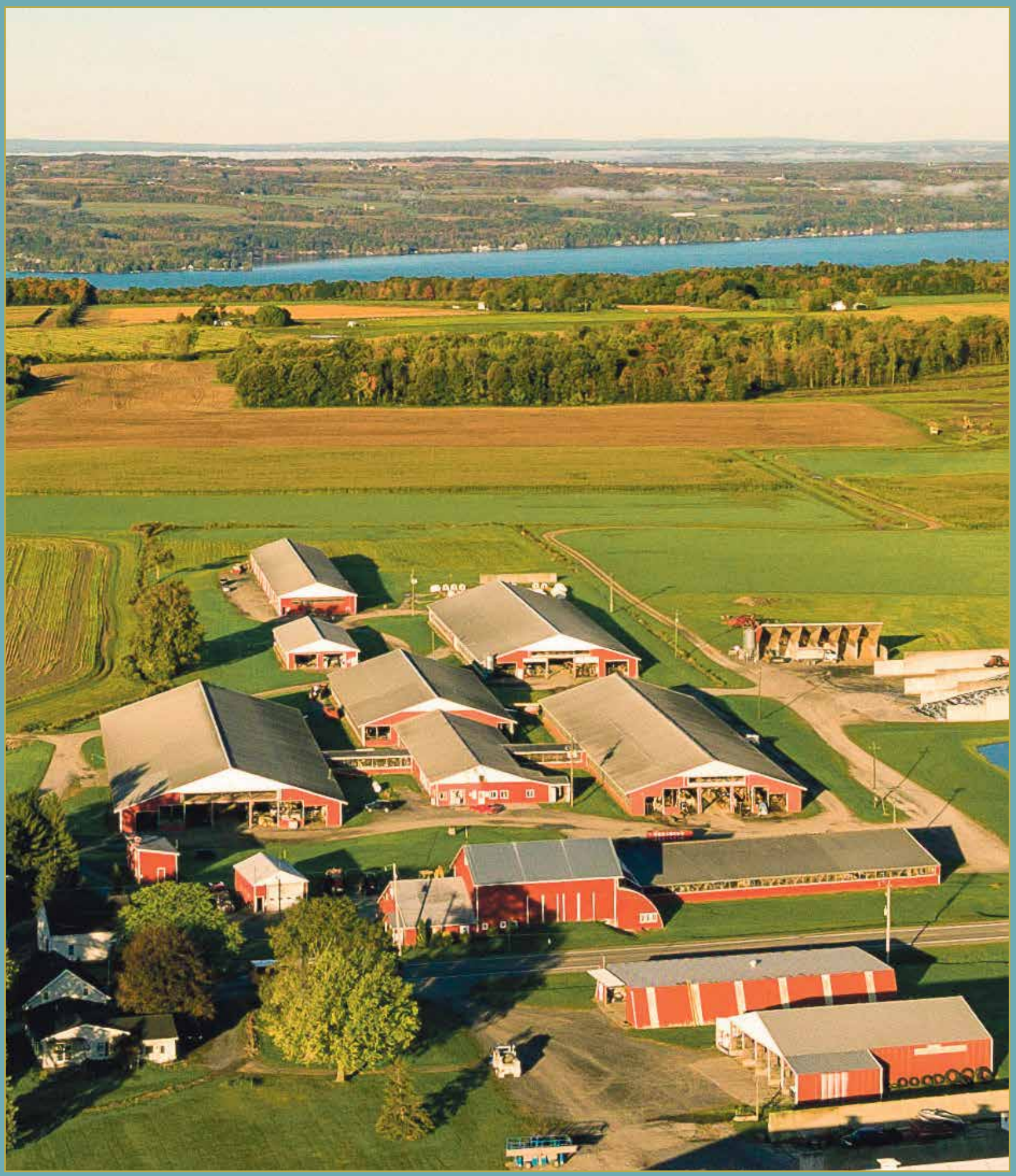
Small Farms Quarterly

Good Living and Good Farming – Connecting People, Land, and Communities



Feature Articles

CORNELL Small Farms PROGRAM

SPRING 2025

SMALL FARMS QUARTERLY – SPRING 2025

Cover photo: *An aerial view of a farm alongside the Finger Lakes region of New York. Photo courtesy of RJ Anderson / CCE*

SMALL FARMS QUARTERLY

Good Farming and Good Living
Connecting People, Land, and Communities

Small Farms Quarterly is for farmers and farm families – including spouses and children – who value the quality of life that smaller farms provide.

Our goals are to:

- Celebrate the Northeast region's smaller farms;
- Inspire and inform farm families and their supporters;
- Help farmers share expertise and opinions with each other;
- Increase awareness of the benefits that small farms contribute to society and the environment;
- Share important research, Extension, and other resources.

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Editorial team

• Anu Rangarajan, Cornell Small Farms Program	Editor-in-Chief	ar47@cornell.edu
• Kacey Deamer, Cornell Small Farms Program	Managing Editor	kacey.deamer@cornell.edu

For subscription information contact:
Lee Newspapers Inc., P.O. Box 121, Palatine Bridge, NY 13428
888.596.5329 ext. 146 • subscriptions@leepub.com

For advertising information contact:
Liz Friers, Lee Newspapers Inc., 518.673.0113
or efriers@leepub.com

Send your letters and stories to:
Cornell Small Farms Program
15A Plant Science Building, Cornell University, Ithaca, NY 14853
607.255.9238 • kacey.deamer@cornell.edu

The Small Farms Quarterly is compiled by the Cornell Small Farms Program, based at Cornell University in Ithaca, NY. The Cornell Small Farms Program fosters the sustainability of diverse, thriving small farms that contribute to food security, healthy rural communities, and the environment. We do this by encouraging small farms-focused research and extension programs.

Anyone is welcome to submit articles for consideration. See our guidelines at smallfarms.cornell.edu/quarterly/writers/ and contact Kacey Deamer with inquiries. Articles should be 1,000 - 1,600 words in length with at least three high-resolution image options.

Cornell Small Farms Program
www.smallfarms.cornell.edu
607.255.9227

Cornell Cooperative Extension

News from the Cornell Small Farms Program, Spring 2025

Futuro en Ag Project Had a Busy Winter
The Futuro en Ag project team has spent the past few months hosting a major in-person workshop, an online course, peer learning circles, and individualized technical assistance in Spanish, all prioritizing Latino/a/x farmers and aspiring farmers in the Northeast.

On Dec. 6 - 7, 2024, Futuro en Ag anchored coordination of a two-day bilingual workshop in the lower Hudson Valley, with active participation from farm families from 16 New York counties and Pennsylvania. Presenters spoke on marketing channels, farm finances and taxes, agroforestry and regenerative practices, postharvest management, and farmer associations.

In January and February, Futuro staff led a six-week online course, BF 102, “Analizando el Mercado y la Rentabilidad de su Negocio Agrícola” (“Analyzing Markets and Profits in Your Farm Business”). Throughout the course and in one-on-one technical assistance sessions, participants developed marketing plans, financial plans, and applied for small grants to support new farm enterprises.

In addition, Futuro en Ag has been supporting farmers through peer learning circles and technical assistance, focusing on production planning, business legalization, individualized advisory services for farm families, and the formation of associations and cooperatives. These initiatives help farmers enhance their skills in financial management, grant writing, and planning. Futuro en Ag has actively assisted individuals seeking employment in agriculture, connecting them with resources and professional guidance.

Share Your Farm’s Experiences with Extreme Weather and Climate Change
We know that small farms in urban and rural places have been impacted by extreme weather events in the recent past. How have you adapted or plan to change your farming strategies to meet these challenges?

We are asking farmers to participate in our climate resilience survey to help us develop trainings and technical resources to help you adapt to climate variability. This survey asks questions about your current practices, as well as your awareness of climate-resilient farming strategies.

Survey in English **Encuesta en Español**

This is the first survey of its kind for New York State, and we especially want to hear from small farms and historically underserved farmers. The purpose of this research is to assess:
• The production systems, barriers, and future interests of participants
• The level of awareness and implementation of climate resilience farming practices of participants
• The awareness and concern that climate change and extreme weather may cause to the farming enterprises of participants

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Message from the Editor

Dear farmers and friends,

If you have a story to share, we want to hear from you. As the Cornell Small Farms Program has grown, so has the agricultural landscape of New York and the Northeast. Small farms are changing, and the farmers cultivating them are more diverse than ever.

We want to know what brought you into farming, what keeps you farming, and more. In particular, we are seeking stories from:

• New and beginning farmers about their experiences (good and bad) getting started

• All farmers about how they’ve adapted to change (from climate to markets to pandemics)

• Farmers trialing new techniques in the field or in business practices

• Anyone wanting to share about life on the farm

Learn more about contributing to the magazine, including article types, upcoming deadlines, and more, at smallfarms.cornell.edu/quarterly/contribute.

Our team, and our Small Farms Quarterly readers, can’t wait to hear from you.

Kacey Deamer
Managing Editor
kacey.deamer
@cornell.edu

Frequently Asked Questions About Bird Flu in New York State

Cornell Cooperative Extension's response to the HPAI response in New York State is a coordinated effort of the New York Extension Disaster Education Network.

By Cornell Cooperative Extension Staff

What is avian influenza, and where does it come from?

Highly pathogenic avian influenza (HPAI) is a contagious poultry virus that has caused significant financial losses to the U.S. poultry industry and disruptions to the nation's supply of eggs and poultry meat. The highly pathogenic strain, H5N1, has been circulating in the U.S. since February 2022 resulting in the death and euthanasia of over 148 million birds in nearly 1,500 commercial and backyard flocks. This is the nation's largest animal health emergency.

Waterfowl, both wild and domestic, act as the primary carriers, which can spread the virus to other wild bird and domestic poultry populations. Wild waterfowl populations are monitored, and hunters have the option to send their harvested birds in for testing. Wild waterfowl regularly carry low-pathogenic strains of the virus, but it can easily mutate to a highly pathogenic strain, as we've seen with this outbreak. The disease has spread to mammalian and avian scavengers that feed on the carcasses of dead, infected wild waterfowl. It has also been found to spread to poultry from infected dairy cattle.

Is HPAI in avian species a concern for New York State?

Yes. Since the February 2022, we have seen 28 cases of this disease in domestic flocks in NYS. Of those, two flocks were commercial, seven were identified at live bird markets, and 19 were found in backyard flocks. Affected flocks have been identified in Columbia, Dutchess, Fulton, Kings, Monroe, Onondaga, Orleans, Putnam, Queens, Suffolk, Sullivan, Tomkins, Washington, Wayne, and Ulster counties. These flocks have been euthanized to help control the spread of the virus.

Since February 2022, we have seen 28 cases of highly pathogenic avian influenza in domestic flocks in New York State.

Jason Koski / Cornell University

It is difficult to predict how large of an impact the disease will have moving forward, but the risk posed is significant since the virus is present in the environment via wild bird hosts. To date, there have been 472 positive wild bird cases across most counties in the state. The majority of wild birds identified have been waterfowl, with some corvids (crows, ravens), and some birds of prey. HPAI has also been found in mammalian scavengers that feed on the carcasses of infected wild fowl.

For more information on current detections on HPAI in wild birds, commercial flocks, and backyard flocks, visit aphis.usda.gov/aphis/ourfocus/animalhealth/animal-disease-information/avian/avian-influenza/2022-hpai.

While the disease is circulating in wild and domestic bird populations, there is no need to panic, but there is need to be on high alert. Poultry owners should be prepared to report any suspicious disease symptoms in their flocks.

How does HPAI spread?

HPAI lives in the respiratory and/or intestinal tract of birds. It can be picked up from contact with infected feces, surfaces, or through the air, though aerial transmission from farm to farm is unlikely. It can be transported on infected feed, clothing, or equipment. It can also be spread through wild bird populations encountering domestic birds and can be transported through and on other living creatures, such as dairy cattle, rodents, and insects. Once on the farm, the disease is readily passed from bird to bird, infecting an entire flock quickly.

Transmission into poultry flocks from dairy cattle is not yet a concern for NYS farms, since it has not yet been identified in our herds. Regular milk testing to confirm that the virus has not entered our state's dairy farms is being conducted across the state.

Which types of birds are affected?

Domestic poultry flocks of any size, from backyard to commercial, and any species can be affected. Game birds and ratites (emu, ostrich, rhea) can also contract the disease. Waterfowl may be affected and not show symptoms.

Chickens coming out of their coop into a grassy field.

RJ Anderson / CCE

Affected wild bird populations are predominantly waterfowl, which can carry the disease and not show symptoms. However, other wild birds, including birds of prey, game birds, and corvids can be infected with the virus too.

What are the symptoms of HPAI?

Any birds can be affected, but birds other than waterfowl react most strongly to the virus. Poultry infected with HPAI may show one or more of the following symptoms:

- Sudden death without clinical signs
- Lack of energy and appetite
- Decreased egg production or soft-shelled or misshapen eggs
- Swelling of head, comb, eyelid, wattles, and hocks
- Purple discoloration of wattles, comb, and legs
- Nasal discharge, coughing, and sneezing
- Discoordination
- Diarrhea

Large death losses without any clinical signs or explanation like predators or the weather is known to be a hallmark of the virus. In some cases, expect the majority of the flock to die within 48 hours of the first symptoms appearing. Regardless of how the disease presents, a large portion of the birds in a flock will be affected. Waterfowl may carry the virus but not show symptoms.

With any suspicious disease, rule out obvious causes such as predation and weather issues. Deaths that are in the realm of "normal" don't need to be reported.

What happens if I think I have the disease in my flock?

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Our work on climate resilience at the Cornell Small Farms Program has grown and diversified over the years, and is now expanding further to meet the goals of the NY Connects: Climate Smart Farms and Forests Project Grant from New York State. Help us build a more climate-resilient small farm sector!

Participation in this survey is voluntary and should take about 15 minutes to complete. It is available in both English and Spanish. Your response will be kept confidential. Information gathered through this survey will be summarized across all responses before sharing. If you would be interested in entering a drawing for a free Small Farms online course, follow the link at the end of the survey.

If you have questions, contact María José Oviedo (mo488@cornell.edu) or Connor Youngerman (czy2@cornell.edu) from the Cornell Small Farms Program.

How to Prepare Your Yourself and Employees for an ICE/CPB Encounter

Knowing what rights you have as a business owner and what rights your employees have can be empowering.

By Elizabeth Higgins

There has been a lot of concern among ag employers and immigrant communities in New York about recent changes in federal immigration policy and enforcement.

First, it is important to note that many of the rumors of drastically increased Immigration & Customs Enforcement (ICE) presence in New York State are not true. An article in the Dispatch (a right of center media outlet with high rating for fact checking), "Trump's Deportation Dilemma," reported recently that despite "'Cops'-style raids in cities across America" actual arrests and deportations are actually in keeping with or below the levels during the Biden and Obama administrations. The article points out that the majority of ICE arrests occur in prisons and jails.

"Because ICE gets 90% of them when they are booked into jail, they don't miss that many targets. Even adding nonviolent and minor offenses to the list of arrest targets, along with 'collateral' non-criminal illegal immigrants incidentally swept up in enforcement, the pool of potential arrests is difficult to increase with existing ICE capacities."

ICE's X account (@ICE.gov) stopped posting daily arrest numbers at the end of

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Resources

The Cornell Farmworker Program works on improving the living and working conditions of farmworkers and their families in New York State and beyond: **cals.cornell.edu/global-development/our-work/programs/cornell-farmworker-program**

The New York Immigration Coalition advocates for the rights of all immigrants in New York State: **nyic.org**

The Cornell Agricultural Workforce Development works on developing the people who feed our local families and the world: **agworkforce.cals.cornell.edu**

Bird flu ***from 4***

Report it! If a large number of your birds are sick or dying, it's important to report it immediately so that we can stop the spread to other flocks. This helps protect the welfare of the flocks around you, the livelihoods of farmers, and the pleasure that backyard flock owners get from their poultry. To report, you can call:
• The NYS Department of Ag & Markets: 518.457.3502
• USDA: 866.536.7593
• Your local CCE Office: cals.cornell.edu/cornell-cooperative-extension/local-offices

The first step in reporting is to answer a few questions about what's going on with your birds. If your flock is suspected of having the virus, a field veterinarian from NYS Ag & Markets will come out and evaluate your flock. They will take samples from live birds, dead birds, and your birds' housing. These samples will be sent to a testing laboratory with preliminary results expected in 24 hours. Until then, the veterinarian working on your case will help you put measures in place to make sure that if the disease is on your property, it doesn't spread further. Usually, that means that only people who are authorized to work with your poultry are allowed onto and off of your property, and the movement of live poultry and poultry products (meat, eggs, feathers, etc.) is not allowed.

While the testing is occurring, you'll work with USDA to inventory your poultry. In the case of a positive test result, all flocks on your property will be euthanized to stop the spread of the disease. The inventory will help determine the indemnity (payment) for your flock. This information will not be shared with other producers, the municipality, county, or town.

The goal of USDA is to depopulate your flock within 24 hours of a positive result. This 24-hour window is critical to keep the virus from building in the environment, potentially spreading to other flocks, and re-entering wild bird populations. The veterinarian working on your case will work with you to be sure that your birds are euthanized quickly and humanely.

What can I do to keep my birds safe?
Because there is not a vaccine currently available in the U.S. for this disease, keeping it out through biosecurity is going to be the best course of action. The easy-to-follow biosecurity principles below are for all bird species and can go a long way to keeping your birds safe from disease:
• Protecting against exposure to wild birds or restricting access to water or ground contaminated by wild birds.

For many flock owners, this means keeping flocks indoors until the threat has passed. For others, it can mean not letting poultry on pastures that wild birds frequent and not allowing poultry access to open water sources visited by wild birds.
• Closing bird areas to nonessential personnel or vehicles.
• Providing poultry caretakers with clean clothing and disinfection facilities and directions for their use.
• Thoroughly cleaning and disinfecting equipment and vehicles (including tires and undercarriage) when entering or leaving the farm.
• Halting the borrowing or lending of equipment or vehicles.
• Stopping visits to other poultry farms, exhibitions, fairs, and sales or swap meets. If visits must occur, poultry caretakers should change footwear and clothing on their return to the farm.
• Banning bringing in birds from slaughter channels (auctions, processing facilities) to the farm.
• Establishing an "all-in, all-out" flock-management policy, where only one age of birds is kept on your premise at one time.

If you are a poultry hobbyist or small flock owner, we encourage you to look through the biosecurity resources developed by USDA-APHIS's Defend the Flock Program.

To read more answers to frequently asked questions, visit cals.cornell.edu/news/2025/02/frequently-asked-questions-about-bird-flu-new-york-state.

A version of this article originally appeared on CALS News.

NY EDEN is a collaborative educational network based at Cornell University and dedicated to educating New York residents about preventing, preparing for, and recovering from emergencies and disasters.

Slow-Moving Vehicle Safety Season

In our agricultural communities, farmers are using roadways to move equipment between farms and fields.

By Emma Wilson

Spring is here, and although warmer weather eliminates the risk of snow and ice on roadways, it also marks the season of slow-moving vehicles (SMVs). From April through October, you are far more likely to encounter a SMV on the road.

SMVs are defined as any vehicles that operates under 40 mph, including tractors, bicycles, construction vehicles, and animal-powered vehicles such as horse-drawn buggies. In our agricultural communities, farmers are using roadways to move equipment between farms and fields, and all over the state many more cyclists are utilizing roadsides. All drivers should be vigilant year-round but keep an extra sharp eye out for SMVs April through October!

SMVs can be on the road at any time of day but are more common in the mornings and evenings when farmers are starting or ending a day of work. Animal-powered vehicles may be more prevalent on Sunday mornings because of church services in Amish and Mennonite communities, or around auctions and markets where these communities are actively involved.

Under state law, SMVs may be on the road at any time of day and in any weather conditions, so long as they are properly lit and labeled. All SMVs should be labeled with the slow-moving vehicle emblem, which is a reflective and bright orange triangle, so they are visible to drivers. This emblem is for SMVs only and it is illegal to place them on stationary objects such as mailboxes.

All agricultural equipment must display this symbol, whether it is self-propelled or towed. SMVs on the road after dark or in poor visibility must be equipped with signaling devices – two reflectors on the back as far apart as possible, headlights, amber lamps, and a taillight. SMVs

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Remember to share the road!

Image provided

Prepare ***from 5***

January and is now posting details about individual criminals who are being arrested and deported. This strategy – of making a story about an individual for greater effect – is a well-known communications strategy for heightening the emotional response and it has the added advantage of minimizing the fact that deportation numbers are nowhere near the Trump Administration's stated goals. Currently, there are too few beds to house detainees, too few immigration judges, too few resources, and not enough manpower.

That said, given the concerns of the agricultural community about increased ICE and U.S. Customs & Border Protection (CPB) enforcement, and this administration's stated policy goals of removing unauthorized individuals and reducing illegal immigration to the U.S., knowing what rights you have as a business owner and what rights your employees have can be empowering.

The NYS Office for New Americans and the Cornell Farmworker Program are offering information to help immigrants and employers know their rights and how to respond and be prepared for interactions with ICE and CPB.

Here is a summary of information provided by the New York Immigrant Coalition (nyic.org):

• You always have the right to remain silent and not answer questions. Any information provided can be used against you later.

• You always have the right to refuse searches of your home, person, or belongings by law enforcement, unless a judicial warrant is produced. But do not physically resist or interfere with them.

• You do not need to show identification. But do not lie or show false documents.

• You have the right to request an attorney.

• You have the right to record law enforcement, including ICE agents, as long as you are not interfering with them.

Within the 100-mile Border Zone (which covers much of NYS) CBP agents have some additional powers. The publication "Immigrants & Upstate New York" by the New York Immigrant Coalition (at nyic.org/wp-content/uploads/2022/11/Immigrants_and_Upstate_New_York.pdf) specifically provides information about your rights when stopped by CPB. CPB agents:

• Can stop you and ask questions about your citizenship or immigration status.

• Can enter onto private land within 25 miles of the border.

• Cannot enter a home or dwelling on private land anywhere without a judicial warrant or consent.

• Cannot conduct searches without a legal reason or consent.

Tips for Employers

The National Employment Law Project and National Immigration Law Center have put together a publication, "What to Do if Immigration Comes to Your Workplace" (at nilc.org/resources/a-guide-for-employers-what-to-do-if-immigration-comes-to-your-workplace), that can provide some guidance. Here are some key takeaways:

ICE agents can enter public areas of a business, such as parking lots or lobbies, without restriction. However, they cannot access nonpublic (private) areas without consent of the owner or a valid judicial warrant.

It is a good idea to train your staff to refer ICE agents to you and not to allow ICE agents entry to private spaces (including worker housing). A worker can say "I can't give you permission to enter. You must speak with my employer."

It is important to know the difference between a judicial warrant and an administrative warrant. A judicial warrant, issued by a federal or state court and signed by a judge, specifies the search's scope and location, which may include a private area. Employers must allow access to areas specified in the warrant but can refuse entry to nonpublic areas beyond the warrant's authorizing scope. In contrast, an administrative warrant, which is not issued by a judge, does not authorize ICE agents to enter private spaces without permission. It directs law enforcement to arrest or detain specific individuals suspected of immigration violations but does not impose a legal duty on individuals or employers to comply with ICE demands.

I-9 Audits of Workplaces

With the heightened focus on immigration enforcement, an increase in I-9 audits and compliance investigations is anticipated. The Immigration Reform & Control Act of 1986 (IRCA) prohibits employing individuals unauthorized to work in the U.S. and requires employers to verify identity and employment authorization. Federal law mandates that employers timely complete an I-9 form for each employee to verify employment eligibility. The Cornell Ag Workforce Development Program has resources on I-9 forms for employers, including a presentation on Authorization to Work and Enforcement from Jan. 8, 2025 and recorded the video. (Find it and more resources at agworkforce.cals.cornell.edu/2025/01/27/prepare-for-immigration-enforcement-at-your-farm.)

Some best practices in I-9 records management:

1. You need to keep I-9s the length of three years after the employee hire date or one year after the termination date. Shred old I-9s that you don't need to keep so they are not a liability to you.

2. Along with the I-9s you will need to provide payroll lists but you do not need to provide individual pay records or personnel files – keep the HR files separate to control the information that is provided.

Finally, the resource "Immigrants & New York," also from the New York Immigration Coalition (at nyic.org/resources-training/kyr), provides resources to help immigrants, particularly those with families and children, prepare for possible interactions with ICE. Tips include making a child safety plan and finding someone to care for your child in the event of an emergency; making copies of important documents (birth certificates, medical and school records, passports); finding a good immigration lawyer; and tips on how to respond if interacting with ICE.

Elizabeth Higgins is a business specialist with the CCE-Eastern NY Commercial Horticulture Program.

Getting Ready for Spring Grazing

In the second installment of our new series "Where's the Grass?", we share several important tasks to accomplish before you let your animals out to graze this spring.

By Rich Taber

This is the second installment in this new series on grazing. The Winter 2025 edition of Small Farms Quarterly has the first installment, which can be read in the SFQ archives on the Small Farms site. My previous series, "Where's the Beef," which ran for several years, is also available in the archives for your perusal. That series had several grazing articles too.

The focus of this edition's article is on how to get ready for the spring grazing season. Long before you let animals out to graze, there are certain agronomic and infrastructure requirements that must be met to be successful with grazing. By the time that you read this in April, you should have your pastures just about ready to go for your animals.

As mentioned in the previous article, grazing can have a tremendously positive impact on your farm's bottom line. Grazing, however, is not free! A certain amount of money must be invested into the soil and grasses as well as the infrastructure – fences, laneways, and watering systems.

First, we must be vigilant in maintaining the quality of our pastures and will periodically need to monitor the pasture soil and add any needed inputs. We need to have the soil tested for nutrients and pH. You don't need to test the soil every single year, but certainly every three years is a good target to aim for. All pastures need a certain amount of nitrogen, phosphorus, and potassium. Fortunately, in the grazing world we don't need to add near the amount of inputs as we do in a hayfield.

In a hayfield, almost 100% of the plant biomass is removed every year in a series of cuttings. If nutrients are not added to make up for the draw of the hay crops, the tonnages and nutritional qualities of the hay will suffer. This too can occur in a grazing pasture, but not to the same extent. About 70% of the existing nutrients are recycled through the animals every year, and also in much of the plant biomass that remains.

Nonetheless, nutrients are removed from a pasture by grazing, and they too must be replaced. Additionally, most pastures need a soil pH of at least 6.2 for the nutrients in the soil to be available to the growing plants. If soil is too acidic (below 6.2), the nutrients remain locked up and are not available to the plants. What does all of this mean? It means that you need to take a soil test about every three years and whatever the grazing land needs in the form of fertility elements and lime must be added.

Oay, that's the agronomic end of the equation. We also need to talk about which species of plants need to be in the grazing mix. The two big categories of plants are grasses and legumes. The grasses include timothy, orchardgrass, Kentucky bluegrass, and several others. On the legume side, there's alfalfa, red clover, white clover, and bird's-foot trefoil. The advantage of the legumes is that they can pull in nitrogen from the air whereas the grasses need to be provided nitrogen in one form or another. (We will look at different grazing species in later installments of this series.)

Many pasture fields contain what is known as a native seedbank, where seeds may lay dormant for many years and grow when the conditions are just right. This is one way to renovate an old pasture – by providing plant nutrients and lime, an old field can be made to produce again without resorting to expensive tillage and fertility inputs.

This is an example of electric netting, which can be used to subdivide pastures, but does not work well as a perimeter fence.

One of the most important components of grazing system infrastructure is fencing. We need permanent perimeter fencing as well as a way to subdivide the bigger fields into smaller, more manageable grazing paddocks. There are several different types of fencing that can be used for perimeter fencing. In days of old, barbed wire was commonly used. This type of fencing has slowly fallen into disuse over the years as more effective fencing methods have come along, most notably high tensile electric fencing.

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Slow-moving ***from 6***

on the roadways should be clearly marked and easy to spot for a vigilant driver.

SMVs alone can present a hazard to drivers, but the rural roads they are often found on may also be hard to maneuver. When driving on rural roads you may encounter blind hills or driveways, sharp turns, limited vision, loose gravel, and narrow roads. SMVs may take up more than a single lane in the road, making narrow roadways even more challenging. As a driver you should be aware of the possibility that you may need to stop or pull over to make way.

SMVs are especially common in rural areas and these combined hazards can result in disaster if drivers aren't prepared. It is especially important to practice safe driving in rural areas where the danger of road conditions and SMVs are combined.

To be courteous to SMVs and practice good safety on the road, you should slow down immediately upon seeing one. It's especially important to slow down for animal-powered vehicles, such as buggies. Although they are well-trained and working horses, equine are animals of prey and can be easily startled. It's also important to remember SMV operators have limited visibility and may make unexpected movements. Allow a large cushion of space between yourself and any SMV. Pass with care only when it is safe and legal to do so. Accidents with SMVs are easily preventable when precautions are taken. Stay alert and stay safe while sharing the road!

To support the slow-moving vehicle safety campaign, pick up a free yard sign that reminds drivers to share the road at the CCE Ontario office, located at 480 N. Main St., Canandaigua. These signs have been sponsored by Ontario County Farm Bureau.

If you have any questions or concerns on staying safe this SMV season, reach out to CCE Ontario's Ag Awareness/ Literacy Educator Emma Wilson for additional resources. She can be reached at 585.394.3977 ext. 437 or ejw226@cornell.edu.

Solar Solutions: Agrivoltaics Offer Array of Options for Farmland Use

Approximately 84% of land identified as suitable for future solar development in New York State is agricultural.

By Krisy Gashler

Not everyone is excited about New York's rapid solar expansion.

The buildout of solar energy infrastructure across the state has become an issue of grave concern for many farmers and those worried about the state's agricultural communities. The U.S. Department of Energy estimates that 10 million acres will be needed to meet solar energy production goals by 2050, and American Farmland Trust (AFT) estimates 80% of that could be built on agricultural lands. A Cornell study found that approximately 84% of land identified as suitable for future solar development in New York State is agricultural.

"One of the big questions is always 'How will landowners, both farmers and non-farmers, respond to solar leasing opportunities?'" said Rich Stedman, professor of natural resources and the environment in the College of Agriculture & Life Sciences (CALS). "Some people fear this will be the death of farming, that people are going to lease their acres for solar panels and that'll be it – it will be an 'exit strategy' and that land will be lost to production. Other people have hypothesized that the additional income will enable people who want to stay in farming to do so."

Stedman studies the social science dynamics of energy transformations and has conducted surveys and focus groups with farmers and other landowners. One recently completed survey of NYS landowners living near transmission lines and electricity substations found that farmers were more opposed than non-farmers to large-scale solar development in their area, and that farmers were more likely than non-farmers to be approached by solar developers but less likely to lease their land.

Graduate student Dana Russell (left) and Extension Associate Caroline Marschner, who co-leads the Cornell Agrivoltaics Research program, plant crops to study how they can flourish under solar panels.
Heather Ainsworth / Provided

The research also found that among farmers who have leased their land, about half expect to continue producing agricultural products on the land with solar panels – a process called agrivoltaics, which has seen a great leap in Cornell research activity.

In 2024, with $1 million in initial support from NYS, CALS established the Agrivoltaics Research Program to bring together dozens of researchers across campus and external partners to explore the engineering, agronomics, economics, policy, and social science of agrivoltaics.

"There certainly is interest in this idea of agrivoltaics, but people want a lot more information about what that would actually mean for their farms," Stedman said. "Because agricultural land is so 'in the crosshairs' with utility-scale solar, it's very important that we figure out how to avoid prime farmland and how to work with farmers in a way that honors what they actually do and want to do."

An equally important factor, according to Max Zhang, the Irving Porter Church Professor of Engineering in Cornell Engineering and Provost's Fellow for Public Engagement: What will it cost energy consumers?

"The cost-effectiveness of agrivoltaics systems is crucial to market adoption and the overall energy transition," said Zhang, whose team conducted the NYS land-use analysis. "As solar becomes a major source of electricity generation in the near future, we must ensure electricity remains affordable for the public."

'The missing link in the whole system'

Elizabeth Ryan owns Hudson Valley Farmhouse Cider and Stone Ridge Orchard, where she grows a wide variety of vegetables and fruits, including 1,000 acres of apples. Ryan is in early negotiations to incorporate solar panels into her orchards.

"Agrivoltaics are the missing link in the whole system, because they allow growers to dual-crop, so to speak: harvest the sun and harvest plants or graze livestock under the panels," she said. "I'm super excited about this concept and see it as the next frontier."

Solar solutions 9

Getting ready ***from 7***

If you find yourself on a farm that has lots of old barbed wire fencing on it, you can buy a little time by stringing up a hot electrified wire in front of the old barbed wire, keeping the animals away from the barbed wire. You will also need to decide on which method of temporary fencing you will use to divide your pastures up into smaller rotational paddocks.

If you are going to be using electric fencing, whether it's for the perimeters or for interior paddocks, you will need to learn about high impedance fence chargers and grounding systems. Many problems with electric fences stem from grounding issues.

Another form of perimeter fencing that can be used is non-electric high tensile woven wire.

Interior paddock fencing and management is critical to the success of a rotational grazing system. The theory is simple: graze for short periods and then rest the paddocks for an appropriate number of days until the grass has grown back. The devil is in the details, and I would suggest that you purchase a good book on grazing that explains the principles of grazing and grassland management. Sarah Flack has authored "The Art and Science of Grazing," which is an excellent source for grazing information. I use this as a textbook for my college students in the grazing class that I teach in autumn.

We certainly cannot forget about water in a grazing system. Sometimes you can rely on natural sources such as ponds and streams, but most of the time you will need water pumped from wells into watering troughs. You will also need to figure out how to get water to the animals in all of their grazing paddocks throughout the grazing season.

Probably the biggest challenge in a grazing system is managing the supply of grass throughout the season. In the early part of the season, we usually have more grass than we know what to do with. Once grass growth starts slowing down in summer, it becomes a challenge to always have enough grass for the animals, and we will need to lengthen out our grazing intervals, from the 20 or so days of use earlier in the season to as much as 40 days in the middle of summer.

We must avoid overgrazing at all costs! If we overgraze, we are shortchanging the animals, the grass, and our profitability.

Here's an example of barbed wire fencing, which is not used too much anymore in grazing systems.

High tensile fences need strong corners and bracing.
Rich Taber / CCE Chenango

Rich Taber is a longtime educator of grazing, forestry, and agriculture with CCE Chenango, and he lives on a high elevation farm in nearby southern Madison County where he has raised a variety of livestock over the years. He can be reached at 607.334.5841 ext. 1121 or rbt44@cornell.edu.

Solar solutions *from 8*

Solar industry research has found that adjustable-tilt solar panels above a vineyard reduced heat stress on the crop by providing shade, protected plants against late frost by holding in more nighttime heat, and reduced irrigation requirements by minimizing evaporation. On overcast days, the panels could be straightened to allow in more light, and during hail or heavy rain storms, panels could be flattened to protect plants.

Separate research led by Zhang, who is also a senior faculty fellow at Cornell Atkinson Center for Sustainability, found that agrivoltaic systems can benefit the solar panels themselves. Panels traditionally have been mounted a half-meter (approximately 20 inches) off the ground, to save on building costs. This leaves little room for farmers, let alone equipment. Zhang and his colleagues developed a physics-based model which demonstrated that when panels are placed 4 meters (13 feet) above soybean fields, they are up to 10° C cooler than panels placed over bare ground. This cooling effect can make the panels more efficient and longer lasting.

Agrivoltaics are not appropriate for every field or every farm. For example, NYS grows 1 million acres of corn each year; researchers, developers, and growers all agree that trying to combine corn and solar panels would be logistically infeasible. Working around solar panels is also more difficult the larger the operation and its equipment, said Joe Lawrence, dairy forage systems specialist with PRO-DAIRY.

“The average farm size keeps increasing in New York,” Lawrence said. “If you’re milking 50 to 60 cows in a traditional dairy farm and making round bales with a mower that’s eight feet wide, cutting around solar panels could work well. But more and more in our dairy and field crops, we’re talking about 1,000 cows and a 30-foot-wide mower chopping into a tractor trailer driving next to it.”

To protect prime farmland, Lawrence said he hopes state and local officials will allocate resources for building new power lines and substations in areas with less-productive farmland, where landowners may be eager to lease for renewable energy production. This, along with siting solar panels on already-developed lands, such as along highways, could alleviate the pressure on the most productive

Adjustable-tilt solar panels can reduce heat stress on crops by providing shade, protect plants against late frost by holding in more nighttime heat, and reduce irrigation requirements by minimizing evaporation. On overcast days, the panels can be straightened to allow in more light.

acres, he said.

“The history lesson is that the most productive farmland is where the population centers grew and where the roads and electrical infrastructure grew,” he said. “Meanwhile, there are areas with very poor soils and little farming going on where people would really benefit from these solar leases, but often these areas lack the electrical infrastructure to move the power.”

Linda Garrett, New York regional director for AFT, also believes that protecting farmland and farmers is key, and agrivoltaics could be part of the solution, especially for small and beginning farmers.

“We need to change the narrative around the solar buildout and start thinking about agrivoltaics as a farm viability tool,” Garrett said. AFT has developed “smart solar” principles and is working on an agrivoltaics guide to help farmers understand how to advocate for their needs with developers and local municipalities.

“We want to help farmers understand where their power is,” she said. “Farmers could require developers to dig a well or provide appropriate fencing. Town boards can change zoning requirements in ways that support agrivoltaic projects, or even require land access on solar sites

Last year, the Cornell Agrivoltaics Research program planted an autumn crop of lettuce, spinach, radishes, strawberries, and raspberries under a large commercial array of tilting, single-axis solar panels in Ravena, NY.

for growers. We want to empower farmers so that this renewable buildout can become an opportunity rather than a threat.”

‘To make it work, we need to push the envelope’

Cornell can be an objective third party that can provide unbiased information to help farmers, landowners, and policymakers make decisions, according to Antonio DiTommaso, professor in the School of Integrative Plant Science’s Soil & Crop Sciences Section (CALS) and associate director of the Cornell University Agricultural Experiment Station. DiTommaso also leads the Cornell Agrivoltaics Research program, along with Extension Associate Caroline Marschner and Steve Grodsky, assistant professor (courtesy) in natural resources and the environment (CALS).

“This is where we as the land-grant university for New York can test some of these company claims and provide legitimate data,” he said.

The program is overseeing projects that will test the viability of a variety of crops grown around solar panels in NYS. Of particular interest is how solar panels impact weed and pest pressure, disease occurrence, soil health, and productivity.

Last year, the program planted an autumn crop of lettuce, spinach, radishes, strawberries, and raspberries under a large commercial array of tilting, single-axis solar panels in Ravena, NY.

Cornell’s Hudson Valley Research Laboratory in Highland, NY, is planning to install a 300-kilowatt solar arrangement this spring to cover about 1,100 apple trees. The single-axis movable energy array will be 12 feet above the ground, tracking the sun to capture energy but providing a warm canopy on cooler spring days and shade the trees from excessive heat.

The researchers aim to demonstrate how the panels can be used to protect growing apples from extreme weather, including hail, in a changing climate. They will also examine how varieties and rootstock react to covered or uncovered conditions.

Despite the rising interest in agrivoltaics systems, their growth could be stymied by impractical regulations to define and guide their implementation, according to recently published research from Zhang’s research group.

After having extensive discussions with solar professionals, the researchers used a shading and radiation tool to evaluate a solar incentive program in Massachusetts, and they found that policy requirements based on shading alone – not light availability – may underestimate crop suitability. The team developed new policy recommendations to encourage cost-effective designs, such as considering agricultural-use case scenarios and benchmarking crop suitability for a given region.

Solar solutions 10

Farmers and Researchers Tackle Manure Management Together

These collaborations help us understand how manure application affects yield and soil health over time.

By Madeline Hanscom

The Nutrient Management Spear Program (NMSP) team conducts on-farm research to help farmers optimize their manure management and improve their soil health. They want to identify exactly what each farmer's manure adds to the soil – from key nutrients to organic matter, microbes, and more – and how manure application affects yield and soil health over time.

To accomplish this, the NMSP team collaborates closely with farmers, Certified Crop Advisors, and Cornell Cooperative Extension branches around New York State. One of those farmers is Jon Greenwood of Greenwood Dairy in Canton, NY.

Greenwood bought the farm in 1978 and grew it to what it is now. He has almost 1,600 cows and cultivates around 3,600 acres of a variety of crops, from alfalfa to corn silage, corn grain, soybeans, and more.

For the last two years, Greenwood has worked closely with NMSP's On-Farm Research Coordinator Juan Carlos Ramos to implement the Value of Manure project on his farm.

"Before joining, I already believed in the research that was being done, especially with the challenges that are coming environmentally and the negative impact of nay-sayers when it comes to the value of manure," said Greenwood. "I think every farmer knows that manure has a value – but how do we put a number to that? A project like this shows that the value of manure is important."

A big part of what makes these on-farm research trials successful is increasing connections between farmers, researchers, and others who aid farmers in their success.

Knowing this, Ramos looked to Certified Crop Advisor Mike Contessa of Champlain Valley Agronomics, Greenwood's crop consultant, for both assistance and advice when it came to implementing the Greenwood Farm research trials. Having worked in the area (and specifically with Greenwood) for years, Contessa understands the farm's land and the challenges they may face.

"Our partnership with Contessa has allowed us to use state-of-the-art precision agriculture tools to conduct our trial with accuracy and efficiency," said Ramos. "We used GPS-guided manure application and corn seeding, and variable rate nitrogen sidedress application. We also harvested using a yield monitor system and remotely sensed the plots with a drone. All of this was possible due to Mike's extensive knowledge in precision agriculture and the farm's continued investment in precision agriculture equipment."

Francisco Lopez (left) and Carlos Irias collect soil samples in a field.
Juan Carlos Ramos

Greenwood, who is also one of three co-chairs for the Northern New York Agricultural Development Program (NNYADP), decided to join the Value of Manure project because he has seen how valuable manure can be but wanted to see it quantified on-farm.

How have the preliminary results of the study stacked up to Greenwood's expectations?

"In our trial at Greenwood we observed that manure replaced inorganic fertilizer and increased yields to levels not achievable with fertilizer only," said Ramos. "These yield benefits were also present in the second year after manure application."

"Manure has values other than just nitrogen; we have all surmised that between the micronutrients, organic matter, and microbes – all the good things in manure," said Greenwood. "We still don't really know what all those good things are, but now we know that there's more than just the N, P, and K."

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Solar solutions ***from 9***

Zhang's group also conducted a study that determined agrivoltaics could create mutual benefits for growers and solar developers while accelerating power grid decarbonization in Concord grape vineyards in western NYS.

There is even a place in agrivoltaics for perovskites, according to Fengqi You, the Roxanne E. and Michael J. Zak Professor in Energy Systems Engineering in Cornell Engineering.

Since perovskite photovoltaics can be semi-transparent, they can be incorporated into greenhouse-like panels that allow sunlight to pass through to the crops below.

Cornell graduate student Dana Russell plants strawberries at a commercial solar farm in Ravena, NY. It is one of the active agrivoltaic research projects – the idea of growing crops while harnessing the sun's energy – around the state.

"That's something that silicon cannot do, because silicon is not going to be semi-transparent," said You, who has also studied how to optimize the efficiency of agrivoltaic systems. "They don't have the flexibility."

Given the variety of stakeholders and interests around solar energy and farming, agrivoltaics research aims to be equally multifaceted.

"When this buildout started, the goal was just energy production. Now we're saying 'You need to think about energy production and agricultural systems,'" DiTommaso said. "If a grower can get some revenue from leasing land to these solar companies and still get hay off, grow crops, or graze livestock, that could be really important for the farm's viability. But to make it work, we need to push the envelope on the engineering, the policy, the economics, the ecology – everything."

This article originally appeared in CALS News.

Krisy Gashler is a writer for the College of Arts & Sciences. David Nutt contributed to this report.

Rooted in a Cornell Collaboration, New York State is Tops for Beets

New York harvested more acres of beets than any other state according to the most recent Census of Agriculture.

By Laura Reiley

New York State is known for producing the most yogurt, cottage cheese, and sour cream of any state in the U.S. But there's a vegetable that – while not everyone's favorite – is also number one out of the Empire State.

"Every five years there's a Census of Agriculture, and in 2022, lo and behold, New York harvested more acres of beets than any other state," said Julie Kikkert, a vegetable crops specialist with Cornell Cooperative Extension's Cornell Vegetable Program.

Producing 22.2% of the U.S. crop, New York beat out Wisconsin's beet acreage. The root of the surge: a heady mix of the state's strong agricultural history, climate, and soil suitability in the western part of the state; processing demand; and innovations in technology and new varieties. Many of the state's largest processors – including Seneca Foods in Livingston County and Love Beets in Rochester – have long-standing relationships with Cornell researchers, sharing information and seeking advice.

"We've done projects with Cornell to look at camera technology to help with forecasting, using drones to fly over fields to understand diseases and yields," said John Henderson, product director at Love Beets. He said the company has worked with researchers in Cornell's College of Agriculture & Life Sciences in some of their trials in order to improve plant health, the growing environment, and even the flavor of beet varieties.

"Working with Julie and the Extension team has been invaluable – it's been a steep learning curve in the U.S.," he said of the company, which began in England and relaunched in the U.S. in 2010.

In a nation where "Eat your beets!" has been a dreaded parental directive, the popularity of the root vegetable has risen, with fresh and ready-to-eat options gaining ground. Mark Dewey, principal at Dewey Produce in Genesee County, attributes some of that to the rise of Food Network and some to the increasing popularity of farmers markets.

"Back in the 1970s, beets were grown somewhere between Yates, Ontario and Genesee counties. It was all pretty much for canning," he said. "Now people are singing the praises of beets from a nutritional standpoint. You see them in sports drinks, and in products like Super Beets and different supplements. Beets are in vogue."

Kikkert said beet varieties these days are bred for eating fresh, with new colors, more sweetness, and a less earthy taste.

And while the climate in New York is good for these root vegetables, weeds are still a huge issue, as are root rots and foliar diseases caused by fungi.

A fungal disease called *Cercospora* leaf spot causes ugly leaves on beets sold into the fresh market, said Sarah Pethybridge, associate professor of plant pathology and plant-microbe biology at Cornell AgriTech. It can also defoliate the plants, impacting the ability of a mechanical harvester to pull the vegetables from the soil by their tops, she said. Cornell researchers are working with UV light to suppress the leaf spot fungus, using drone images to spot-treat infected plants rather than spraying entire fields. These light treatments may be used in conventional beet production as well as in organic systems where synthetic fungicides are not permitted.

Pethybridge said climate change is bringing more turbulence to the growing season and presenting new challenges. Dewey echoed that sentiment.

"What we've seen in the last 10 years is the weather is warmer and a lot more intense from the standpoint of storms," he said. "Beet seedlings are not very vigorous. At times, it seems like the seedlings would rather die than make it. Managing moisture is extremely important during planting and emergence of the beet seedlings."

Beets are grown and studied at Cornell AgriTech in Geneva, NY.

Allison Usavage / Cornell CALS

They aren't planted very deep, he said, so you want the soil nice and moist. Commercial beet production compacts the soil. When the beets are harvested, nearly all of the surface of the beet field is run over by either a harvester, tractor, dump cart, or truck. Growing beets one year on a field and then followed by five years of other rotational crops is necessary to help mitigate the soil compaction and reduce the accumulation of pathogens in the soil that are detrimental to beets.

Cornell researchers are also working on additional "value-added" product options for New York growers. Chang Chen, an assistant professor of food science at Cornell AgriTech, began work on microwave vacuum-dried beet chips, a project that started as a Summer Research Scholars project in 2024 and has continued this year.

"We are targeting the better-for-you snack market. A lot of the snacks out there are fried or baked, making them calorie-dense and not so healthy," Chen said. "We use a vacuum chamber that is equipped with magnetrons that are 10 times stronger than home microwave ovens. The microwaves penetrate the food, causing volumetric heating, which allows the moisture to evaporate quickly and the beet slices to puff. We can make crispy 100% beet slices with natural flavor, no added sugar or oil."

The project is at the research stage, and Chen said they're working with industry to gauge feasibility and see who's interested in pursuing this low-calorie, moderately processed snack.
With products like this, and new tech in the field, New York's beet goes on.

This article originally appeared in the Cornell Chronicle.

Laura Reiley is a writer for the Cornell Chronicle.

Tackle manure ***from 10***

Ramos looks forward to continuing their collaboration with Greenwood. "Northern New York is an important dairy region in our state," he said. "For us at NMSP, it's great to have research at Greenwood Dairy as it brings data that are representative of that agricultural region. Working with Jon and Mike again in the third year of our Value of Manure trial on the farm will allow us to quantify the benefits of manure over multiple years."

For more information about the Value of Manure project, visit the Nutrient Management Spear Program website (nmsp.cals.cornell.edu). If you're a New York farmer interested in participating in this project, reach out to Juan Carlos Ramos (at jr2343@cornell.edu) or Quirine Ketterings (at qmk2@cornell.edu).

Since 2022, the NMSP team at Cornell University has worked on the Value of Manure project. This project is part of the NMSP New York On-Farm Research Partnership program and is co-funded by the New York Farm Viability Institute, the NNYADP and New York State.

This article originally appeared in CALS News.

Madeline Hanscom is a writer for the Nutrient Management Spear Program.

En Manhattan, una Nueva Finca Urbana Hará Florecer el Desarrollo Juvenil

Oportunidades para juventud de la ciudad de Nueva York conocer sus raíces, tanto en el sentido de sus tradiciones familiares como en el de las mismas raíces, tallos, y hojas que componen las plantas que producen los alimentos que consumen.

A Tim Shenk

Una parcela de tres acres abandonada desde hace décadas en el área de Washington Heights, en Manhattan, pronto tendrá nueva vida. Será la sede de un programa de desarrollo juvenil y una floreciente finca urbana.

Ese es el sueño de la Dra. Rosa Yolanda Pineda, una de las principales responsables del proyecto. Pineda y Omar González investigaron sobre la parcela en 2018 y empezaron a hacer preguntas. “He vivido en Washington Heights durante casi 50 años, y este pedazo de tierra ha estado abandonado durante todo el tiempo que he estado aquí”, dijo. “Pertenece al Departamento de Educación de la ciudad de Nueva York, y está básicamente en el patio trasero del campus de una escuela secundaria. ¿Qué mejor uso para ese terreno que convertirlo en un espacio educativo para que jóvenes aprendan a cultivar alimentos?”.

La organización sin fines de lucro a la que pertenece Pineda se llama Connectemonos. Lleva más de 20 años trabajando en el desarrollo y la capacitación de jóvenes. Este proyecto de granja urbana conecta varias de sus pasiones.

Pineda nació y fue criada en Las Matas de Farfán, cerca de la frontera con Haiti, en la provincia de San Juan, República Dominicana, donde su comunidad cultivaba habichuelas (frijoles), plátanos, y tubérculos y además criaba animales. “Particularmente para las generaciones que comíamos lo que cultivábamos, yo creo que una responsabilidad intergeneracional de nosotros como inmigrantes y como gente que crecimos comiendo saludable, de pasarles esos conocimientos a los jóvenes”, dice. “De ahí viene la importancia de tener acceso a opciones saludables dentro de la ciudad”.

Pineda afirma que la juventud de la ciudad de Nueva York no tienen suficientes oportunidades para conocer sus raíces, tanto en el sentido de sus tradiciones familiares como en el de las mismas raíces, tallos, y hojas que componen las plantas que producen los alimentos que consumen.

Señala que las y los jóvenes urbanos se entusiasman con el cultivo de alimentos cuando se les da la oportunidad. “Existe el mito de que la juventud de hoy no quiere alimentos sanos”, explica Pineda. “Pero todo el mundo quiere comer bien. No importa si eres rico o pobre, o si vives en el campo o en la ciudad.

“Esta siempre ha sido una comunidad de inmigrantes, una comunidad de emprendedores”, continúa. “Hemos recibido mucho interés de restaurantes. Uno en concreto es una pizzería en la que queremos incorporar verduras cultivadas localmente a su menú. Todo el mundo debería tener la opción de elegir comida sana donde vive. Tenemos que lidiar con el hecho de que lugares como Washington Heights son desiertos alimentarios. Carecen de opciones de comida sana. Esto se reduce a una cuestión de justicia”.

La justicia, quizás, sea la esencia del trabajo de Pineda. “En muchos lugares se está perdiendo el sentido de comunidad, así que intentamos mostrar a la juventud que tienen alternativas”, explica. “Necesitan espacios donde puedan darse cuenta del poder que tienen. Cuando los jóvenes tienen un envolvimiento cívico, no sólo les ayuda a ellos, es un aporte a toda la comunidad”.

Connectemonos ofrece programas educativos sobre el cambio social. Gran parte de esto consiste en comprometerse con la comunidad a su alrededor. La organización trabaja para recuperar zonas verdes y espacios recreativos en Washington Heights. La operación agrícola urbana ampliará esta misión.

Pineda y otros ya han invertido mucho trabajo y sudor en la parcela. De 2018 a 2020, Connectemonos organizó días de limpieza colectiva donde personas de la comunidad se reunieron para arrancar malezas y eliminar basura. En 2021, el superintendente Ramírez y las autoridades de la escuela secundaria aprobaron oficialmente el uso del terreno. El departamento de escuelas públicas de la ciudad ha asumido la responsabilidad de resolver problemas estructurales, como la reparación de los muros de contención, para que el lugar sea seguro y accesible en 2025. Pineda espera recibir plena autorización para empezar a construir camas elevadas y plantar hortalizas durante este año.

Ya sea en una zona rural o en un rincón escondido de Manhattan, poner en marcha una finca requiere una gran cantidad de planificación. Antes de poner las primeras semillas en la tierra, Pineda y sus colegas han estado trabajando con el proyecto Futuro en Ag del Cornell Small Farms Program (CSFP) desde 2023.

Pineda ha asistido a varios eventos presenciales y cursos de capacitación en línea organizados por Futuro en Ag, que abarcan una amplia gama de temas, desde el desarrollo de canales de mercado hasta la comprensión de los impuestos agrícolas y la cría de aves de corral. En diciembre, Pineda y su colega Ramón Toribio asistieron el invierno pasado a un taller de dos días en español para agricultores y aspirantes a agricultores latinos/as/x organizado por Futuro. Se reúnen regularmente con el personal técnico de Futuro para desarrollar un plan de negocios y un plan de mercadeo.

Mildred Alvarado, directora de programación de la Iniciativa para un Futuro Agrícola Equitativo del CSFP, ha disfrutado trabajar con el equipo de Connectemonos.

Dr. Rosa Yolanda Pineda, pictured here in a 2024 farm field day hosted by Cornell Small Farms Program, is one of the principal drivers behind an urban farm and youth development project in upper Manhattan, where teens will grow crops and learn about soil health, marketing, and entrepreneurship.

La Dra. Rosa Yolanda Pineda, retratada aquí presenciando un día de campo organizado por el Cornell Small Farms Program en el 2024, es una de las principales impulsoras de una finca urbana y proyecto de desarrollo juvenil en el Alto Manhattan. Ahí las y los jóvenes cultivarán productos agrícolas y aprenderán sobre la salud del suelo, la comercialización, y el emprendedurismo.

Photo provided

“Más allá del nombre de Connectemonos, ellos realmente conectan con las personas, especialmente con los jóvenes y toda la comunidad latina. Son consistentes en su misión de apoyar a los jóvenes a través de la conexión con la tierra y la naturaleza”, explica Alvarado.

“Con su ejemplo, nos demuestra que es posible soñar y lograr lo que uno se propone cuando trabaja por ello, tal como Rosa Yolanda y Omar lo hacen. Es un verdadero placer trabajar con ellos”.

María José Oviedo, educadora agrícola bilingüe del CSFP, está apoyando a Connectemonos en temas de salud del suelo.

“En entornos urbanos, comprender e implementar conceptos sobre la salud del suelo contribuye directamente a la sostenibilidad de la iniciativa, mejorando la estructura del suelo, la disponibilidad de nutrientes, el uso eficiente del agua, entre otros aspectos”, explica Oviedo. “Además, la adopción de prácticas sostenibles incrementará a mediano y largo plazo la productividad y la calidad de los cultivos”.

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Manhattan Urban Farm to Prioritize Youth Development

An opportunity for New York City youth to connect to their roots, both in the sense of their family traditions as well as the actual roots, stems, leaves, and vines that produce the food they eat.

By Tim Shenk

A long-abandoned three-acre plot in the Washington Heights neighborhood of upper Manhattan will soon be home to a youth development program and flourishing urban farm.

That's the dream of Dr. Rosa Yolanda Pineda, one of the primary leaders of the project. Pineda and Omar Gonzalez did research on the plot in 2018 and started asking questions. "I've lived in Washington Heights for almost 50 years, and this piece of land has been abandoned for as long as I've been here," she said. "It belongs to the Department of Education of New York City, and it's basically in the backyard of a high school campus. What better use for that land than to make it an educational space for young people to learn to grow food?"

Pineda's nonprofit organization, called Connectemonos ("Let's Connect" in Spanish), has been doing youth development and empowerment work for more than 20 years. This urban farm project connects several of her passions.

Pineda was born and raised in Las Matas de Farfán, near the frontier with Haiti, in the province of San Juan, Dominican Republic, where her community grew beans, plantains, and root vegetables and raised animals. "Particularly for those of us who grew up eating what we grew, I believe it's a generational responsibility for us as immigrants to pass our knowledge on to our young people," she said. "We need people to understand the importance of having healthy food options in the city."

Pineda said young people in New York City don't have enough opportunities to connect to their roots, both in the sense of their family traditions as well as the actual roots, stems, leaves, and vines that produce the food they eat.

She noted that urban youth get excited about growing food when they get a chance. "There's a myth that kids today don't want healthy food," she said. "But everyone wants to eat well. It doesn't matter if you're rich or poor, or if you live in the country or the city.

"This has always been an immigrant community, and a community of entrepreneurs," Pineda continued. "We have gotten a lot of interest from restaurants. One in particular is a pizzeria where we want to incorporate locally grown vegetables into their menu. Everyone should have the option to choose healthy food where they live. We have to deal with the fact that places like Washington Heights are food swaps, lacking healthy food choices. This comes down to a justice issue."

This three-acre plot, undergoing structural improvements in early 2025, will soon be home to Manhattan's largest urban farm, managed by the Connectemonos youth development project.

Esta parcela de tres acres, donde se están llevando a cabo mejoras estructurales a principios del 2025, pronto será la sede de la finca urbana más grande de Manhattan, gestionada por la organización de desarrollo juvenil Connectemonos.

Photo provided

Justice, perhaps, is the essence of Pineda's work. "In many places, we're finding a loss of a sense of community, so we're trying to find ways to show young people that they have alternatives," she said. "They need to have spaces where they can realize the power they have. When young people are civically engaged, not only does it help them, it helps the whole community."

Connectemonos delivers educational programming about social change, and a big part of that is acting locally. The organization works to reclaim green space and recreational spaces in Washington Heights. The urban farm will expand on that mission.

Pineda and others have already put a lot of sweat equity into the farm plot. From 2018 to 2020, Connectemonos organized cleanup days where members of the community came together to pull weeds and remove litter. By 2021, Superintendent Ramirez and the school campus community officially approved the use of the site. The city public school system has since taken responsibility for addressing structural issues like repairing retaining walls to make the site safe and accessible in 2025. Pineda expects to be given full authorization to start building raised beds and planting vegetables later this year.

Whether in a rural area or in a tucked-away corner of Manhattan, starting a farm requires a tremendous amount of planning. In preparation for getting the first seeds in the ground, Pineda and her colleagues have been working with the Futuro en Ag project of the Cornell Small Farms Program (CSFP) since 2023.

Pineda has attended several online and in-person events and trainings put on by Futuro en Ag, covering a range of topics from developing market channels to understanding farm taxes to raising chickens. She and colleague Ramón Toribio attended a two-day Spanish-language workshop for Latino/a/x farmers and aspiring farmers anchored by Futuro last winter, and they have been meeting regularly with Futuro technical staff to develop a business plan and a marketing plan.

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Oviedo espera que entre los principales logros de su colaboración esté que los jóvenes puedan involucrarse en prácticas que les permitan interiorizar conceptos claves, despertar su interés y su creatividad.

Pineda ha encontrado la relación con CSFP reveladora. Los programas educativos en español de Futuro en Ag la ponen en contacto con familias agricultoras latinas de todo el noreste de E.U. Aprovecha lo que aprende de las experiencias de los demás y adapta las lecciones al contexto urbano.

Admite que quedan muchos retos por delante. "Pero creo que los valores que tenemos, nuestro amor por la familia y la comunidad, nuestra esperanza de que sí se puede, tenemos que transmitirlo", afirma Pineda. "Nadie va a venir a salvarnos al pueblo. Somos nosotros los que estamos aquí, los que tenemos que hacerlo".

The Future of Small Farming is Fungi

Last October, Hawk Meadow Farm hosted a hands-on shiitake cultivation workshop, sponsored by the Cornell Small Farms Program, drawing a diverse group eager to learn the art of growing shiitake mushrooms from logs.

By Rich Mattingly

Gesturing toward thousands of neatly aligned logs – some sprouting mushrooms, others with mycelial potential hidden from sight beneath rugged bark – Steve Sierigk, the co-owner and co-operator of Hawk Meadow Farm, welcomed visitors to the forest where he grows his mushrooms. The scene, both organic and orderly, harmonized with the towering pines that framed the laying yard.

"Shiitake grown on logs isn't just about food, it's about land stewardship," he explained to rapt workshop participants, his affable voice ringing through the sun-dappled clearing. Steve described the delicate partnership between artful log arrangement and care and the wild nature of the fungi, which he has grown for four decades. "When we cut some trees to become mushroom logs we then also encourage or plant others, and you become an active participant in where the forest is going. It becomes a beautiful cycle."

Connor Youngerman, Cornell Small Farms Program Agroforestry and Mushroom Specialist (L), looks on as Brendan Gaffney drills holes in a log bolt with a specialized bit attached to an angle grinder, one of the techniques workshop participants were instructed on.

In October, Hawk Meadow Farm near Ithaca, NY, hosted a hands-on shiitake cultivation workshop, sponsored by the Cornell Small Farms Program, drawing a diverse group of gardeners, homesteaders, and farmers from underserved communities, eager to learn the art of growing shiitake mushrooms from logs. The workshop blended ecological philosophy and historical context with practical skills, from inoculating logs to fostering resilient farm ecosystems.

"The highest quality mushrooms are grown this way, in harmony with the land," said Steve, emphasizing the decentralized, small-scale ethos of the practice: "In Japan a shiitake farm may have half a million logs. Here, it's a few thousand. But every log represents a softer ecological footprint compared to other growing methods, and it feeds the soul."

Shiitake cultivation in Japan began centuries ago when wild shiitake was collected in the forest, long before modern, log-based methods were used. "Shiitake" means "mushrooms of the shii tree," one of the trees on which shiitake grows that has similar qualities to oak. Shiitakes have long been highly prized for their flavor and there are centuries-old examples of their use in folk medicine. Samurai warriors, living near forests where shiitake grew, often forbade others from collecting it, coveting it for its health benefits.

Worldwide, shiitake is the second most-cultivated mushroom after the common white mushroom Westerners may be more familiar with. Shiitake's popularity goes beyond flavor. When cooked, it imparts a full-bodied aromatic but distinctly pleasant umami taste to the dish while maintaining its own original color and chewy texture. Fresh shiitake resists both bruising and spoilage remarkably well compared to other commercially grown fungi. Dried shiitake, which is also widely available commercially, is convenient and inexpensive to store and transport. USDA has published research showing shiitake exposed to sunlight while drying can store the daily recommended adult minimum requirement of vitamin D in just a single gram, thanks to a natural chemical compound called ergosterol.

Heather Gable, workshop participant, steadies a log bolt on a frame used for inoculating logs with mushroom spawn.
Rich Mattingly / Cornell Small Farms Program

Shiitake's rich history and culinary appeal set the stage for a deeper understanding of its role in sustainable agriculture at the workshop. At Hawk Meadow Farm, this tradition isn't just preserved – it is actively cultivated through hands-on education in modern, small-scale farming practices.

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Mildred Alvarado, director of the Equitable Farm Futures Initiative programming at CSFP, has found it a joy to work with the Connectemonos team.

"Connectemonos is not just a name," said Alvarado. "Rosa Yolanda, Omar, and the rest of their team really connect with people, especially youth and the entire Latinx community. They are consistent in their mission to support young people through communing with the land and nature.

"Their example shows that it's possible to dream and achieve what you set out to do when you work for it. It is a real pleasure to work with them," she said.

María José Oviedo, a CSFP bilingual ag educator, is working with Connectemonos to develop resources related to soil health.

"In urban environments, understanding and implementing techniques related to soil health contributes directly to the project's sustainability, improving soil structure and the availability of nutrients, making more efficient use of water, and many other things," Oviedo said. "Also, adopting sustainable practices will increase the productivity of the soil and the quality of crops in the medium and long term."

Oviedo hopes that among the achievements of the collaboration will be that young people will learn practices that will allow them to internalize key concepts and awaken their interest and creativity.

Pineda has found the relationship with CSFP eye-opening. The Futuro en Ag educational programs in Spanish put her in touch with Latino/a/x farmers from around the Northeast. She takes what she learns from others' experiences and adapts the lessons to the urban context.

She admitted that there are many challenges ahead. "But I believe that the values we hold, our love of family and community, our hope – all of these things, we have to transmit them to the people around us," Pineda said. "No one is going to come here and save us. We're the ones who are here, so we're the ones who will have to do it."

Tim Shenk is the Bilingual Communications Specialist for the Cornell Small Farms Program.

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Gathering workshop participants in a convivial circle near the beginning of the workshop, Steve and Anne Sierigk explained the origin of their mushroom growing enterprise. “Shiitake was pretty much unknown in the U.S. in the 1980s. It wasn’t allowed to be grown domestically because the USDA was afraid it would escape mushroom yards and become invasive. Buying dried, imported mushrooms was the only way you could get them. In 1976, the ban was lifted as it was realized that shiitake was not aggressive,” explained Steve. “I got into it through the macrobiotic diet community in Ithaca. There were maybe 1,000 macrobiotics in the area, and we would have these big potlucks. I was in a circle that really embraced that diet. We would buy mushrooms in bulk from Japan and one day I saw an article about growing it in the traditional Japanese style in logs in the woods. I thought I might try it on a garden scale and things grew from there after these techniques proved to be successful.”

From these early beginnings, Steve and Anne built Hawk Meadow Farm into a hub for sustainable shiitake cultivation, where their knowledge now supports a new generation of growers. The spirit of stewardship was on full display at the workshop, where participants weren’t just learning to grow mushrooms but also engaging with a philosophy that intertwines ecological care, food security, and economic resilience.

Connor Youngerman, agroforestry and mushroom specialist with the Cornell Small Farms Program, echoed this vision. “Shiitake cultivation combines sustainable woodlot management, economic diversification, and food security,” he said. “It’s a system that’s easy to learn, scalable, and sparks creativity. Everyone should grow mushrooms!”

Participants took turns practicing drilling holes into cut hardwood logs (bolts), inserting spawn, and sealing the holes with wax – a process requiring precision, but easy to learn. María José Oviedo Ventura, a bilingual agricultural educator with the Cornell Small Farms Program, ensured Spanish-speaking farmers could fully engage. “Live translation allowed attendees to ask direct questions and contribute to discussions,” she said. “It transformed the space into one where everyone belonged.”

The workshop also bridged experience levels. Tricia Park, a farmer previously enrolled in the Cornell Small Farms Program’s outdoor mushroom course on a veteran scholarship, aims to harvest her first crop this autumn. “Customers want this,” she said. “It complements our farmstand and connects people to resilient food systems. Since we have been farming for a couple of decades already, we have our core enterprises of grass-fed beef, pasture- and woodland-raised pork, and a market garden that supplies our farmstand, plus a small maple syrup operation, firewood, and skin care products. Any added enterprises have to be carefully thought through in order to fit in with all that. Growing shiitake on logs should fit in and complement what we do now while helping us with resiliency both on our land and with our bottom line.”

Connor Youngerman, Cornell Small Farms Program Agroforestry and Mushroom Specialist, displays a log with shiitake mushrooms fruiting for workshop participants while Anne Sierigk, co-owner and co-operator of Hawk Meadow Farm, looks on.

Park appreciated the workshop’s practicality. “I saw how to stack logs, deter slugs, and use tools like the angle grinder adapter – small details that prevent big headaches,” she said. “The hosts’ low-cost, low-infrastructure approach proved this is doable.”

Beyond technique, the day repeatedly highlighted mushrooms’ role in regenerative agriculture. “Every log is an act of stewardship,” Steve noted. “We manage these woods for long-term health, culling invasives and planting species like locusts and white oaks. The trees we nurture will outlive us. We are meant to be around trees and forest health is key to climate and soil stabilization.”

Youngerman added, “Shiitakes build climate resilience. They recycle hardwood waste into food, enrich soils, and promote healthy forests.”

Anne said the process of growing mushrooms doesn’t just help the forest land she stewards but helps her heal herself. “I think about how stressed people are in our culture – how they work endlessly, chasing an end goal, but often their jobs don’t feed their souls. We have that perspective of being over 70 and a lot of people our age are missing out on being healthy. We love being in the woods and being outside. During our workshops we like to make people think about their connection with the work – what are you doing that nurtures yourself? Stress is a huge factor in how healthy we are. I urge people to find that joy in life. Find whatever it is that feeds your soul. You have to have fun and if you’re not, you have to reexamine your life.”

Steve, echoing Anne’s sentiments, said, “The thing about fun is even if I have a deadline and it starts to feel like drudgery while sorting mushrooms and filling orders … when I’m doing all that stuff I think about how remarkable this all is. That I’m outside and creating habitat and it’s really cool that my job is growing high quality healing foods while improving our woodlands and creating wildlife habitat. It humbles you, and you feel grateful that you’re one little piece of a grander natural design system.”

For the workshop participants standing around a dunking tub, where the spawn logs are regularly immersed to encourage production, the topic of discussion moved to the economic viability of scaled-up production.

Steve, fielding questions, explained, “When you’re trying to visualize something, like an enterprise, it’s easy to go to a place where you want to maximize your production. We’ve become generalists, just like some of the mushroom species we grow. We can tell if the scale stresses us out and you’ll have to make that decision for yourself and your farm. At one

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Steve Sierigk, co-owner and co-operator of Hawk Meadow Farm, speaks to workshop attendees about how to inoculate a drilled log bolt.

Uncovering the Value of Manure: Sustainable Farming in the NYC Watershed

The Value of Manure project aims to help farmers understand the value of cow manure and use it as efficiently as they can, reducing reliance on nitrogen-based synthetic fertilizers.

By Madeline Hanscom

The Hanselman family has owned and operated their neighboring farms, Windy Acres and DelRose farms, since 1954 and 1979, respectively. They have a dairy herd of about 60 cows as well as significant vegetable (primarily sweet corn) and cash crop enterprises.

The Hanselmans have worked closely with nutrient management planners from the Watershed Agricultural Council and CCE Delaware on feed and manure nutrient management since 2003. From there, it was a natural transition to start working with the Nutrient Management Spear Program (NMSP) in 2022, collaborating with NMSP's On-Farm Research Coordinator Juan Carlos Ramos on the Value of Manure project.

We spoke with the Hanselmans about why they wanted to join the study.

"We are fortunate because we are both dairy farmers and crop growers," explained Ladd Hanselman. "Because of this, we have manure readily available to use as fertilizer on our farm – there are many crop growers that don't have manure. We want to put it to good use and stretch it as far as we can. With these research trials, we will be able to put numbers to it. Exactly how much more does it cost us to put an acre of manure injected down versus putting it on top? It's a good thing to know, and participating in this project helps us with that."

Over the last 10 years, the Hanselmans have fully committed to no-till crop cultivation, meaning that they do not turn and disturb the soil to plant crops or incorporate their manure. No-till practices are often adopted to promote better soil structure and a potentially healthier microbiome. The Hanselmans partnered with the Value of Manure project hoping to learn how to use their manure as efficiently as possible in their no-till system.

"No-till is good for soil health, but it can make management of manure nutrients more challenging," said NMSP's Ramos. "If manure is not incorporated in the ground, less of its nitrogen will be crop available."

When it comes to success in on-farm research and problem-solving, collaboration is key.

"We have worked closely with Paul Cerosaletti [agricultural program team leader, CIG Enhanced Manure Management project coordinator] and Dale Dewing [senior team leader, WAP Nutrient Management] during our two years of research to coordinate trial implementation and data collection, and to disseminate our findings," said Ramos. "Working with them has allowed us to better understand the agricultural landscape in Delaware County and adapt our research protocols accordingly."

In 2025, a new USDA-NRCS Conservation Innovation Grant (CIG) project is building a "manure injection custom services business" in the Delaware County-New York City watershed, where the Hanselmans' farm is located. With this new service, the Hanselmans will be able to "inject" manure in a way that is compatible with their no-till system while still incorporating the manure into the soil – drastically increasing the share of manure N that will be crop available.

A farm field where research is conducted.
Juan Carlos Ramos

"The CIG project is bringing disk coulter injection to Delaware County, a technology that we have not had in the region, allowing us to capture the full fertilizer value of manure on both row crop and sod fields while reducing nutrient run-off risk," said Cerosaletti. "This is especially advantageous to many of our committed no-till farmers like the Hanselmans who can't use tillage to incorporate manure. It's a win-win for our farmers and the environment!"

With the new CIG project coming into play this year, the project partners anticipate gaining information about how manure injection could contribute to their efficiency. The project allows farmers to determine if a manure injector would be a good investment when it comes to their economic and environmental sustainability.

"One of the advantages of participating in the Value of Manure project is that we are able to experiment with manure injection and see what happens," said Hanselman.

"If I had to put down commercial fertilizer or manure, I'd rather put down manure in the long run," Hanselman said. He's more comfortable with manure given that, unlike synthetic fertilizers, he knows where it's coming from – his own farm. He also stated that he has seen how well manure boosts and maintains crop yield, making him more

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point, we were getting a lot of good leads for how to expand the mushroom log business and getting approached by larger companies about producing secondary products. It was feeling like we were in a factory, and we had to do what felt right for us."

For attendees like Olga Nedlin, a budding farmer-veteran seeking land to start her own shiitake enterprise, these lessons on balancing scale and sustainability provided a realistic roadmap for launching their own mushroom enterprises. "I realized how simple it could be. I want to start with 1,000 logs. I did the math and six hours of work a day once the logs are going could make it viable for me," she said. Her motivation? "Once you taste fresh shiitake from the air fryer, you have to have more."

One Spanish-speaking participant reflected after the workshop on why he decided to invest in shiitake cultivation: "It was a mix of things. I had seen them in the market before, and I noticed that many people bought them. Also, when I made a list of all the instruments needed, I realized I already had most of them, or that buying what I was missing wouldn't be too expensive. I even had wood for the logs. Therefore, we decided to primarily grow shiitakes, but also experiment with other mushrooms in small quantities to see how customers would react."

The workshop also helped him determine the cost vs. benefit of growing shiitakes. "Steve mentioned a lot of numbers and details, like the pounds he could yield from a log. Afterward, my family and I calculated the costs and decided it was worth the investment. We've started to incorporate shiitake, and we think it could be expanded in the spring or next season."

As the late-lingering sun stretched golden fingers across Hawk Meadow Farm, Steve took in the group's energy. "The future of agriculture lies with small farms. When people see how this work nourishes both the land and their own futures, they leave inspired."

Participants departed not just with inoculated logs, but with a deeper understanding of their connection to something greater. Steve's parting words underscored his belief that growing mushrooms in the woods is more than a method – it's an act of collaborative stewardship and community building. "There are countless support networks within this decentralized movement to help you start and sustain outdoor mushroom cultivation. But this community is about more than economics. This isn't just farming – it's taking part in something timeless that connects us deeply to nature."

Rich Mattingly is a veterans project associate with the Cornell Small Farms Program.

Chaotic Springs, Long Summers Mean Uncertainty for NY Grape Growers

Grapevines rely on signals of the changing seasons to gain cold hardiness for winter and blossom effectively in spring.

By Krisy Gashler

At first blush, the warmer average winter temperatures brought on by climate change would seem to be a boon for New York's grape growers and winemakers. But warmer autumns and more "false" springs are disrupting the signals grapevines rely on to gain cold hardiness for winter and blossom effectively in spring, according to new research from Cornell AgriTech.

"In New York, we are right at the coldest edge that grapevines can tolerate, so as things get warmer, it's great for the middle of winter, but it's not great for the spring and fall, because it messes with the signaling grapes need," said Jason Londo, associate professor in the School of Integrative Plant Science, Horticulture Section, at Cornell AgriTech. "It sets us up for the potential for some years to be wonderful and others to have very heavy damage."

Londo is first author of new research published Feb. 8 in the Journal of Experimental Botany. The co-author is Al Kovaleski, Ph.D., assistant professor of horticulture at University of Wisconsin-Madison.

The researchers examined 31 grape varieties over three years, seeking to understand which external signals and genetic pathways encourage grapevines to shed their winter defenses and develop buds in spring. They found that wild grape varieties that have evolved to survive the deep cold of Northern winters are fastest to develop buds in spring and, therefore, are most vulnerable to late bud-killing frosts. Hybrid commercial varieties bred with those wild cousins are almost as vulnerable.

Northern climates have a shorter summer growing window, so plants' signaling pathways urge a quick wakeup when the weather warms, Londo said.

"This is kind of scary because for decades we've been breeding and planting grapes for deep midwinter hardiness, which brings along with it this trait of waking up early. But now our winters are getting warmer and more erratic, so those cultivars are more at risk for late frost damage," he said. "We live in this very dynamic climatic region, and climate change is making it more dynamic."

Another study by the same authors – along with Hongrui Wang, a Ph.D. student in horticulture in Londo's lab – published in October 2024 examined how grapevines gain their cold hardiness in autumn. As autumn temperatures stay warmer longer, the researchers sought to understand whether drops in temperature or light were more important in signaling grapes to gain cold hardiness. They found that neither factor induced sufficient cold hardiness; far more important was temperature oscillation throughout autumn.

"We thought if you put vines at increasingly colder temperatures, they would gain resistance to cold, but we saw nothing," Londo said. "But as soon as we let the temperatures bounce, they responded."

Dormant grapevines at Anthony Road vineyards in Penn Yan, NY.
Jason Londo / Provided

For growers, the key adaptation in the face of climate change is planting diverse varieties, he said. Growers, particularly in warmer microclimates near lakes, might consider planting some more Southern varieties. Cold-hardy varieties should still stay in the mix, because a polar vortex in winter could kill off less-hardy varieties.

"The safest thing is for growers to plant diverse cultivars so that year over year, you have better resilience," Londo said.

The research was funded in part by USDA's National Institute of Food & Agriculture.

This article originally appeared in the Cornell Chronicle.

Krisy Gashler is a writer for the College of Arts & Sciences. David Nutt contributed to this report.

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confident that an investment in optimizing application methods is worth making.

In addition, as part of the Value of Manure project, the NMSP team has also been investigating the microbiome of the soil on the farm. "Manure is like a vitamin," Ernie Hanselman said. "There are lots of microbes in it, organisms that we don't even know everything about – all the good stuff, not just nitrogen."

There is immense value in the mutual learning that inherently happens as a part of on-farm research, Ramos pointed out. "Going back at the end of the season and discussing our findings has been a great two-way learning process. This gives us the opportunity to hear the farmers that we work with express what questions are relevant for the farm and share our latest findings."

"I look forward to continuing our work with the Hanselmans, Paul Ceroseletti and Dale Dewing in 2025, under the context of their CIG manure injection custom application services to the New York City watershed and under a new NYFVI project called the Power of Manure." Ramos said. "We are planning to test the agronomic and environmental benefits of these new services and all of these data will also be used to inform our manure crediting system updates."

The Value of Manure project is jointly funded by the New York Farm Viability Institute (NYFVI) and the Northern New York Agricultural Development Program (NNYADP). This project has been active since 2022.

This article originally appeared in CALS News.

Madeline Hanscom is a writer for the Nutrient Management Spear Program.

(L - R) Ben Hepler, conservation planner, Watershed Agricultural Council; Dale Dewing; Juan Carlos Ramos Tanchez; and Paul Cerosaletti, getting ready to scout a field.
Image provided

The Start of Grazing Season

How tall should the grass be before you start grazing in spring?

By Ulf Kintzel

The majority of publications you may have read will suggest starting to graze your pasture when the grass is (depending on the grass species) about six to eight inches tall. That is true for set-stock grazing operations, meaning you do not intend to rotate or do not intend to rotate frequently in a meaningful way between grazing cells.

Rotational grazing allows but also requires a different approach. If you were to heed the same advice and wait before the pasture grasses measure six to eight inches, you would have to wait until sometime mid-May in most parts of the Northeast and New England. You then would have little time left before much of the pasture becomes unpalatable because the developing seed stems are high in lignin. Yet, your pasture rotation will last a total of several weeks. By the time you have grazed every pasture cell you will have wasted a lot of pasture plants, which have become too mature and less nutritious.

The height of six to eight inches of pasture grasses is being suggested so that the plants are not weakened or even killed when grazed. That is a high risk when grazing early without any frequent pasture rotation. However, in a rotational grazing system, any forage in any given grazing cell will have many weeks to recover and regrow after being grazed. During the main grazing season of late spring and throughout summer, pasture rest should be between five and six weeks. It can be a week or two less in the beginning of and up to mid-spring, and it can be a week or two more toward late season to allow for stockpiling.

In a rotational grazing system, how short can the grass be when you start grazing without doing any long-term damage to the pasture? When the growing season starts in April and into May, all forage species are primed to grow. Pasture is very “forgiving” at that time. It is more sensitive to shorter rest periods and short grazing in summer, and it is quite sensitive to it in autumn. However, the rigorous growth in spring allows for a turnout as soon as it greens up. No need to measure the length of the grass! In fact, I turn out my sheep as soon as there is a green sheen to the pasture.

I don’t practice rotational grazing at that point in time. The flock has access to all my pasture. I feed supplemental free choice hay in hay feeders in the pasture for as long as they will eat it. When the weather turns bad, the flock goes in the barn and feeds on hay until the weather returns to being nice so that young lambs can spend time outside.

Just as soon the grass starts greening up, I start grazing.
Ulf Kintzel / White Clover Sheep Farm

The pasture is the most potent when it comes to nutrients at the beginning of spring. Both protein and energy levels are very high. In addition, the energy in the plants comes in its most valuable form: sugars. Any potential lack in fiber is being countered with the available hay. It is very important when you have ewes that nurse young lambs to have very nutritional feed. Any stored feed like hay or baleage does not come close to matching the nutrient content of pasture in early spring.

As the grass starts growing more vigorously in late April, I start setting up rather large grazing cells and start a daily rotation. The large size at this point in time is simply due to the fact that there isn’t much forage per acre available yet. As the growth of pasture accelerates, I make my daily grazing cells smaller and smaller. The hay is being provided until the sheep stop eating it in any significant amounts. Sometime in mid-May the pasture that will be hayed is set aside also and will not be grazed anymore.

You may have noticed I described a rather vague timeline for April and May. The vagueness is on purpose because every year is different and the decision about the size of the grazing cells, when to stop hay feeding, and when to set the fields aside that will be hayed depends on the weather during spring. Warm weather – especially warm rain – can speed up the growth of pasture; dry weather and a cold snap can delay it significantly. Besides, you may live in an area with a slightly different climate, even though geographically speaking, many of you are not that far away from me. Observing the weather and monitoring the growth of pasture will be necessary to assess the daily course of action.

Starting a strict daily rotation on April 14, 2022.

Is there a risk of damaging or weakening the pasture plants when grazing so early in the season? A field trial conducted in Wisconsin with heifers examined exactly that. The result of that trial was that there is no significant decrease in yield when pasture is grazed early just as long as a proper rotational grazing schedule was observed later on and throughout the grazing season. That has been my experience as well.

The argument against early grazing has been made in discussions with me that “no significant decrease in yield” may still mean there is some decrease in yield. Let’s assume for this discussion’s sake that this is true. Let’s assume someone doesn’t want any decrease in yield and therefore starts grazing when the grass reaches the height of six to eight inches. That is in any given year approximately a month later than when I start grazing. That month the flock needs to continue feeding on stored feed (and possibly grain if your flock is not grass-fed). Feeding stored feed is the single biggest expense for most sheep farms. I save that cost almost entirely.

In addition, delaying grazing most definitely will mean that a lot of pasture will have become in part unpalatable by the time the first grazing cycle of a rotational grazing system nears its end because you are now almost certainly in the month of June. Furthermore, early grazing has the advantages of reducing the number and size of seed stems, which will keep lush vegetative undergrowth growing for a longer time and thus it will keep the pasture more palatable. It also allows the individual grass plants to develop more tillers. Weeds are grazed more aggressively early in the season, reducing the amount of competition for grasses and legumes.

If there is an insignificant decrease in yield later during summer because of early grazing, I have never noticed because throughout the grazing season I have ample pasture available due to a rigorous daily pasture shift, ample rest time, leaving appropriate residual, and other good pasture management practices. Early grazing has been good for the profitability of my sheep enterprise without any measurable downside.

Ulf Kintzel owns and operates White Clover Sheep Farm and breeds and raises grass-fed White Dorper sheep without any grain feeding and offers breeding stock suitable for grazing. He is a native of Germany and has lived in the U.S. since 1995. He farms in the Finger Lakes area in upstate New York. His website is whitecloversheepfarm.com. He can be reached by email at ulf@whitecloversheepfarm.com or by phone during the “calling hour” indicated on the answering machine at 585.554.3313.

The Science of DIY Mushroom Substrates

What research has revealed about growing mushrooms indoors on different materials.

By Connor Youngerman

Mushroom cultivation is an art as much as a science, and for many growers, it starts with a simple ready-to-fruit block. When folks are just starting indoor mushroom production, we often recommend getting a few ready-to-fruit mushroom blocks. These are available from most mushroom suppliers, and while everyone has their own substrate recipe and block size, the concept is universal: blocks are formulated to provide a good source of carbon and nitrogen, come pre-inoculated with the mushroom species and strain of your choice, and require minimal care beyond maintaining the right temperature and humidity range. Blocks are cost effective and used exclusively by some growers. But they are not the only way to grow mushrooms indoors.

Indoor mushroom production is one of the most creative, adaptable, and scalable agricultural enterprises. There are manifold experimental tweaks one can try to improve yield, efficiency, or circularity in production, and there is always something new to learn for growers of any experience. Enter DIY mushroom substrates.

Specialty mushrooms (anything cultivated that is not an Agaricus such as button, Cremini, and Portobello) are decomposers. They need a carbon source to feed on in order to grow and reproduce. The carbon source can be almost anything, especially if you are growing a generalist species like oyster mushroom, which can grow on cardboard, straw, crop residues, sawdust, old clothes, composted manure, bagasse, and more. (Logs and woodchips are the carbon source for outdoor production.)

Amendments, such as biochar, minerals, and nitrogen, are typically mixed in with the carbon source; these can boost yield and chemical expression of the mushrooms. When you buy a ready-to-fruit block, the supplier’s recipe optimizes the carbon source, the C:N ratio, and the specific

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amendments for their strains. If you make your own mushroom substrate, you can optimize it for your needs and on materials you have on hand.

The two most common substrate ingredients are straw and sawdust, sometimes mixed in different ratios. There is some research that shows the type of straw (e.g., rice vs. oat vs. hay) or sawdust (oak vs. mulberry vs. eucalyptus) has an effect on mushroom success and yield. If you use sawdust, check with a mushroom supplier that it is compatible with the mushroom strain you want to grow. In general, steer clear of conifers! Straw is a safer bet and is usually easier to come by. Whether you are using straw or sawdust as your primary substrate, you must sterilize it before you inoculate with mushroom spawn.

Spawn is typically a mix of sawdust and mycelium. The "body" of the fungal organism that decomposes a substrate grows and – when conditions are right – produces the reproductive structures we eat: mushrooms. The amazing thing about mycelium is that you can take a piece of it, introduce it to an appropriate substrate, and it will grow. Then you can use it as spawn to inoculate more things to produce mushrooms.

In outdoor mushroom production, we drill holes into logs, fill them with sawdust spawn, and get mushrooms a year later. For indoor production, we mix spawn and substrate together in a bag or bucket and get mushrooms weeks or months later. Spawn needs the right conditions, and if you add it to a straw substrate that hasn't been sterilized, it will have to compete with bacteria and fungi that are already established – you might not get mushrooms.

Sterilization of the substrate can be a labor-intensive process (and is one reason why some growers prefer to just use ready-to-fruit blocks). Sterilization can be done with an autoclave, or steam room, or simply by boiling the substrate before adding the spawn. The downside is that these methods require infrastructure and electricity. If you have my luck, there is a chance of burning yourself on boiling cardboard. Luckily there is a low-tech option that does not require heat, pressure, or OSHA.

In 2021, my predecessor at Small Farms, Steve Gabriel, got a grant to explore a lime-based sterilization process for indoor mushroom production. (The videos are up on the Cornell Small Farms website!) We are talking about lime (calcium hydroxide) produced from burning calcium carbonate (limestone) then adding water to make a caustic, alkaline material. In an exemplary case of mushroom creativity, Steve tested this method of sterilization for four strains of oyster mushrooms with and without a nitrogen amendment.

We evaluated two strains of two species of oyster mushroom (*Pleurotus citrinopileatus* and *P. ostreatus*, 'Golden' and 'Blue') for the project. Oyster is a versatile species, with a wide range of substrate tolerances and tones of culinary uses. I typically recommend it as a "starter" mushroom. Pan-seared in butter and served over salad it is quite excellent.

In order to not be overly pedantic, assume that every tool, receptacle, bag, hand, and device mentioned below is sterile (or at the very least very clean). This minimizes contamination and is essential for indoor mushroom production:

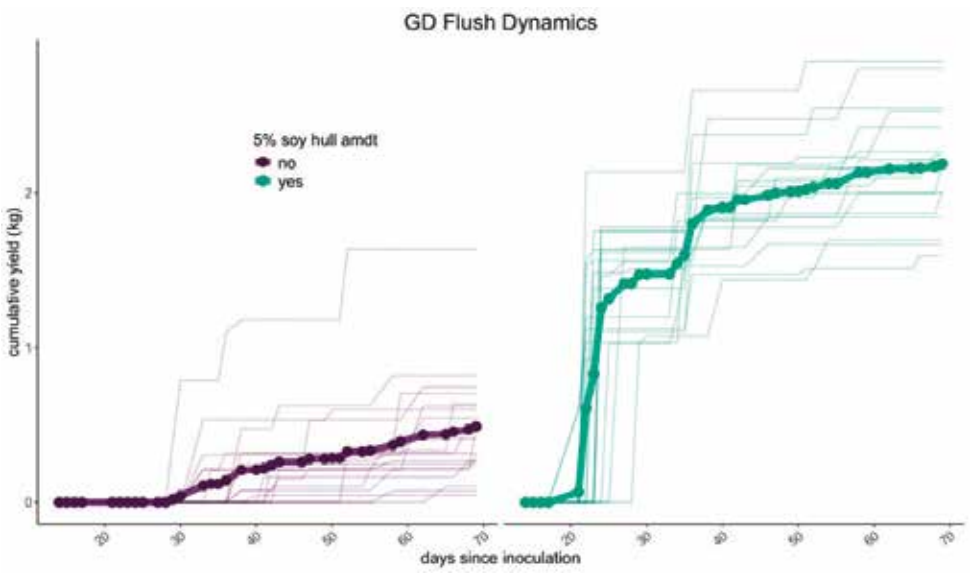
We added 5 lbs. of hydrated mason lime (<10% magnesium) to 80 gallons of water in a 100-gallon steel stock tank, then mixed slowly with a paint mixer until a pH strip showed the solution to be between 10 and 11. Next, 50 lbs. of dry shredded straw was added in small portions with a pitchfork; each portion was fully submerged before adding more, and once the whole lot was soaking it was weighed down with a plastic grid and cinderblocks overnight. This process kills off most microorganism competitors that might be growing on the straw, so the field is wide open for colonization of our desired mushrooms.

The following day the soaked straw was laid on a wire mesh to drain – all the alkaline water was captured and returned to the stock tank – and the lime solution was neutralized back to pH 7 - 8 by adding citric acid. Ten-pound portions of the damp straw was mixed with half a pound of dry soybean hulls (as a N amendment) and half a pound of mushroom spawn, then the mix was tightly packed into plastic bags, subsequently perforated for airflow. All the bags were stored in a dark room to incubate for two weeks, with temperatures between 65º and 75º F and a constant flow of air. After two weeks, you could see the growing mycelium spread throughout the bags. It was time to fruit!

Slits were cut into each bag and they were all moved into a "fruiting room." Here, temperatures were kept at 75º, humidity at 85%, and fresh air was regularly circulated in. Any fruiting room must have these conditions to maximize mushroom growth and to minimize mold growth. The fruiting room was also equipped with blue spectrum LED lighting. It is a common misconception that mushrooms don't need light to grow. They do! And there is a growing body of literature to support that the color and intensity of light in a grow room affects the structure, size, color, and chemistry of the mushrooms. Once the bags were set up in the fruiting room, they were checked on every other day for new mushrooms.

Harvesting mushrooms is all about time management, and depending on light, temperature, and mushroom strain, a few hours may be the difference between perfectly saleable and overly mature. You want to harvest when the mushroom cap is still curled under, and ideally before the mushroom has produced spores; as the mushroom ages, the cap flattens out and becomes less palatable. For this project, the mushroom bags were checked regularly so everything harvested was not past prime.

The results were delightful in both consistency and magnitude for all four stains of mushrooms. Take the 'Grey Dove' strain for example:



There's a lot to take in from this plot: the X-axis is the number of days since the bags had been inoculated (they were moved into the fruiting room 14 days after inoculation); the Y-axis is the cumulative mushroom yield.

When you look at a given day, you see how much yield has been achieved to date – the higher the curve, the more yield we saw. Steep increases in the curve mean a big jump in yield. Thin lines are the yield curves for each mushroom bag, and the thick lines are the average yield curve for each group. Purple represents bags that had no amendments; green represents bags that had half a pound of soybean hulls mixed in.

What can we say about the yields and timing of the yields of our mushroom strains?

1. Bags that had soybean hull amendments on average produced around twice as much yield as bags that didn't. There was variability between strains, but this was generally true for all of them.

2. Bags that had soybean hull amendments fruited sooner than those without amendments – from four to 10 days depending on the strain.

3. Bags that had soybean hull amendments reached their total yields sooner than those without amendments.

Based on this experiment, it is a no-brainer to recommend that you add soybean hulls to your DIY mushroom substrate. For just a little extra cost you can potentially double your yield and achieve the yield faster (so you can grow more mushrooms!).

It also raises a number of other research questions: How much would the yields change with a greater amount of soybean hull per volume substrate? Would we see the same trends if we added the soybean hull to a different substrate, such as sawdust? Can we get a similar yield boost with log grown mushrooms?

We are planning to keep pursuing mushroom research here at Small Farms, so stay tuned for more.

Connor Youngerman is the agroforestry and mushroom specialist for the Cornell Small Farms Program.

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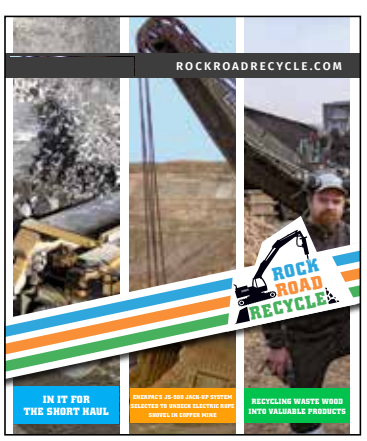

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