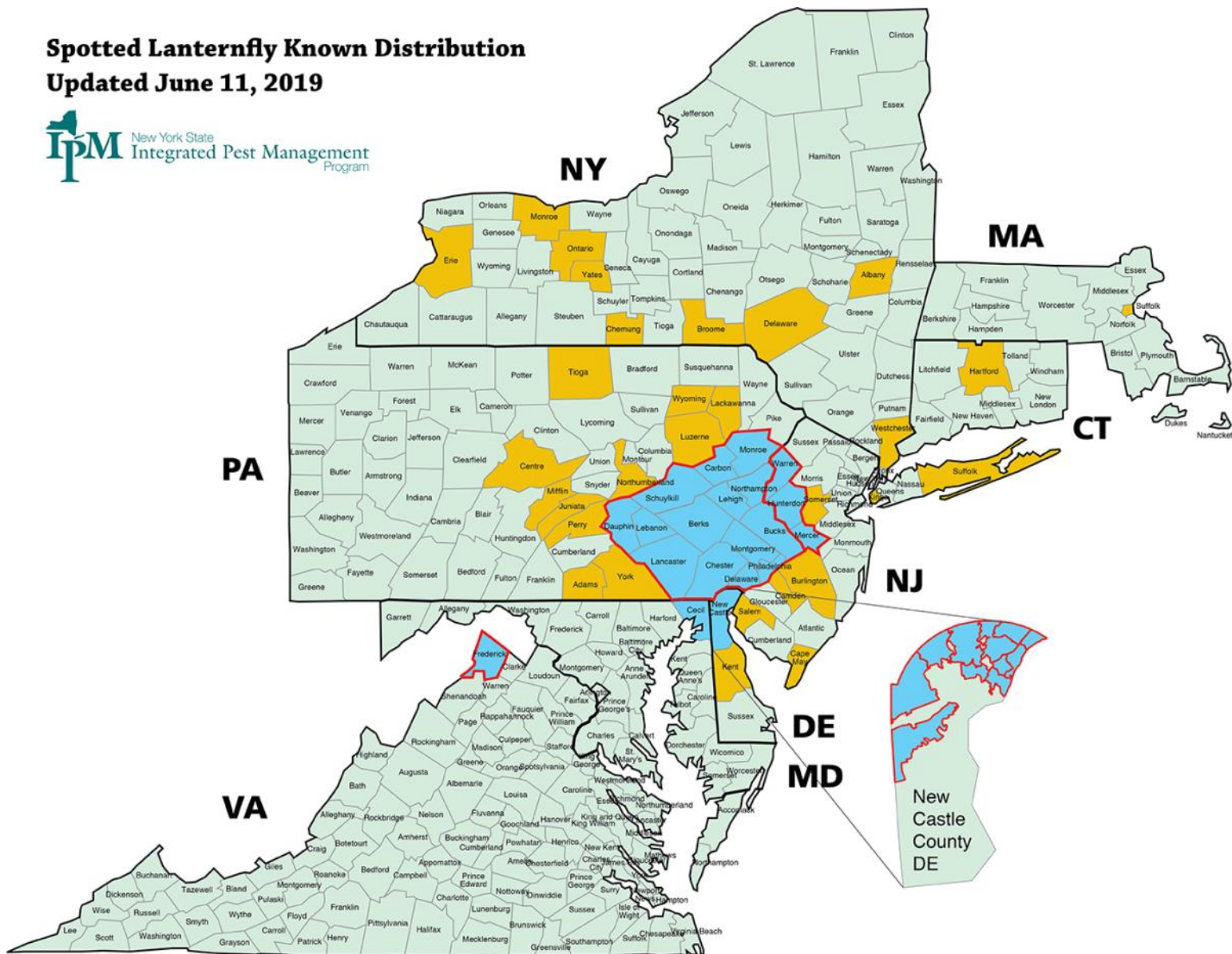
Louela Castrillo, an entomologist at the United States Department of Agriculture (USDA) Agricultural Research Service on Cornell’s campus, and Andrii Gryganskyi, a molecular biologist at L.F. Lambert Spawn Co., are co-authors of the study.

The study was funded by the USDA.



Spotted Lanternfly adults on grapevine. Photo: Eric H. Clifton, Cornell University

Spotted Lanternfly Known Distribution Updated June 11, 2019



NY external quarantine areas. Spotted lanternfly infestation found.

Spotted lanternfly found, no infestation.

Internal state quarantine areas.

Be Aware of Blueberry Leaf Rust

Dr. Annemiek Schilder, formerly at Michigan State University Extension, now Director of UCCE Ventura County and Hansen Agricultural Research and Extension Center

Editors Note: *What we are seeing in eastern NY this year is the initial infection of blueberry leaves from the aeciospores released from the alternate host hemlock lesions. This makes sense due to the very wet cloudy weather of spring and early summer. But now, with heat and dry setting in, we are not seeing the initial lesions moving to the more diagnostic orange uredia. This may happen later in the season if wet weather recurs, but it may not result in the overwintering stage of teliospore. Super fascinating but complicated life cycle!*

Be on the look-out for blueberry leaf rust, particularly in fields that have had a problem in previous years. While this disease is relatively rare in Michigan, it can be severe in fields that are affected. Rainy periods in the middle of the growing season are conducive to disease development. It also occasionally pops up on blueberry plants in greenhouses. Leaf rust is caused by the fungus *Pucciniastrum vaccinii*. Yellow spots appear on leaves by mid-season and eventually turn reddish-brown (Photo 1). On the lower leaf surface, yellow to orange spore pustules (uredia) are present, which may turn rusty red with age (Photo 2). You have to turn the leaf over to see the orange pustules.

(Continued on page 5)



Photo 1: Yellow spots appear on leaves by mid-season and eventually turn reddish-purplish-brown. Photo by Bill Kline.

The disease is not systemic in blueberries. Leaf rust can rapidly increase towards the end of the season. It generally has little impact on yield, but may cause premature defoliation. It is possible that severe defoliation could affect winterhardiness of the canes.

The alternate host of the rust fungus is hemlock (*Tsuga* spp.), which explains why the rust is more severe in the vicinity of hemlock trees (up to a half mile). Airborne aeciospores from hemlock needles infect blueberry leaves in early summer. Yellow uredospores (Photo 2) then develop on blueberry leaves and spread the disease among blueberries. The uredospores are airborne and spread easily from leaf to leaf and bush to bush. In fall, teliospores (the overwintering stage) form in the rust pustules on blueberry leaves. The teliospores produce basidiospores, which are airborne and infect hemlock needles in early spring. In areas where green leaves are present all year (in the southern United States or in greenhouses), hemlock trees are not needed. On green leaves, the fungus will continue to perpetuate itself via the orange/yellow uredospores.

For management, a recommendation to remove hemlock trees within a half mile may neither be desirable or practical. However, it would remove the alternative host, which would break the life cycle in cold climates. Raking up blueberry leaves after leaf fall and burning them can also help to reduce inoculum carry over.

Other things that can be done: limit overhead irrigation to reduce leaf wetness and apply effective fungicides during periods of high risk (usually starting before or shortly after harvest). Though we have not evaluated any fungicides for rust control in blueberries in Michigan, the sterol inhibitors are

usually quite effective against rust fungi, and both Indar (30-day PHI) and Orbit (30-day PHI) are labeled for rust control. Bravo also lists rust on the label – just remember the PHI is 42 days and sprays are not recommended after full bloom due to potential phytotoxicity. However, all of these fungicides can be sprayed after harvest provided that the maximum number of sprays per season is not exceeded. Sonata (*Bacillus pumilis*), a biofungicide is also labeled for blueberry rust control and has a zero-day PHI. Adding NuFilm as a spreader-sticker improves activity of Sonata. Abound does not have rust listed on its label and the labels of Pristine and Cabrio list “suppression” of rusts only, which indicates that they are only moderately effective against rust.



Photo 2: On the lower leaf surface, yellow to orange spore pustules (uredia) are present, which may turn rusty red with age. Photo by Bill Kline.

Mummyberry in Blueberries

Vern Grubinger, University of Vermont

Editors Note: This is a great article, but I would advise against allowing the forsythia bloom as the signal for when to spray for mummyberry. If you really want to time it precisely, try the mummyberry plot approach that was described in a Berry News a month ago.

There has been a lot of this disease around the region due to spring weather conditions that favored infections. Late frost may have exacerbated the susceptibility of shoots as well.

As you may know, mummyberry goes from the soil (spores released by little trumpet-like mushrooms around the time forsythia blooms) to shoots ('primary' infection, causing wilting dark leaves and stems) which then produce a different kind of spore that blows/goes on insects to blossoms and causes 'secondary' infection of fruit. The infected fruit ('mummies') drop to the mulch/soil and start the process over next spring. The mummyberries need a cold treatment to produce spores so are not infective this fall, based on what I have read.

At this point in the season, all of your 'secondary' fruit infection (shoot to blossoms) has already taken place for the year, so there is no benefit to spraying fungicides for this disease. Remove infected berries as best you can, before or after they drop to the ground and overwinter, to help reduce disease pressure next year.



Blueberries infected by mummyberry develop ridges as berries mature. In the early stages, they are soft and rubbery. Photo by Bill Cline, North Carolina State University.

Applying a thick layer of mulch in spring is key, to bury the little mushrooms. Raking the mulch in early spring can also help. I've been asked about laying down landscape fabric or other materials on top of mummies next spring, and it makes sense but I am not aware of evidence that it works.

Fungicides only work against mummy berry infection preventatively, whether shoot and/or fruit infections. There is usually different efficacy for shoot strike (primary) and fruit (secondary) infection among fungicides. If you decide to spray next year you should rotate at least two different FRAC group (mode of action) fungicides. See pesticide recs in the Cornell Berry Pest Management Guidelines.

Next spring, scout for the 'trumpets' and protect the shoots before they release spores (again, usually about when forsythia blooms). Conventional and organic growers then have several spray options.

Organically, you could alternate Regalia with either Double Nickel or Serenade plus spreader sticker (NuFilm). These (OMRI) materials have different modes of action so they suppress fungi differently. Alternate the sprays, re-applying at the shortest spray interval that the labels allow if you have had high pressure this year.

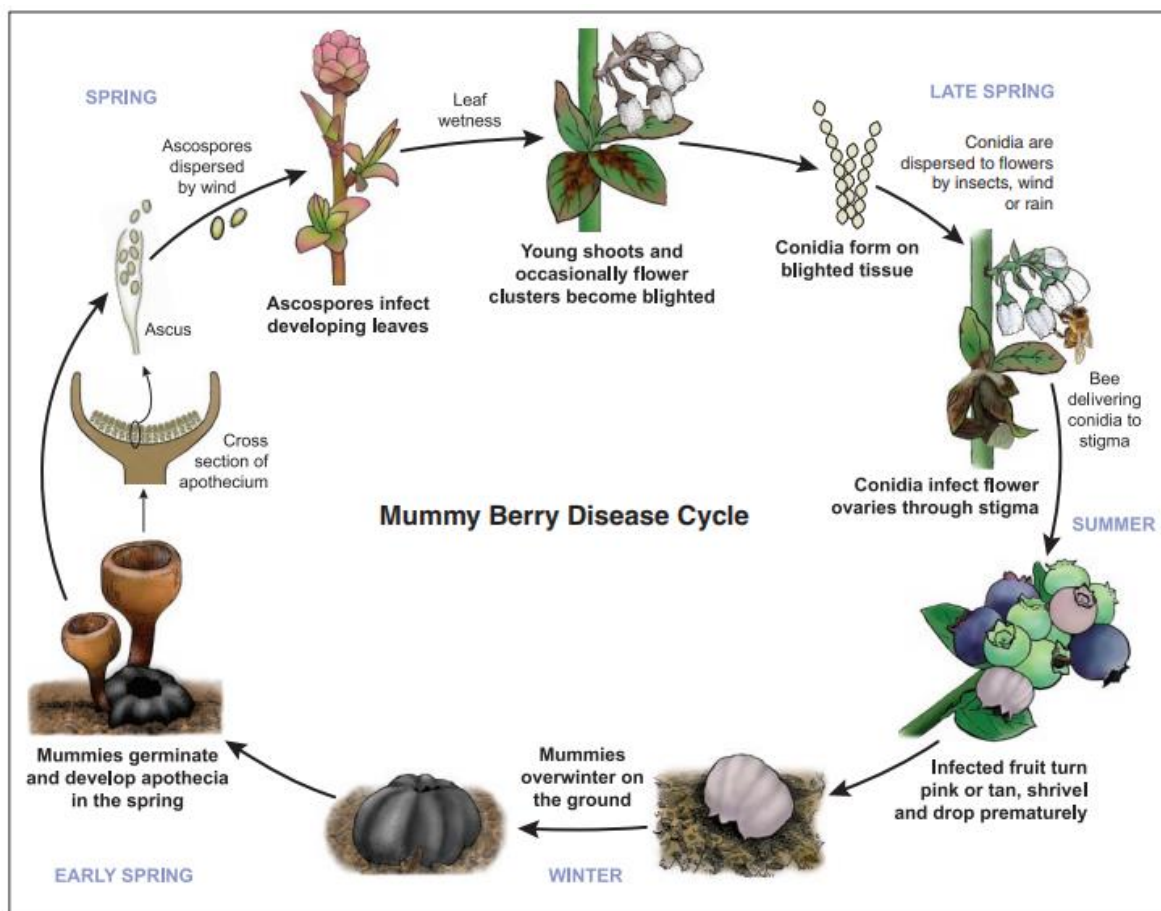
Good spray coverage is very important, use a spreader-sticker, and get a decent sprayer. Spray early or late, when pollinators are not active. Well-timed sprays, prior to leaf and then fruit infection will very be important to effectiveness of the sprays - just spraying randomly is not likely to be effective. Materials need to be reapplied after heavy rains.

This disease should be manageable (I have seen that!) by deploying all the cultural practices plus some well-timed sprays, but you do not want to let it get ahead of you. Re-mulching annually is very important!

Following are good fact sheets on mummyberry disease, with images of the symptoms:

<http://blogs.oregonstate.edu/mummyberry/files/2014/05/MUMMY-BERRY-FACT-SHEET.pdf>

https://www.canr.msu.edu/news/scouting_and_management_of_mummy_berry_in_blueberries



Disease cycle of mummyberry of blueberries cause by *Monilinia vacciniae-corymbosi*. Illustration by Marlene Cameron.

Utilizing UAV's (Drones) on Eastern NY Farms

Monday, August 19th, 2019

(rain date: August 20th)

10:00am—12:00pm

American Legion Hall

9509 Route 9

Chazy, NY 12921



ENYCHP specialists Jim Meyers and Mike Basedow will be hosting a demonstration and discussion of the use of low-cost unmanned aerial vehicles (drones) in crop management. In the first portion, Jim will discuss the basics of drone operation and uses including:

- Selecting a drone
- Federal regulations for operating
- Obtaining a pilot license
- Using automated flight control software for field mapping
- Uses of images for scouting
- Uses of 3D modeling for canopy measurements
- Uses of specialized cameras for mapping variability and plant health

Weather permitting, we will move to the orchard for the second half of our meeting for a live demonstration flight. Jim will be mapping orchard variability using his quad-copter drone, equipped with a Normalized Difference Vegetation Index (NDVI) camera. As Jim demonstrates the flight procedure, Mike will briefly discuss how we intend to utilize the imagery to develop future scouting protocols. Other forms of innovative farm tech will also be discussed. While orchard focused, we will discuss applications across agricultural commodities, and all farms are welcome!

There is no fee to attend this workshop, however registration is required:

<http://bit.ly/DronesinENY>

Cornell Cooperative Extension | Eastern NY Commercial Horticulture Program

Cornell Cooperative Extension is an employer and educator recognized for valuing AA/EEO, Protected Veterans, and Individuals with Disabilities and provides equal program and employment opportunities.

Calendar of Events

Spotted Lanterfly—NYS IPM Conference

August 15, 2019 - Broome County CCE Farmers Market, 840 Front St., Binghamton, NY 13905

Representatives from the NYS IPM Program, Cornell University, NYS Department of Ag & Markets, NYS Department of Environmental Conservation, and Finger Lakes Partnership for Regional Invasive Species Management (PRISM) will discuss what is being done to prevent SLF's establishment in New York, including how nature can assist in management. Register at <https://lergp.cce.cornell.edu/event.php?id=416>

Hemp Field Meetings

August 15, 2019

1:00pm—3:00pm: Hudson Valley Research Lan
3357 Rt 9W, Highland, NY 12528

6:00pm—8:00pm: Fields of Brian Pawelski and Bruce Ludovicy
736 Pulaski Highway, Goshen, NY 10924

Register at <http://weblink.donorperfect.com/hempfieldmeeting>

Utilizing UAV's (Drones) on Eastern NY Farms

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IPM in Tomato Production

August 19, 2019 - Davenport Farms, 3072 US Route 209, Stone Ridge, NY 12401

Dr. Margaret McGrath and ENYCHP Vegetable production Specialist Teresa Rusinek will lead a one-hour workshop for growers to discuss and learn how to integrate techniques in managing tomato diseases. The meeting is taking place in the field at Davenport Farms where a disease resistant tomato variety trial is hosted. Growers will have an opportunity to tour the trial, taste fruit, and provide feedback for plant breeders. 1 DEC recertification credit in categories 10, 1a, and 23 will be available to those who attend for the entire duration of the meeting.

Biocontrol Trial and IPM Field Meeting

August 20, 2019 - Eli Martin's Farm, 388 Brookman Corners Rd, Fort Plain, NY 13339

4-5 pm: Dr's Amara Dunn and Meg McGrath will discuss powdery mildew control using biocontrols and organic and conventional fungicides. Crystal Stewart from the ENYCHP will provide a tour of the biocontrol trial and additional squash and pumpkin mini-variety trial.

5-6pm: Walk the farm fields with Dr's Dunn and McGrath and with CVP specialist Elizabeth Buck to talk about integrated strategies to control pests, diseases, and weeds on the vegetables farm. Bring samples and questions! 2 DEC credits have been applied for in categories 1a and 23.

Willsboro Farm High Tunnel Twilight Meeting

August 27, 2019 - 5:00pm-7:00pm

Cornell Willsboro Research Farm, 48 Sayward Lane, Willsboro

Join vegetable specialists Elisabeth Hodgdon, Jud Reid, and farm manager Mike Davis for a high tunnel and field tour at Cornell's Willsboro Research Farm, where they will share research results for the following projects:

- Striped cucumber beetle management using netting and row cover
- Varietal differences in cucumber susceptibility to striped cucumber beetle
- Ground cherry and goldenberry production in field and high tunnel environments
- Overwintered high tunnel spinach nitrogen fertility

Depending on availability, a taste-testing of the different cucumber, ground cherry, and goldenberry varieties will be held. This free program is made possible through funding by the Northern NY Agricultural Development Program.

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