



### News From CCE

By Shona Ort, CCE Chemung

Happy March Everyone!

It is hard to believe that the first two months of 2019 are already over. However, it is very exciting because we are getting closer to spring.

Many of you are probably getting ready to start seeds for your gardens. If you haven't ever started seeds before or want to brush up on your seed starting skills, I encourage you to come out to one of the upcoming seed starting workshops that are being hosted by Cornell Cooperative Extension (CCE). The first of these workshops is going to be on Thursday March 21, 2019 from 2 to 3pm at CCE Chemung (425 Pennsylvania Ave, Elmira, NY 14904). The second is going to be held on Wednesday April 3, 2019 from 6 to 8 pm at CCE Tompkins (615 Willow Ave, Ithaca, NY 14850). If you have further questions and would like to register, please reach out to CCE Chemung at 607-734-4453 ext. 208 and CCE Tompkins at 607-272-2292 ext. 146.

Also, now is the time that farm stores start being filled with the sound of baby chicks and ducklings. If you are thinking about adding chickens, ducks, or other poultry to your farm, please check out "MAIL ORDER CHICKS. First steps to caring for your new brood" by John Susovich on page 6.

I encourage you to reach out to us at CCE as well. We can get you connected to resources on selecting breeds, housing, feeding, predator control, and more. If you are in Tioga County, please feel free to reach out to Barb Neal at

[ban1@cornell.edu](mailto:ban1@cornell.edu) or 607-687-4020. And if you are in Chemung County, please feel free to reach out to me, Shona Ort at [sbo6@cornell.edu](mailto:sbo6@cornell.edu) or 607-734-4453 ext. 227.

Anyways, that is all from me for now. I hope you all enjoy this issue of the Farm and Garden Newsletter. As always if you have any questions, concerns or comments in regards to it, please let us know. Wishing you all the best!

*Which came first? The chick or the egg?*



### Inside this issue:

- Getting mail order chicks off to a great start
- Microbiology gives insights to plant/fungus interactions
- How raindrops spread disease spores
- Maple weekend
- Lots of workshops
- And more!

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Mary Kate Wheeler, SCNY Farm Business, [mkw87@cornell.edu](mailto:mkw87@cornell.edu)

## Poultry Diseases Workshop

March 11, 2019- Location: 4-H Building, Chemung County Fairgrounds (171 Fairview Rd, Horseheads, NY 14845). Time: 6 – 8pm. Do you raise poultry? If so, please join us for this upcoming workshop on poultry disease. Dr. Jarra Jagne of the Avian Health Program with the Animal Health Diagnostic Center at Cornell University's College of Veterinary Medicine will be joining us for this presentation. She will be going over diseases which you should be aware of and on the watch for in your flocks.



This class is open to all ages and poultry keepers of all sizes. Cost to attend is \$5 per person. Youth 12 and under are welcome and free. Pre-registration is recommended in order to ensure enough seating, handouts, and food. For more information and to pre-register, please contact Shona Ort, Ag Educator with CCE Chemung, at 607-734-4453 ext. 227 or [sbo6@cornell.edu](mailto:sbo6@cornell.edu).

## Workshop: Seed Starting

March 21, 2019; 2:00 – 3:00 PM. Starting your own seeds is a cost effective way to grow a greater variety of plants for your garden. Join Cornell Cooperative Extension of Chemung County to learn how to start seeds successfully. The topics we will cover include techniques for starting seeds indoors, proper care, lighting and watering, and how to prepare your seedlings for transplant. Speaker: Jingjing Yin, Horticulture Educator at CCE of Chemung County Chris Gagliardo, Chemung County Master Gardener. Place: CCE Chemung, Conference Room. 425 Pennsylvania Avenue, Elmira, NY. Workshop fee: Free, but a \$3 suggested donation helps support our Horticulture program. Please register with Chemung CCE at 607-734-4453, or [jy578@cornell.edu](mailto:jy578@cornell.edu).



## Upcoming classes in Tioga County

**Learn to prune shrubs!** March 18th from 6 pm to 7:30 pm Hubbard Auditorium, 56 Main Street, Owego

Learn the theory behind shrub pruning, the best tools to use, and other super tips. Then, join us on Tuesday, April 16th to do some **hands-on pruning**. Meet at Draper Park on Front Street (across from the Parkway Restaurant) and do some pruning—it is the best way to learn! Lecture is \$5 and the hands-on class is free.

**Learn to prune young trees!** March 25th from 5 pm to 7:30 at 56 Main Street in Owego. Join us to do some hands-on pruning of young trees. Get them started off right! The class is free, but come ready to work—with glasses and gloves.

**And save the date! Back by popular demand is Seed A Rama!** Join us on April 6th at the 4H youth building in Marvin Park on Main Street in Owego anytime between 9 am and noon and go home with a tray of seeds already started, and perhaps some transplanted seedlings as well. Learn how to start seeds and grow veggies! It is all free and open to folks of all ages—bring your kids or grandkids!

For more specific information about the Chemung County Master Gardener program, please contact Jingjing Yin at 607-734-4453 or [jy578@cornell.edu](mailto:jy578@cornell.edu).

For more information about the Tioga County Master Gardener program, please contact Barb Neal at 607-687-4020 or [ban1@cornell.edu](mailto:ban1@cornell.edu).



## Old Skills, New Foods

CCE Tioga was awarded a grant to bring to our county **Old Skills, New Foods**. We will be hold hands-on workshops for middle and high school students that combine science, cooking, and gardening. Since this is a Floyd Hooker grant, there is NO fee for participating in these workshops.

These workshops are stand alone, but we welcome kids to come to every one! This is a multigenerational class, so if you are a grandparent or parent, please come, bring your kids or grandkids and have a blast while learning together and creating community around the kitchen table.

All classes will be in our kitchen space and run from 9 am to noon.

This program was funded by a grant from the Floyd “Vic” Hooker Youth Fund of the Community Foundation of the Twin Tiers, made possible by generous donors since 2003. Note that due to scheduling changes, a few dates have changed.

1. **Learning from Indigenous Cultures**—We will learn about indigenous cropping systems and focus on the Three Sisters: corn, beans and squash. We will grind our own Iroquois white corn, and then make a traditional snack using each of the three sisters, drizzled with maple syrup. **March 9th**
2. **Homemade potato-leek pizza**—we will make our own pizza dough, discuss the microbiology of bread, mill our own flour, discuss how leeks and potatoes can be grown at home, and learn basic knife skills. **March 30th**
3. **Yogurt, berry and granola parfaits**—we will make our own yogurt and granola, discuss how yogurt is created using live bacteria, learn how to plant and care for blueberry bushes and strawberry plants, and learn about vitamins and minerals in your diet. **April 27th**

**Classes are free, and run from 10 am to noon.  
Please call 607-687-4020 to register.**



## Get Your Sweet Tooth On!

### It is Maple Syrup Time!!

Sweetrees Maple Products in Berkshire, NY. We have Open house during Maple Weekend March 23 & 24; 30 & 31, 2019. Tours of our working sugarhouse, the sugarbush, demonstrations, free samples and more. Bring your family and friends to enjoy the sweet sights, smells and tastes of fresh maple syrup being made! Best of all it's FREE to visit! Contact Dan & Ruth Beasley Sweetrees Maple Products, 761 Glen Road, Berkshire, NY 13736. B: 607-972-6699; H: 315-699-3855; C: 315-481-4060 (best # to call). <https://www.sweetreesmaple.com/events--festivals.html>

March 23 and 24 we are sponsoring a pancake breakfasts at the Speedsville VFD from 8-11, all proceeds benefit the fire dept. We also have our sugarhouse open for tours, samples and sales from 10am-4pm. FREE family fun! The following weekend, March 30 we've partnered up with several local organizations for the 3rd annual Berkshire SAPpening! The Berkshire VFD will have a pancake breakfast 8-11.

The SAP Run is a 1 mile family fun and fitness walk/run that starts at 9am. (Sponsored by the Northern Tioga Chamber of Commerce.) Rowdy, mascot from the Binghamton Rumble Ponies will be on hand to start the race and greet everyone. Registration info : [www.northerntiogachamber.org](http://www.northerntiogachamber.org). There is a Craft Fair at the Berkshire Community Center from 9am-3pm and the Berkshire Free Library will be open for Family Crafts and Storytime.

Sweetrees Maple Sugarhouse will be open again for tours, samples and sales from 10am-4pm both March 30 and March 31. Dress for the weather! FREE!



### Welcome to NY's Maple Weekend

Sponsored by the NYS Maple Producers' Association **March 23-24 & 30-31, 2019**

During Maple Weekend, maple farms across New York State invite visitors to their "sugar houses" to experience firsthand how pure, mouth-watering maple syrup and other related products are made. Visitors also have the opportunity to enjoy fun, family-friendly activities, taste New York's freshest syrup and purchase maple products.

Join us this year for sugar house tours, samples, activities and much more.

Create a new family tradition—go mapling!

Here is a link to the NYS Maple website to locate local maple syrup producers who are open for tours on Maple Weekend <https://mapleweekend.nysmaple.com/maple-weekend-sugarmakers/>



## You're Invited to a RESEARCH UPDATE & INFORMATION SESSION

**Date:** Wednesday, March 13, 2019  
**Time:** 1:00 pm –3:45pm  
**Where:** Cornell Cooperative Extension  
Ag Development Center Conference Room  
(next to the Taste of NY Store)  
840 Upper Front Street, Binghamton, NY 13905



### Speakers:

**Cornell Research Projects Status & Update**  
*-Dr. Larry Smart, Professor, Horticulture Section, School of Integrative Plant Science, Cornell AgriTech*

**Industrial Hemp Research Permit Program Update**  
*-Mr. Chris Logue, Director, Plant Industry, NYS Department of Agriculture and Markets*

**Farmer & Processor Panel Presentation & Questions**

This meeting offers the opportunity to learn about findings from 2 years of Cornell research projects, farmer's perspectives, and how to navigate the process of permit application.

*There is No Cost to attend but Pre-registration is Requested:*

To register contact Shannon at 607.391.2662 or go online to <https://scnydfc.cce.cornell.edu/event.php?id=856>. Questions: Janice Degni 607.391.2662 or [jgd3@cornell.edu](mailto:jgd3@cornell.edu).



## Cornell Cooperative Extension

South Central NY Dairy and Field Crops Program

*Building Strong and Vibrant New York Communities*

*"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"*

## MAIL ORDER CHICKS. First steps to caring for your new brood.

By John Suscovich. April 7, 2014. Source: <https://smallfarms.cornell.edu/2014/04/07/mail-order-chicks/>.

Whether your farm is large or small scale there is usually one guiding motivator that we all share: fostering life. There are few things more exhilarating on a farm than new buds breaking through the surface of the soil, the first steps of a new born calf, or knowing your customers are happy and healthy eating the food that you provided.

In poultry farming that new life can come in two ways. You can have an incubator on farm and hatch your own eggs, or you can order chicks through a hatchery. Order chicks? Like, in the mail? That's right.

You see, at the writing of this article I do not have an incubator or hatching program on my farm. I order all of my chicks in. In fact, I am getting 100 egg layers tomorrow morning, and today I just placed 10 orders for the summer totaling in 2400 broilers. I've been doing this for a while now and I have had a lot of chicks come in the mail. There are a few things you should know when ordering chicks to come in the mail, let's go over a few.

The first step applies to any agricultural operation.

### **Do your research.**

You want to know what you are doing before you are caring for babies. That's what they are, chicken babies. You will not only want to know everything you can about how to raise the chicks, but also where to order them, which hatchery to trust, and how to handle the chicks when they arrive on your farm. I highly recommend Robert Plamondon's "Success With Baby Chicks" as a good book to own if you want to raise chickens from chicks. It is an honest and down to earth "how to" book that doesn't leave you feeling like everything you do is going to kill your chickens. The chicks are going to be fine.

Baby chicks can survive roughly 3 days with what's left of the yolk in its stomach after it hatches. Hatcheries hatch the chicks and have them in the mail very quickly headed toward your local post office.

There are minimum orders for a reason. The number of chicks huddled together help regulate temperature and keep each other warm. Chicks should never be allowed to get chilled – not until they are older and can regulate their body temperatures.

There are times where shipping is delayed for some reason, or something goes wrong. Mortality can happen in transit. If you have very sensitive kids I'd open the box without them seeing, or be prepared for a pretty serious discussion.

### **Baby your babies.**

I go back to doing your research and knowing what you are doing. That is crucial. I'll give you the general over-view of

what I do, but there are some specifics that are a little detailed for the length of this article.

Before the chicks arrive I prepare my brooder space. I make sure all the lamps are working, I have fresh pine shavings, I have feed, the proper waterers, and the area is secure against predators that may come lurking in the night. There are different schools of thought as to whether chickens will eat the pine shavings and choke when they're young. I have started a lot of chickens on pine shavings and haven't had that problem yet.

When the chicks arrive, temperature is my main concern. They want to be at 95 degrees when they are very young. They're supposed to have a mother hen sitting on them, so you need to take the place of that environment. I control the heat in my car on the way to the farm. Once there I minimize the time they are outside, especially if it is cold outside. From there I make sure the brooder is on and warmed up.

When I take the chicks out of the box I dip their beaks in warm water and make sure feeders are close by. I also put a little bit of feed on a piece of board so they can scratch around. Some people don't put food in right away and wait up to three hours to give the birds a chance to rehydrate. I do both at once and haven't found issue yet.

From then on out I check in on them several times a day making sure they aren't getting stuck anywhere, piling up, and I keep them with fresh water. Something to look for in regards to the heat that your brooder lamp is putting out is the placement of the chicks. If the chicks are all huddled in a mass under the light and they are climbing on top of each other than your light is too high and the birds are cold. If your chicks are in a ring around your light without any birds in the middle your light is too close and they birds are too hot. This also poses a fire hazard, so be careful. You should be checking in several times a day, especially for the first week, so it will quickly become obvious what normal behavior is.

### **Know when to bring the birds outside.**

Too much time in the brooder isn't a good thing. As the birds grow they are going to need more space. I raise birds on pasture, so when they are big enough they go in my mobile coops or chicken tractors. For my meat birds they are in the brooder about three weeks in the colder months and less in the summer if they feather out. For egg birds it takes a couple weeks longer than that. You want the birds to have a good covering of feathers to ensure they can protect themselves from the elements.

When the chicks are big enough, they move to mobile coops or chicken tractors.

It helps to be able to brood the chicks in an area where you can give them access to the outdoors to acclimate them before they take the plunge into pasture life. My brooder has doors that open and fenced off areas when I have grass and feed hay. On that note, I put two things in with my chicks that I seldom see anyone else do. Total transparency: I got this idea from Troy Bishopp, aka "The Grass Whisperer". The first is a pile of grass or hay. If these birds are bound

for life on pasture why not start by bringing the pasture to them? It gives them something to do, adapts them to eating grass, and adds nutrients. The second thing is a shovel full of dirt. That's right, dirt. They will devour that pile of dirt looking for small stones to aid digestion and whatever else may be in there. I've seen batches of chicks completely devour a spade full of dirt in a 24-hour period. You could always pay for the stones that the hatchery tries to sell you, or you could go the free route and do just fine.

In the end you just have to enjoy it. That peeping that comes home with you in the car is very cute for the first ten minutes. Kids love baby chicks, it is rewarding to care for them and watch them grow (kids and chicks), and some day they will provide you with the food that is going to keep you happy and healthy.

**John Suscovich, known as The FoodCyclist, is the Farm Manager at Camps Road Farm in Kent, CT. In addition to working the farm John also publishes a bi-weekly podcast about the business of farming at Farm-MarketingSolutions.com. Contact him at Facebook.com/FarmMarketingSolutions**

Image by CCE Genesee County. Source: <http://westchester.cce.cornell.edu/4-h-youth-development/incubation-embryology>.



## The Farmers' School Tax Credit

By Zack Baker, Tioga County Economic Development & Planning

As farmers often say, "Cows don't go to school and tractors don't dial 911." State and local governments are increasingly recognizing that keeping farmland in production may help control the cost of providing community services. The result is a number of tax incentives designed specifically for farm businesses.

One of these incentives is the Farmers' School Tax Credit. The Farmers' School Tax Credit allows eligible farmers to obtain a state income tax credit for school district property taxes. To be eligible, a farmer must receive 2/3 of his or her excess federal gross income from farming. The credit is equal to the amount of school taxes paid on the first 350 acres of qualified agricultural property. After 350 acres have been claimed, the credit equals 50% of school taxes paid on remaining land. The credit becomes limited when a farmer's New York adjusted gross income exceeds \$100,000. It decreases by two percent for every \$1,000 of income earned over \$100,000 and phases out completely at \$150,000. For more eligibility information, visit this link: [https://www.nyfb.org/application/files/5914/9781/5210/Farmers\\_School\\_Tax\\_Credit\\_2016.pdf](https://www.nyfb.org/application/files/5914/9781/5210/Farmers_School_Tax_Credit_2016.pdf)

The Farmers' School Tax Credit applies to school taxes paid by the farmer on land, structures and buildings used for agricultural production. Farmhouses used as personal residences do not qualify. However, farmers may also qualify for the New York State School Tax Relief (STAR) program, which provides a partial exemption of \$30,000 from school property taxes for owner-occupied primary residences. The basic STAR program is available to all primary residence homeowners, including farmers, regardless of age. The enhanced STAR program provides eligible senior citizens with a \$50,000 exemption off the full value of their property.

For more information about the Farmers' School Tax Credit, contact your tax preparer or the New York State Department of Taxation and Finance. Ask for tax forms IT-217 (for individuals, estates and trusts) or CT-47 (for corporations). For more information about the STAR program, contact your local tax assessor or the New York State Office of Real Property Services.



## THE LABOR READY FARMER

### About the Labor Readiness Project

Being prepared to hire, manage and retain skilled employees is crucial for farmers across New York. A new project, the “Labor Ready Farmer” (LRF), will offer a team-based approach to address this challenge by building skills of new farmers and Latino agricultural employees wanting to climb the ladder from labor to management.

The project’s long-term goal is to ensure that new farmers and advancing employees in our region can access high-quality information, supportive networks and proven tactics essential to effective management of labor. These efforts will support new farmers scaling up and Latino agricultural employees to move up the ladder of management on existing farms. For new farmers (operating less than 10 years), effective management of labor is core to scaling up produce businesses. By investing in the skills of valuable employees, we aim to create pathways for advancement and long term retention of these individuals in the NY fruit and vegetable industry. The curriculum developed by the project will feature online materials and videos, Spanish plain language guides and visual resources, cell-phone based English classes, regional face to face training programs (ENY and WNY) and new HR consultant teams that will coach 25 selected participants.

### Improving Agriculture Labor Management Workshops & Programs

Your employees are your most valuable resource. Wages, salaries, and contract labor expenses represent more than 40 percent of the cost of production in labor intensive crops like fruits, vegetables, and nursery products. This winter, staff at Cornell Cooperative Extension will be hosting a series of four workshops across New York related to hiring, training, retaining, and working with employees within a farm business. Take a look at the workshop descriptions and schedule here.

### Smart Farming Teams

The Labor Ready Farmer Project is offering grants to

provide up to 12 hours of Technical Assistance (TA) consulting services to farms who want to make improvements to their farm’s processes in hiring, training, managing or evaluating employees. Applicants will choose from one of the following four areas for TA assistance and identify a specific project. If selected they will be matched with a “Smart Farming Team” of consultants who will provide one on one technical assistance.

### HIRING EMPLOYEES 101 – GETTING OFF TO A GOOD START

### ON BOARDING & TRAINING EMPLOYEES QUICKLY AND EFFECTIVELY

### FINE-TUNING & IMPROVING THE WORKING ENVIRONMENT

### H2-A READINESS

Application Instructions: Click [here](#)

Please complete [this application](#) and send to Nicole Waters, Beginning Farm Project Coordinator for the Cornell Small Farms Program. The form can be submitted by email, mail or in-person at the address listed below. Please feel free to call or email with any questions.

Nicole Waters – Beginning Farmer Project Coordinator

Plant Science Building, Room 15b

Tower Road, Cornell University

Ithaca, NY 14853

Phone: 607-255-9911

Email: [nw42@cornell.edu](mailto:nw42@cornell.edu)

Applications accepted on a rolling basis.

Want to receive news about upcoming programs and resources in our Labor Ready project? Click here to sign up for enews, and keeping checking back below for announcements, workshops, and new resources and opportunities within the Labor Ready Farmer project. Additional resources may also be found on the Ag Labor Management Facebook page.



## Raindrops launch plant spores into the wind, spread fungi

By Kelsey O'Connor, Cornell Chronicle February 26, 2019

That distinctive smell following rainstorms arises from dry particles unearthed when raindrops strike soil.

By a similar process, rain that hits plants disturbs spores on the leaves, launching disease-causing fungi into the air. New Cornell-led research explains the physics behind how individual water droplets create air flow patterns capable of transporting thousands of spores and spreading disease from plant to plant.

At a microscopic level, the researchers found, spores from the wheat rust fungus *Puccinia triticina* were launched into the air from the impact of falling water. The spores followed upward swirling, tornado-like trajectories, or vortex rings.

“When a raindrop, or any object, impacts the surface of a plant, it is carrying air with it. When the rain comes to a sudden halt, the air keeps flowing down. This moving air creates an air vortex ring capable of carrying spores aloft,” said Sunny Jung, associate professor of biological and environmental engineering and author of “Vortex-Induced Dispersal of a Plant Pathogen by Raindrop Impact,” published Feb. 25 in *Proceedings of the National Academy of Sciences*.

The study by researchers in Jung’s Bio-Inspired Fluid Lab, along with researchers at Virginia Tech, is the first to explore how dry spores are dispersed by air vortices induced by raindrops.

Dry plant spores can be deadly problems for plants. Researchers estimate that wheat pathogens are responsible for up to \$5 billion in damages annually across the globe. Previous research has shown that spores can travel hundreds of kilometers in the atmosphere, and even cross continents.

A vortex is a ring of recirculating particles – think smoke rings or whirlpools. To understand how the spores are dispersed by an air vortex after rain hits a plant leaf, Jung said to picture the chalk gymnasts use on their hands. After they pat it on, the leftover chalk drifts down to the floor, and when it hits, the air swirls up around where it made impact.

Once airborne, spores avoid falling raindrops by following air streamlines around each drop before catching wind currents, which can carry them greater distances. The researchers used high-resolution cameras to capture the process, examining: the number of spores ejected; how they were dispersed; the distance and trajectory spores traveled; and the

effect of surrounding air flows. Researchers also used glass beads with a similar density and radius to the spores to help visualize the air flow.

The results revealed the physical nature of a process that causes severe economic damage for farmers and spreads plant diseases on a global scale.

“At the very beginning of the rainfall, millions of dry spores are liberated from the plant,” Jung said. “By having the wind around it, these dry spores can easily disperse to another plant. Pathogens spread in this way can ruin an entire crop.”

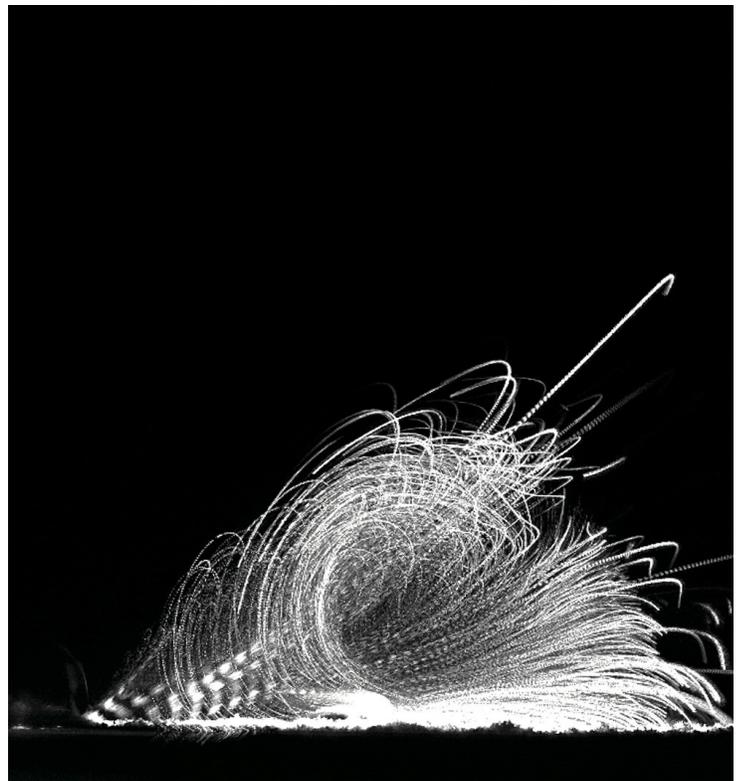
Understanding this process is an important step toward understanding how plant diseases, which threaten food safety and security, spread through crops. Jung said the mechanism can be applied to any small particles, such as pollen and other allergens, revealing how rain-plant interactions impact human health. The next phase of the research will seek to understand how spores land.

*Seungho Kim, a postdoctoral researcher at Cornell, was lead author. Other authors include Jung and three researchers at Virginia Tech.*

*The research was supported by funding from the National Science Foundation and the U.S. Department of Agriculture.*

*Kelsey O'Connor is a freelance writer for the College of Agriculture and Life Sciences*

An image of vortex-induced plant pathogen dispersal. Photo: Seungho Kim, Hyunggon Park and Sunny Jung/Provided



## Research explains nature of key plant-fungus interfaces

By Aaron J. Bouchie, Cornell Chronicle, February 28, 2019

For millions of years, plants and fungi have exchanged crucial nutrients such as phosphate and fatty acids. These symbiotic relationships are extremely important to the growth and survival of both organisms, but the mechanism by which this exchange happens has been poorly understood.

The interface between plant roots and their symbiotic fungi are full of membrane tubules both in the fungus (yellow) and between the plant cell membrane and the fungal cell wall (green). Red lines are fungal cell membrane, and the plant cell membrane is gray. Now, researchers at the Boyce Thompson Institute (BTI), located on the Cornell campus, have uncovered structural networks of tubules at the plant-fungal interface that could shed light on the mechanisms of this natural partnership. A better understanding of this process could eventually help reduce the use of fertilizer in agriculture.

Findings were detailed in “Extensive Membrane Systems at the Host–Arbuscular Mycorrhizal Fungus Interface,” published Feb. 8 in *Nature Plants*.

An estimated 80 percent of vascular plant families form symbioses with a type of soil fungi called arbuscular mycorrhizal fungi. The fungi penetrate the outermost cells of a plant’s roots and grow intricate branchlike structures called arbuscules. Each host plant cell then grows a membrane that envelops an arbuscule, and nutrient exchange takes place within the space between the plant membrane and the fungal cell wall.

In an attempt to understand this exchange, BTI faculty member Maria Harrison and postdoctoral scientist Sergey Ivanov used advanced electron microscopy techniques to image arbuscules present in the roots of the legume *Medicago truncatula* colonized by the fungus *Rhizophagus irregularis*.

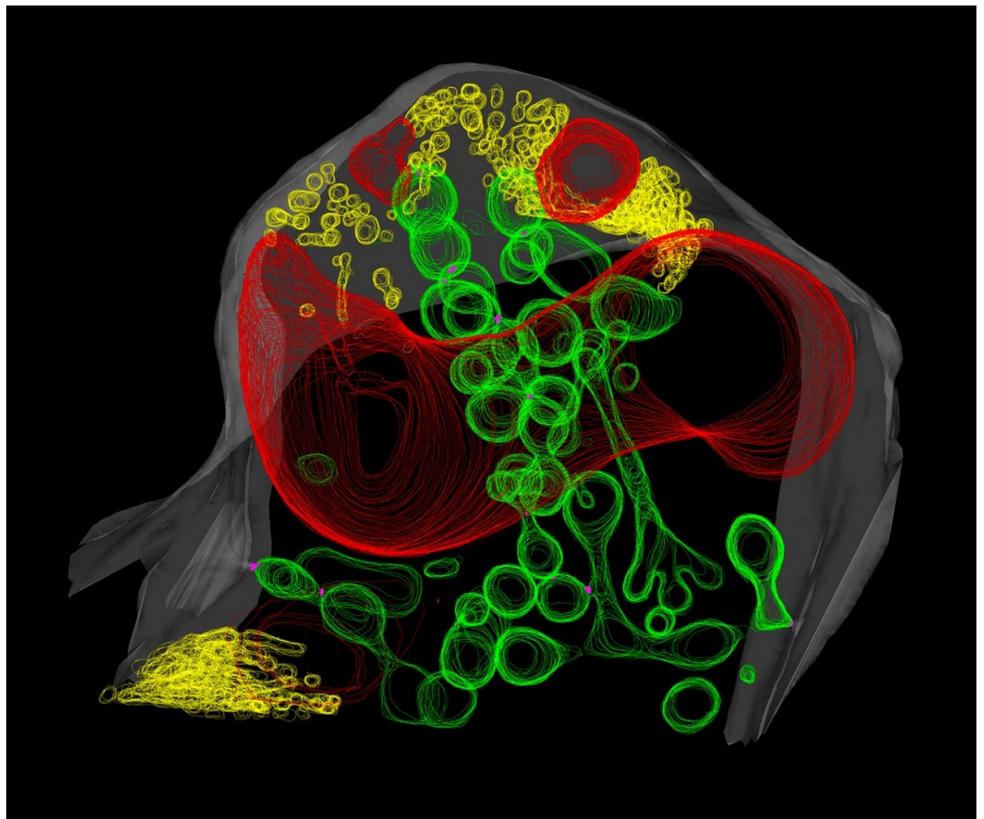
The researchers were surprised by the results.

“[Previous studies] indicated that the material around the fungus but inside the plant membrane would be an amorphous matrix of carbohydrate material,” said Harrison, the paper’s corresponding author and an adjunct professor in Cornell’s College of Agriculture and Life Sciences.

Instead, the researchers found a network of round, tubular and dumbbell-shaped structures made of lipid membranes, nearly all of which appeared to connect back to the plant cell’s membrane.

The researchers were further surprised to find another network of membrane tubules in the space between the fungal cell membrane and the fungal cell wall.

“It was totally unexpected to see such an extensive proliferation of fungal membrane, particularly knowing that the fungus is starving for lipids,” said Ivanov, the paper’s lead author.



The interface between plant roots and their symbiotic fungi are full of membrane tubules both in the fungus (yellow) and between the plant cell membrane and the fungal cell wall (green). Red lines are fungal cell membrane, and the plant cell membrane is gray. Photo: Jotham Austin II and R. Howard Berg/Provided

Harrison and Ivanov speculate that the networks are related to the transfer of lipids.

“Somehow lipids are released from the plant cell and fed to the fungus, and we wondered how they move through what we thought was an aqueous matrix between the plant cell membrane and the fungal cell wall,” Harrison said. “But maybe this space isn’t so aqueous after all, and perhaps this membrane-rich environment facilitates the movement of lipids between the organisms.”

Given the plant and fungal membrane networks’ close physical proximity to each other, the fungal network could be involved in lipid absorption in order to optimize the process. The researchers suspect the network is not involved with transferring phosphate to the plant because the membrane networks are more abundant near the larger branches of the arbuscule, whereas phosphate uptake likely occurs near the smaller branches.

Harrison believes that newer technologies are to thank for finding these networks of tubules. “High-pressure freezing fixation of samples gives better membrane preservation than older techniques. I think that is the reason that these extensive membranes were not seen before,” she said. “Plus, 3D electron tomography is very powerful and let us visualize the networks, which didn’t look connected on 2D images.”

*Also contributing was R. Howard Berg, director of the Integrated Microscopy Facility at the Donald Danforth Center in St. Louis. Ivanov worked closely with Berg, who has expertise with cryofixation and electron microscopy, and Jotham Austin II at the University of Chicago, who is an expert in tomography.*

*Financial support for this project was provided by the National Science Foundation and by the TRIAD Foundation.*

*Aaron J. Bouchie is a science writer at the Boyce Thompson Institute.*



## FARM CREDIT EAST

Cornell Cooperative Extension  
Broome County

**Ask the Experts: Farm Taxes**

**Tuesday March 19th, 5:30-8pm**

**Cornell Cooperative Extension—Broome County**

Do you have questions about what tax forms you need to file as a farm?

Are you keeping copies of all the receipts and paperwork that you’ll need come tax time?

How are you currently keeping track of your income and expenses?

Join Cornell Cooperative Extension of Broome County for our first “Ask the Experts” talk with Grey Bennis, Tax Associate with Farm Credit East. He will discuss typical tax forms that a farm or agri-business would file, the best ways to keep track of all your receipts, mileage and other important numbers, and best practices for tracking income and expenses.

Cost: \$15/farm (includes 2 registrations) Veterans are FREE

Click [here](#) to register.



**CORNELL**  
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Croghan, NY 13327  
Phone 315-346-1222

[www.oswegatchie.org](http://www.oswegatchie.org)

## **Into the Woods** **Forestry Training at the Oswegatchie Educational Center**

**March 31 – April 2, 2019**

January 18, 2019

To: Interested Students, ages 14–18, in pursuing a career in Forestry & Wood Products

From: Bill Waite, Program Director, [Oswegatchie Educational Center](http://www.oswegatchie.org)

Todd Lighthall, [NYS FFA Leadership Training Foundation](http://www.nysffa.org)

On Behalf of the [NYS Wood Products Development Council](http://www.nyswoodproducts.org)

RE: Into the Woods, a Forestry Training Program at Oswegatchie

The Oswegatchie Educational Center is offering a FREE 3 day / 2 night trip, March 31st - April 2nd, 2019.

In partnership with the NYS Wood Products Development Council, The Oswegatchie Educational Center is offering an intense 3 day / 2 night program at our facility in Croghan, NY. The intent is to teach interested students about the basics of forestry management and timber production. Workshops will include timber cruising, sawmill operation, chainsaw safety, arboriculture, and wood product marketing. Team building and leadership skills will also be included.

The Oswegatchie Educational Center is situated on a 1200 acre expanse of land inside the Adirondack Park. This setting provides the perfect atmosphere for learning about forestry. The property includes 4 bodies of water, various streams, wetlands, and woodlands ideal for environmental education. Throughout the year, Oswegatchie provides programming, meals, and lodging for 4,000 students of all ages. This special program is a unique, and you do not want to miss out on this opportunity.

*This is intended for individual students to attend and not necessarily as a school group function. School groups are welcome, but the program is aimed at those students that are interested in forestry and related wood products.*

Please contact me if you have any questions about this opportunity .

Sincerely,

Bill Waite, Program Director  
[wwaite@oswegatchie.org](mailto:wwaite@oswegatchie.org)



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community and ensuring a vibrant future  
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## News, Notes and Workshops for Tioga and Chemung County Farmers and Gardeners

**Ithaca Native Plant Symposium**—check here for conference information: <https://www.ithacanativelandscape.com/>

**Trees of Life: Nuts in the Eastern US and Their Importance through-** Time Tuesday March 12th, 6-8PM at the Human Services Complex in Montour Falls in room 120. This workshop traces the importance of nut trees to ecological and social development in the northeastern US from ancient times to visions of a sustainable future. Class is \$20 and you must preregister by March 8th. About the guest speaker: Sam Bosco is a PhD student in the Horticulture Section of the School of Integrated Plant Science at Cornell University where he studies the agricultural, social, and cultural dynamics of nut tree-based agroforestry in NY. To register please visit: [https://reg.cce.cornell.edu/Treesoflife\\_244](https://reg.cce.cornell.edu/Treesoflife_244)

**Backyard Fruit Production-** Saturday, March 23, 2019, 8:30 AM - 1:00 PM. Held at Reisinger Apple Country at 2750 Apple Lane in Watkins Glen NY. Spend the morning learning about growing apples, peaches, cherries, plums and pears. This workshop will also cover growing small fruits such as raspberries (black, yellow and red), blueberries and currants. Highlights will include pruning, insects, diseases, fertility, "critter control" and netting blueberries. Fee is \$20 per person or \$35 for two pre-registration is required by March 21st. Workshop will be rain or shine, so please dress for the weather! Please visit <http://cceschuyler.org/events> or call Roger Ort 607-535-7161 if you have any questions. To register please visit [https://reg.cce.cornell.edu/Fruitproduction2019\\_244](https://reg.cce.cornell.edu/Fruitproduction2019_244)

### Wild Mushroom Walks and Talks

Sunday, May 5, 2019, 1:00 PM - 3:00 PM- Learning how to identify trees, and their connections to edible mushrooms in a classroom setting.

Sunday, July 21, 2019, 1:00 PM - 3:00 PM The Art of Foraging for Fungi.

Sunday, October 20, 2019, 1:00 PM - 3:00 PM Mushroom hunting, identification and their uses.

Join Dominic Costa and Cornell Cooperative Extension of Schuyler County to dive into the Art of Mushroom hunting. Knowing the forest and the plants that inhabit those eco systems will allow you to search in

the right location for each species of mushroom. Classes are Sundays from 1pm-3pm. \$25 registration fee per session or if you register for all 3 sessions you will get a free book *Mushrooms of the Northeast*. Contact: Call Roger Ort at 607-535-7161 for more details. To register please follow this link: [https://reg.cce.cornell.edu/wildmushroomwalksandtalks\\_244](https://reg.cce.cornell.edu/wildmushroomwalksandtalks_244)

*Join the Tompkins County Master Gardeners for this Botanical Slideshows: Glorious Gardens of NYC (Part 1 and 2)--botanical slideshows on Sundays February 10 and 24, 2:00-3:30pm; and Ireland Sunday March 10, also 2 to 3: 30 pm.*

**Walled Gardens and Wild Landscapes of Ireland, Sun. March 10, 2-3:30 pm.** Chrys Gardener will present slides of public gardens and natural areas in the west of Ireland, where she lived from 2008-2012. Ireland is a gardener's paradise, with a warm moist, temperate climate (Zone 9). One of these areas, the Burren, is an unusual limestone karst landscape, where alpine and arctic plant species grow side-by side.

### Spotted Lanternfly Basics

- Monday, March 4, 2019, 10:00 AM - 11:00 AM
- Monday, March 4, 2019, 1:00 PM - 2:00 PM

In conjunction with the New York State IPM Program and the Department of Agriculture and Markets, the Northeastern IPM Center will host a collection of webinars, titled "Spotted Lanternfly Basics."

Each webinar will focus on, and be tailored to, a specific commodity group:

- Spotted Lanternfly Basics for Hops, Berry, and Vegetable Growers (Feb. 26, 2019, 10:00 a.m.)
- Spotted Lanternfly Basics for Grape and Apple Industries (Feb. 26, 2019, 1:00 p.m.)
- Spotted Lanternfly Basics for Christmas Tree Growers (Mar. 4, 2019, 10:00 a.m.)
- Spotted Lanternfly Basics for Nursery, Greenhouse, and Landscape Industries (Mar. 4, 2019, 1:00 p.m.)

All webinars will follow a similar format that covers spotted lanternfly biology, identification, and hosts, monitoring and management strategies, and a regulatory update. While the content may be relevant to audiences throughout the Northeast, management practices covered will be specific to New York. Participants will be encouraged to ask questions. For more information and registration links, go to: <http://neipmc.org/go/mYey> Ariel Kirk Agriculture Educator [adk39@cornell.edu](mailto:adk39@cornell.edu) 607-664-2574

## Hemlock Woolly Adelgid (HWA) Workshop & Hike

Saturday, March 2, 2019, 9:00 AM - 12:00 PM-Join Finger Lakes Museum & Aquarium and Cornell Cooperative Extension of Yates County as we welcome Charlotte Malmborg from the NYS Hemlock Initiative for a presentation about research updates and management of hemlock woolly adelgid (HWA). She will also be leading our hike, where you'll have the opportunity for hands-on identification and observation of both hemlock trees and HWA. Please visit <http://yates.cce.cornell.edu/events/2019/03/02/hemlock-woolly-adelgid-hwa-workshop-hike> for more details.

## Crop Management Workshop in Binghamton

Tuesday, March 5, 2019 at the Cornell Cooperative Extension Office of Broome County located at 840 Upper Front Street, Binghamton. Registration starts at 9:30 a.m. The meeting will begin at 10:00 and conclude at 2:30 p.m. The Cornell Cooperative Extension South Central NY Dairy and Field Crops program will offer a meeting for 2.0 DEC pesticide recertification credits. Credits will be earned for pesticide applicator licenses in the categories of private field crops, fruit, vegetables, greenhouse and florist and nursery (21-25 and commercial Ag plant (1A). The workshop will address the following subjects: Climate Update: What difference does 20 make?, Getting new seedlings off to a great start, Investigating health effect of glyphosate, Overview of crop insurance products for grain yield and revenue, 2018 Corn Silage Hybrid Trial Results, and an open discussion of agronomic and pest issues. Please call Shannon at 607-391-2662 or [srm242@cornell.edu](mailto:srm242@cornell.edu) to pre-register for this workshop or visit our website calendar at <https://scnydfc.cce.cornell.edu/event.php?id=834>. The cost is \$15. For More Information Contact Janice Degni, Area Field Crops Specialist – 607-391-2672.

## Pheasant Rearing Workshop

March 5, 2019, 6:00 PM - 7:00 PM. Register online: [https://reg.cce.cornell.edu/pheasants2019\\_245](https://reg.cce.cornell.edu/pheasants2019_245) or call (315) 539-9251. Registration is requested by Monday, March 4th. Learn how you can get free day old pheasant chicks to raise and release into the wild. Come to this workshop and learn from staff from the Richard E. Reynolds Game Farm as they explain how the program works and give tips and ideas on successfully raising the day old chicks. The staff will also answer questions and give insights on what is required to make this program work for you. Rearing pheasants is enjoyable and challenging and also a good teaching tool for youth. Releasing the pheasants offers fall hunting opportunities and pheasants are an enjoyable addition to a property. The cooperator program provides a means for youth and adults to learn about the husbandry and natural history of pheasants, with an incentive to expand areas open for public hunting and to improve habitat for grassland wildlife species.

## Grass-fed Beef Marketing

March 5th -Please join us for a special evening presentation by two grass-fed beef experts on Tuesday, March 5th from 6:30 to 8:30 pm at the office of Cornell Cooperative Extension of Schuyler County; 323 Owego St; Montour Falls, NY. Our first presenter, MacKenzie Waro, is the Northeast Live-stock Manager for Strauss Meats (<http://straussbrands.com>) who is looking for producers who raise 100% grass-fed and grass-finished beef in the region. Program-qualified cattle must be 100% grass-fed and grass-finished, raised without the use of antibiotics or growth-promoting hormones, and have English-based genetics. Market-ready cattle must be 30 months and younger. Strauss Brands is a bonded Packers and Stockyards buyer, and is currently seeking year-round deliveries for local processing in the northeast. Strauss is searching for like-minded family farmers and ranchers committed to raising their animals with the same passion and ethical standards. Regional CCE marketing specialist Matt LeRoux will follow with a discussion on tailoring your marketing of grass-fed beef to the buyer. Learn to target your marketing efforts and communication for better results. This talk is free and open to the public. For more information, or in the case of possible postponement due to extreme weather, please contact Brett Chedzoy of CCE Schuyler by phone or text at: 607-742-3657 or by email: [bjc226@cornell.edu](mailto:bjc226@cornell.edu)

**“Healthy Soils, Whole Farms”** NOFA-NY, Inc. is hosting our annual Dairy and Field Crop Conference. n March 6, 2019 at the Holiday Inn/Liverpool! Our presenters are Ray “The Soil Guy” Archuleta, Gabe Brown, and Francis Thicke! This is a one-day event! Please visit [www.nofany.org](http://www.nofany.org) for more information and to register. You can also call our office at (315) 988-4000 and get information or register over the phone.

## 2019 PLANTstny Education Day

March 14, 2019, 7:00 AM - 4:00 Thursday, March 14th at the Coltivare, 235 S. Cayuga Street, Ithaca join us for an informal kickoff to the 2019 landscape season! We've got great speakers this year - focused on the theme of "New Directions" in the industry. Needing some DEC credits? We've got 5 available through this event! Vendors - we expect even more than last year, so bring your questions & collect information with new and exciting folks to share their expertise. Located at Coltivare in Ithaca -we've got a beautiful space and tasty food!

## Restoration of the American Chestnut And Changes in Northeast Forest Species in the last 50 years Program

Saturday, March 23 12:30 pm – 2:30 pm Montour Falls Library, 406 Main Street, Montour Falls Vernon Coffey, Chestnut breeder and Database Manager for the American Chestnut Research and Restoration Project at SUNY College



## Helping You Put Knowledge To Work

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

## **The Farmer 2 Farmer series**

A potluck dinner, guest speaker, and farmer discussion group. A guest presents on the topic for about 20-30 minutes followed by group discussion. Please bring a dish to share and one to eat off of, if you can. This is a great opportunity for you to meet and learn from other farmers with operations similar to yours. We meet at 6:30 at the Cornell Cooperative Ext. offices, 615 Willow Ave., Ithaca.

Wednesday, March 13: Solar Grazing with Lexie Hain, American Solar Grazing Association. Lexie will discuss her research and experience with solar grazing. Learn about this fascinating and exciting opportunity. Please email me by March 11 if attending.

Wednesday, April 3: Early Results from the Farmers' Market Square Project with Matt LeRoux. I'll present on what we learned after collecting detailed customer transaction data with 9 farms at markets this summer. Please email me by April 1 if attending.

Thursday, April 11: Sexual Harassment Training Information Session: A new NY state law dictates that all employers must provide sexual harassment training for employees. Learn what is required and how to get it done from CCE-Tompkin's Human Resources Manager, Krystal Kinney. Krystal will explain the law and answers questions. Please email me by Wednesday, April 9 if attending.

If you plan to come, please let me know via phone or email at [mnl28@cornell.edu](mailto:mnl28@cornell.edu) or 607-272-2292, ext. 159.

### **Low cost funds available in the Southern Tier:**

Working Capital Loans - \$5,000 to \$100,000. Term of 5 years. Fixed at 75% of prime rate at time of approval. Current rate 3.94%. Requires 10% cash equity, and collateral values at 120% of loan amount ( \$50,000 loan requires securable assets ( equipment, real estate, cash) of \$60,000).Eligibility – For profit businesses located in Steuben, Schuyler, Chemung, Tioga, Tompkins, Broome, Chenango, Delaware Counties. Contact [gminer@redec.us](mailto:gminer@redec.us)

Agricultural Loans - \$ 50,000 to \$250,000. Term 5-15 years. Fixed at 75% of Prime rate at time of approval (Current rate 3.94%). Requires 10% cash equity, and collateral values at 120% of loan amount ( \$50,000 loan requires securable assets ( equipment, real estate, cash) of \$60,000).

Eligibility – Agricultural businesses – growers, pro-

cessors, farm markets, wholesale distributors, dairy, grapes, hops, hemp, meat, cheese, etc. located in Steuben, Schuyler, Chemung, Tioga, Tompkins, Broome, Chenango, Delaware Counties. Contact [gminer@redec.us](mailto:gminer@redec.us)

## **The Tax Tips For Forest Landowners**

Well managed forests produce timber and other forest products, provide wildlife habitat, recreational opportunities, aquifer and watershed protection, and other amenities. Non-industrial private woodlands comprise approximately 60% of the nation's total forests. Providing tailored tax information is one way in which the Forest Service is working to increase forest productivity on non-industrial forest lands. For the latest tax information and tips regarding private woodlands, visit: [www.timbertax.org](http://www.timbertax.org).



of Environmental Science and Forestry at Syracuse University will discuss the latest efforts to develop a blight tolerant American Chestnut tree. Regional Extension Forester Brett Chedzoy of Cornell Cooperative Extension of Schuyler County will also talk about the loss of other key tree species over the past fifty years and what this means for the future health and productivity of our woodlands. This program is free and open to all area residents interested in work to restore the American chestnut tree, an iconic and valuable cultural symbol, to the forest ecosystems of the eastern US and in changes happening to other Northeast forest species. For more information contact Elaine Dalrymple, [edalrymple@schuylerswcd.org](mailto:edalrymple@schuylerswcd.org). Sponsored by the Schuyler County Water Quality Coordinating Committee in cooperation with Schuyler County Soil and Water Conservation District, SUNY-ESF American Chestnut Research and Restoration Project, the Southern Finger Lakes Chapter of the NY Forest Owners Association, Cornell Cooperative Extension of Schuyler County and the Montour Falls Library.

Forest as we explore this facility which is managed on behalf of the Department of Natural Resources at Cornell University by faculty and Cornell Cooperative Extension educators. We'll start by visiting acreage which is currently being managed using sustainable forest management practices and how you can implement some into your woodlot. We'll then move to their sugarbush operation with a tour of the sugarbush, sap collection system, sugarhouse and an overview of syrup production. Weather dependent, they may still be making syrup. Click here to register. This workshop will be held at Cornell's Arnot Forest, 611 County Rd 13, Van Etten, NY 14889.

### **Backyard Fruit Production**

March 23, 2019, 8:30 AM - 1:00 PM. Held at Reisinger Apple Country at 2750 Apple Lane in Watkins Glen NY. Spend the morning learning about growing apples, peaches, cherries, plums and pears. This workshop will also cover growing small fruits such as raspberries (black, yellow and red), blueberries and currants. Highlights will include pruning, Insects, diseases, fertility, "critter control" and netting blueberries. Please visit <http://cceschuyler.org/events> or call Roger Ort 607-535-7161 [rlo28@cornell.edu](mailto:rlo28@cornell.edu).

### **Sap to Syrup & Sustainable Forest Management Workshop**

Saturday March 30th, 9:30am-noon at Arnot Forest. FREE for Veterans and Active Service Members/ \$15 for general public. Join staff and educators from the Arnot Teaching & Research

