OHIO STATE UNIVERSITY EXTENSION

NORTHEAST OHIO AGRI-CULTURE NEWSLETTER

Your Weekly Agriculture Update for Ashtabula and Trumbull Counties

January 23, 2024

Our thoughts are with the Kibler family. Photo from the Tribune Chronicle.

In This Issue:

- Managing Risk On Farms – Insurance, Business Entity, or Both?
- Regional Ag Outlook and Policy Meetings Set for 2024
- Cover Crops Support Microbial Diversity: Three Case Studies
- Food From Urban Agriculture Has Carbon Footprint 6 Times Larger Than Conventional Produce, Study Shows
- Upcoming Extension Programs

Hello Northeast Ohio Counties!

As many of you have heard, the Kibler Dairy Farm had a barn fire Monday morning. Fortunately, no one was hurt, and the damage was contained to one building. Our thoughts and prayers are with the Kibler family as they begin the clean up process.

In case you missed the announcement last week, we have moved the Small Farm Financial College back to March to accommodate speaker schedules. There is still time to register by calling our office at 330-638-6783.

Have a great week!

Lee Beers
Trumbull County
Extension Educator

Managing Risk on Farms – Insurance, Business Entity, or Both?

By Robert Moore
Source: https://farmoffice.osu.edu/blog/thu-01182024-608pm/managing-risk-farms-–-insurance-business-entity-or-both

Managing the inherent risks of a farm is a top priority for most farm managers. The challenge for those managers is how best to manage the risks. We often are encouraged to invest in liability insurance or establish a business entity such as an LLC. The question becomes: is one better than the other and do we need both?

For most legal questions, the answer is "it depends on the situation." However, regarding farm insurance, the answer is a definite "yes, you need good liability insurance." Farm liability insurance is the best, most cost-effective liability management strategy for a farming operation. Insurance should always be the primary risk management tool with a business entity being the backup plan. Before spending time and money on setting up a business entity, make sure the farm's liability insurance policy has adequate coverage limits and protects all the farm's activities and assets.

There is no precise answer as to how much liability insurance a farm should carry. For farms with higher risk exposure like customer visitors or trucks and large machinery frequenting roadways, the coverage limit should be higher. Smaller farms with less liability exposure may need a smaller coverage limit. Every farm should probably have at least $1 million in liability coverage. A coverage limit of $3 million to $5 million is probably better for farms with moderate liability exposure. Farms with high liability exposure for visitors or trucks/equipment may want $5 million or more in coverage. With liability insurance, more is better although the premium costs must be considered. Liability insurance is relatively low-cost compared to the protection it provides. The best solution is to talk to the insurance agent to determine the best coverage limits for the specific farming operation.

When discussing the liability insurance policy with the insurance agent, it is vital to make sure the agent is aware of all activities and assets on the farm. If the agent does not know about it, the activity or asset might not be covered. For example, farmers who lease their land for hunting may not be covered by a typical farm policy for injuries to hunters. To address issues like this, a checklist of unique farm activities and assets has been developed and is available **here**. Each activity and asset that applies to the farming operation should be checked and the completed list provided to the insurance agent. The agent can them make sure that all activities and assets are covered.

For a more thorough discussion on farm insurance, see the ***Farm Insurance: Covering Your Assets Bulletin***available at farmoffice.osu.edu.

After ensuring an adequate liability insurance policy is in place, focus can then turn to a business entity. Whether a business entity is needed in addition to the insurance depends on the situation. Generally, a business entity will help provide backup liability protection if the business has any of the following:

- Multiple owners;
- Employees;
- Many visitors;
- External liability exposure such as food safety or product liability.

If none of the above factors apply to a farming operation, a business entity might have limited value for liability protection. The reason is if a liability issue occurs, the owner of the business will have caused it. The business owner will likely be personally liable regardless of what type of business entity they may have.

Consider the following examples:
Example 1. Farmer is a sole proprietor with no employees. He only occasionally receives help from family members. If a liability incident happens with machinery on the roadway, Farmer will likely to have caused it. Farmer will be personally liable. Even if Farmer had an LLC, Farmer would still be personally liable because they caused the liability incident. Farmer's best liability protection is liability insurance.

Example 2. Farmer adds a full-time employee to help on the farming operation and continues to operate as a sole proprietor. If employee has a liability incident while driving equipment, Farmer will probably be fully liable for employee's actions. Under Ohio law, an employer is liable for an employee's actions during the course of work. Again, Farmer's only protection is insurance.

Example 3. Farmer establishes an LLC for his farming operation when they hire the employee. Now, the LLC is the employer, not Farmer. When the employee has an incident driving the machinery, the LLC is liable for the employee, not Farmer. All of Farmer's assets outside of the LLC are safe because Farmer is not personally liable. The LLC may be liable and the assets in the LLC are still at risk, but the LLC contains the employee's liability to only the LLC.

As these examples show, the utility of a business entity to provide liability protection depends on the situation. In some cases, the business entity will provide little protection while in other cases, the entity will provide significant protection. The best course of action is to consult with an attorney to determine the best strategy for a particular situation.

The type of entity used also affects the protection provided. A general partnership provides no liability protection and a limited partnership provides some, but not complete, liability protection. An LLC or corporation are the best entities to use for liability protection. For a detailed discussion on business entities and liability protection, see the ***Using Business Entities to Manage Farm Liability Risk*** **Bulletin** available at farmoffice.osu.edu.

To summarize, let's go back to the original question: do you need liability insurance, a business entity or both? There is no doubt every farm should have liability insurance. Working closely with the insurance agent to ensure that all activities and assets are covered is a goal that every farm should have. Business entities can provide a good backup plan but, in some situations, may only provide limited protection. So, it depends on the situation as to whether a business entity is needed. Consulting with an attorney is the best way to determine if a business entity is a good choice.

Regional Ag Outlook and Policy Meetings Set for 2024

By Mike Estadt, OSU Extension estadt.3@osu.edu
Source: https://u.osu.edu/ohioagmanager/2024/01/23/regional-ag-outlook-and-policy-meetings-set-for-2024/

Ohio State University Extension will present its 2024 Regional Agricultural Outlook and Policy Meetings starting in late January and continuing into February. OSU Extension is the outreach arm of Ohio State's College of Food, Agricultural, and Environmental Sciences, and the main sponsor of the meetings. Economists from the CFAES Department of Agricultural, Environmental, and Development Economics, Extension specialists in tax policy, ag law and meteorology, along with other college specialists and invited guests, will serve as speakers.

Held throughout the state, the outlook meetings will address agricultural topics of interest not only in Ohio, but across the Corn Belt as well. Programs will include presentations on grain market outlook; the dairy industry; agricultural law updates; Ohio's changing climate; energy outlook, international economic outlook, farm real estate values and cash rent trends; grain transportation infrastructure; agricultural input price projections; and federal tax updates. Bearish price projections, world conflicts and lower farm income projections make these program important as you plan for the year ahead. University experts and industry representatives will give the latest information on what to expect. “Outlook meetings have useful take- aways that I have seen farm managers use directly for the upcoming season and planning for the future of the farm business. Farmers are the CEOs of their farm and collecting unbiased information and putting it into action is essential for success”, according to Bruce Clevenger, Extension Farm Management Field specialist.

Here is a current list of Extension opportunities for ag policy, outlook and grain marketing topics. Check with the local contacts for more information regarding specific topics and times.

January 22, 2024- Friendly Hills Camp and Conference Center, Zanesville, Ohio.
Contact: Clifton Martin (martin.2422@osu.edu)
https://go.osu.edu/2024dinner

January 23, 2024- Jewell Community Center, Defiance , Ohio
Contact: Kyle Verhoff (Verhoff.115@osu.edu)
https://defiance.osu.edu/events/2024-farm-outlook-meeting

January 23, 2024- Napoli’s Pizza, Belpre, Ohio
Contact: Ed Brown (brown.6000@osu.edu)
https://go.osu.edu/SEcrops

January 25th, Plaza Inn, 491 S. Main St. Mt. Victory Ohio.
Contact Mark Badertscher (Badertscher.4@osu.edu)
https://hardin.osu.edu/sites/hardin/files/imce/Tillage%20Club%20Flyer%202024.pdf

January 30, 2024, 2022- Emmett Chapel, Circleville, Ohio.
Contact: Mike Estadt (estadt.3@osu.edu)
web: https://go.osu.edu/pickawayoutlook

February 6, 2024 Allen County Fairgrounds-Youth Activities Building.
Contact: Nic Baumer (baumer.15@osu.edu)
https://u.osu.edu/allenanr/upcoming-programs/ag-outlook-and-agronomy-day/

February 23, 2004- Der Dutchman Restaurant, Plain City, Ohio.
Contact: Wayne Dellinger (Dellinger.@osu.edu) web:
https://go.osu.edu/TriCountyOutlook

Cover Crops Support Microbial Diversity: Three Case Studies

By Stacy Kish
First published: 04 January 2024
Source: https://acsess-onlinelibrary-wiley-com.proxy.lib.ohio-state.edu/doi/full/10.1002/crso.20333

Imagine if your neighborhood is routinely destroyed. The houses, streets, and businesses damaged. It would be difficult to have a community thrive under such devastating circumstances. Soil microbes experience a similar scenario when traditional agricultural practices are used on the farm.

The soil microbiome is a collection of bacteria, fungi, and archaea that play an integral role in soil and plant health. These microbes provide vital ecosystem services like breaking down organic matter and cycling nutrients to make them available to plants. The microbes also control and suppress pathogens, both fungi and bacteria.

“[These organisms] promote decomposition of materials, like roots and other plant materials, into carbon dioxide and soil organic matter,” says Christoph C. Tebbe, professor at the Thünen Institute, Germany. “[They] are important for creating the building blocks for keeping soil in a very healthy structure—not compacted but nice aggregates and a pore system that allows plants to grow better.”

In addition, the soil microbiome consumes and stores excess nutrients from fertilizer applications and purifies water, preventing nutrient runoff and eutrophication further downstream. It also degrades pesticides into nontoxic compounds, so the chemicals are more easily processed through the environment.

“Industrial agriculture requires large fertilizer applications on large fields to grow monoculture crops, which can be productive for years, even decades, but soil structure gets worse and plant inputs may need to be increased,” Tebbe says. “In the end though, farmers want to give their fields and farms to the next generation in a state as good as they received it.”

Modern Agriculture and the Soil Microbiome
A healthy ecosystem can be measured in part by the response of the soil microbial community to a disturbance or stress. Removing one group, even a tiny group, from the food web can reduce the health, stability, and resilience of the overall system. Undisturbed, natural, or organically managed soil supports a more robust soil microbiome than a conventionally managed agricultural system. A robust soil microbiome is defined by high biological diversity. Modern agricultural practices alter the

physical, chemical, and biological factors of the soil. In addition, excess nitrogen fertilization leads to soil acidification that decreases microbial diversity.

Under industrial agricultural practices, like the use of heavy machinery, soil structure is compromised and microbial diversity weakened. As a result, the soil microbiome suffers, which in turn, affects its potential agricultural productivity. Because soil microbes are connected to the larger environment, it is essential to consider these organisms when focusing on soil and ecosystem health.

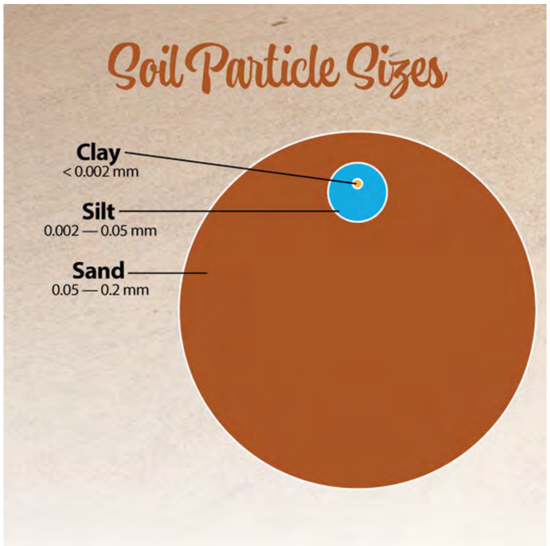
To reduce the negative repercussions from industrial agriculture, conservation agriculture advocates for practices that minimize soil disturbance, enhance plant diversity, and implement plant residue, like cover crops. These restitution practices protect soil, but it takes time to recover soil structure and increase organic carbon content. Cover crops may be one of the most important components of this process.

According to Tebbe, cover crops stabilize the soil and prevent soil erosion. These plants also maintain the diverse sediment grain composition typical to a region that supports the natural microbes living in the soil aggregates. Cover crops also provide a vital source of nutrients to the microbiome, contributing up to one-third of the captured nutrients to the soil through the root system. Winter cover crops are essential for feeding microbes, especially bacteria and fungi, and the turnover of the microbiome provides a jump-start for their beneficial activities promoting plant growth once the spring season arrives.

For the future health of soil and the long-term health of the planet, maintaining a healthy soil microbial community is critical. Undertaking these efforts raises two big questions: how does one assess the diversity and abundance of the microbes in the soil microbiome, and what can be done to maintain these tiny communities?

An Aggregate That is *Just* Right

Christoph C. Tebbe, professor at the Thünen Institute, Germany, and his colleagues have shown that microbes have a "preference" for the size of sediment grains on which they live. During physical and chemical weathering, rocks and minerals are broken into smaller and smaller pieces or grains. Soils are dominated by three grain sizes—clay (< 0.002 mm), silt (0.002–0.05 mm), and sand (0.05–0.2 mm). The concentration, chemical composition, and decomposability of organic matter differs for each grain size fraction. Microbes live in close contact with these sediment particles, and each



sediment size fraction produces distinct microenvironments that are more favorable for different microbial species.

Tebbe found that bacteria and fungi structure their communities around grain size. Microbes living on clay-sized grains include the bacterial taxa Planctomycetales and the fungi *Penicillium* and Mucoraceae. These communities are akin to apartment dwellers crammed together on the tiny particles. The silt fraction is similar to the suburbs, populated by bacteria Gemmatimonadales, Actinobacteria, and *Nitrosospira* and the fungi Sordariomycetes. The sand-sized fraction, which is populated by bacteria Bacteroidetes and Alphaproteobacteria and fungi Dothideomycetes and *Cadophora*, is more rural with large farm houses separated across vast distances.

Soil grains form larger structures called aggregates that range from the micro level (<0.25 mm in diameter) to the macro level (>0.25 mm in diameter). These aggregates form through physical, chemical, and biological activity below ground and play a role in gas exchange, soil moisture, and substrate availability. Macro-aggregates are a construct of soil grains combined with organic material. The larger aggregates are more vulnerable to mechanical disruptions like tillage and are dynamic during seasonal changes. The smaller micro-aggregates have a higher proportion of soil grains with the minerals glued together with decomposed organic (humic) material. The smaller aggregates are more stable compared with the larger aggregates. The aggregates represent a higher level of structural and functional complexity for microbial microhabitats. Healthy soils contain a mixture of both aggregate types, offering many different living conditions for a diverse soil microbiome.

Cover Crops: A Global Perspective

To begin the process of addressing these two big questions, it helps to understand the role that cover crops play in microbial abundance and diversity. María B. Villamil, professor in the College of Agricultural, Consumer and Environmental Sciences at the University of Illinois, Urbana-Champaign, and colleagues conducted a meta-analysis of articles published in scientific research journals that examined the effect of cover crops on soil microbial abundance and diversity.

The team found cover cropping significantly increased parameters of soil microbial abundance, activity, and diversity by 27, 22, and 2.5% respectively, compared with fallow soil. In particular, they found cover crops improved soil microbiome robustness when properly managed with other agricultural practices, like tillage and the timing of cover crop termination.

Under industrial agricultural practices, like the use of heavy machinery, soil structure is compromised and microbial diversity weakened. This, in turn, affects agricultural productivity. Here healthy moist soil (above) is contrasted with dry compacted soil (below). USDA Photo by Lance Cheung.

Case Study: Cover Crops in Canada
Cover cropping is not a widely practiced agricultural method in Quebec, Canada. The long, harsh winters hinder the ability of these crops to take hold. As a result, the impact of cover crops on microbial diversity has rarely been studied in this region.
Marc Lucotte, an environmental geochemist at the University of Quebec, Montreal, and his colleagues conducted a study in the journal *Agrosystems, Geosciences & Environment*(https://doi-org.proxy.lib.ohio-state.edu/10.1002/agg2.20349) that examined the impact of cropping systems on soil microbial diversity. The team focused on three treatments—one seeding, two seedings, and three seedings of corn, soybean, and wheat.

In addition, they evaluated how the different seeding treatments were affected by different cover crops, including rye, alfalfa, and a mixture consisting of alfalfa, sunflower, phacelia, pearl millet, sorghum, buckwheat, oat, radish, crimson clover, and garden pea. The treatments were evaluated at two locations—Montmagny, along the St. Lawrence River, and Ste-Marthe, farther inland and adjacent to a lake.

Studies traditionally use polymerase chain reaction (PCR) amplification to quantify the organisms living in the soil, but this analytical technique cannot point to the function the microbes perform. Instead, Lucotte and his team used metagenomics to identify and quantify the microbes dwelling in the soil. Metagenomics is based on the structure and function of DNA sequences found in a soil sample to identify the inhabitants, but also inform the role these organisms play in the community.

Along with a metagenomic analysis, the team also used qPCR to count the targeted DNA segments to produce microbial counts. The most abundant bacterial phyla were Actinobacteria and Proteobacteria while the most abundant eukaryotic phyla were Ascomycota, Cercozoa, and Mucoromycota.

The researchers found that plant diversity and cover cropping affected the soil microbial composition but not the overall biomass. The researchers point to variations in root structure of the different crops to promote the microbial diversity. Different cropping systems also affected microbial growth. Soybeans degrade quickly, which favored bacteria while wheat and corn degrade more slowly, which favored fungi over the long term.

Case Study: Cover Crops in Belgium

A similar study examined the microbial community dynamics in a long-term field experiment in Gembloux, Belgium. Tebbe and his team explored the role of plant residues on plots where crop residue restitution has been practiced for more than 60 years. The study offers a window into the long-term effect of soil organic carbon on the microbial community.

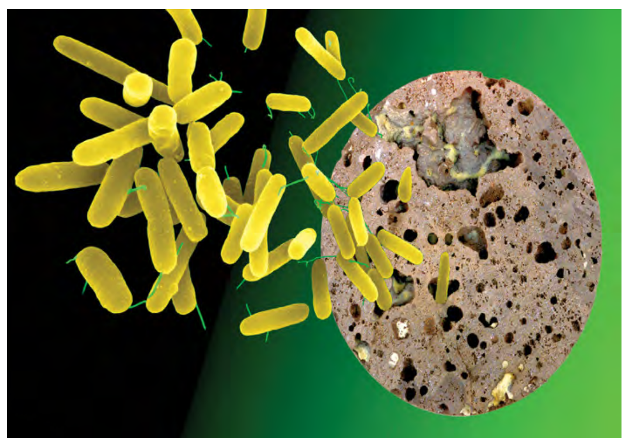


Illustration courtesy of the Lawrence Berkeley National Laboratory. © The Regents of the University of California, Lawrence Berkeley National Laboratory.

In the study, the researchers examined plots for 2.5 years under cropping systems that included a succession of maize, winter wheat, and barley. The analysis also explored the short-term effect of intercropping wheat with pea. The team assembled microbe diversity using 16S rRNA gene PCR amplicon sequencing. Similar to the Quebec study, the dominant bacterial phyla identified in the soil include Proteobacteria and Actinobacteria. The archaea was dominated by Crenarchaeota. Perhaps more importantly, the team found that rare oligotrophic taxa, like Acidobacteria, Chloroflexi, Planctomycetes, Myxococcota, and Verrucomicrobia, thrive in regions with limited nutrients and form strong network structures with one another compared with the more abundant and competitive bacteria in the soil community.

Plant residue injects organic carbon into the soil that is typically lost following traditional agricultural practices. The additional carbon is also fresher and more assessable to the microbial community, which supports and stabilizes the tiny organisms during the winter.

The study showed that short-term intercropping produced a stronger effect on depleted fields where residue was exported, upholding the role that residue restitution has on the resilience of soil microbial communities. The same effect was not repeated with archaea, suggesting these organisms are less dependent on the immediate organic carbon input and decomposition. During the spring months, the abundant bacteria and fungi offered a ready carbon source of nutrients for young plants. In addition, the identified rare bacterial species were affected more by the long-term crop restitution.

Case Study: Cover Crops in the United States
Research from the *Soil Science Society of America Journal* (https://doi-org.proxy.lib.ohio-state.edu/10.1002/saj2.20336) indicates that soil microbial communities may also play a key role in addressing plant health and soil resilience, especially in the face of climate variability. Understanding how agricultural management practices influence soil and soil microbial communities could provide increased insight into the future of crop production.

Kurt Steinke, associate professor of soil fertility and nutrient management at Michigan State University, led a team that examined the role of plants in modulating microbial community composition. They focused on the impact of litter quality, root morphology, and rhizodeposition on the microbial community during two field studies in Lansing, MI. “The more we use metagenomics, the more we learn about microbes, about their functions, like nitrification. Due to metagenomics, we now understand a wider range of organisms who are different but also perform similar tasks.”

Cover crop residues can interact with an annual crop to alter rhizosphere microbial community structure through a combination of root structure and nutrient release during decomposition. In the study, the researchers seeded two cover crops—daikon radish and forage oat—in the spring and terminated in autumn. The results were compared with fields where no cover crop was applied.

The team used 16S rRNA genomic sequencing to compare the effects of each cover crop combined with corn and nitrogen timing and placement strategies on soil bacterial community composition. Like the previous studies, Proteobacteria and Actinobacteria, were common, along with Acidobacteria, and Planctomycetes.

At the study location, the soil microbial communities varied throughout the year. Because cover crop residue provides a slow source of carbon and nitrogen, the researchers found that the selection of cover crop influenced the soil bacteria growing in the soil. In addition, the microbes were more sensitive to cover crops during a wet year.

Oat affected community membership, and radish, which decomposed earlier, had a greater impact on community structure.

The researchers found that increasing the diversity of cover crop species did not enhance the soil physical prosperities or health compared with monoculture cover crops. This result suggests that the diversity-productivity idea may not hold for all regions. In effect, monoculture cover crops may be more effective at improving the physical health of the soil. Further research is needed to clarify the effect of soil chemistry and soil bacteria on regulating community composition and agricultural management strategies.

Folding Research into Future Management Strategies

“The high-intensive agricultural practices, as they are typically applied for more than 50 years, assume you have an unlimited nitrogen supply and can add as much as you want to obtain a high yield, but excess nutrients can result in the release of gases that amplify the effect of climate change,” Tebbe says. “We need to develop practices where we apply fertilizers using a more targeted approach to grow healthy plants and reduce runoff in the rivers and outgassing to the atmosphere.”

Microbes may be one of the smallest members of an ecosystem, but these tiny organisms are incredibly important. Developing agricultural management practices with an eye toward supporting the diversity of the soil microbiome may prove critical for agriculture to continue to grow the crops to feed an ever growing and hungry population. Sustainable agricultural practices, like no-till systems and organic fertilizers, have an immediate effect on microbial community structure and how the microbes interact with each other.

Plant diversity, including diversified rotation and cover crops, is a part of conservation agricultural practices that support soil microbial communities. The studies from Canada, Belgium, and the United States uphold the importance of cover crops for promoting the long-term abundance and diversity of the soil microbiome. These results offer information on how microbial communities respond to different agricultural management practices with the goal of developing environmentally friendly, sustainable cropping systems.

Food from urban agriculture has carbon footprint 6 times larger than conventional produce, study shows

By University of Michigan
Source: https://www.sciencedaily.com/releases/2024/01/240122140408.htm

A new University of Michigan-led international study finds that fruits and vegetables grown in urban farms and gardens have a carbon footprint that is, on average, six times greater than conventionally grown produce.

However, a few city-grown crops equaled or outperformed conventional agriculture under certain conditions. Tomatoes grown in the soil of open-air urban plots had a lower carbon intensity than tomatoes grown in conventional greenhouses, while the emissions difference between conventional and urban agriculture vanished for air-freighted crops like asparagus.

"The exceptions revealed by our study suggest that urban agriculture practitioners can reduce their climate impacts by cultivating crops that are typically greenhouse-grown or air-freighted, in addition to making changes in site design and management," said study co-lead author Jason Hawes, a doctoral student at U-M's School for Environment and Sustainability.

"Urban agriculture offers a variety of social, nutritional and place-based environmental benefits, which make it an appealing feature of future sustainable cities. This work shines light on ways to ensure that urban agriculture benefits the climate, as well as the people and places it serves."

Urban agriculture, the practice of farming within the confines of a city, is becoming increasingly popular worldwide and is touted as a way to make cities and urban food systems more sustainable. By some estimates, between 20% and 30% of the global urban population engages in some form of urban agriculture.

Despite strong evidence of the social and nutritional benefits of urban agriculture, its carbon footprint remains understudied. Most previously published studies have focused on high-tech, energy-intensive forms of UA -- such as vertical farms and rooftop greenhouses -- even though the vast majority of urban farms are decidedly low-tech: crops grown in soil on open-air plots.

The new U-M-led study, scheduled for publication Jan. 22 in the journal *Nature Cities*, aimed to fill some of the knowledge gaps by comparing the carbon footprints of food produced at low-tech urban agriculture sites to conventional crops. It used data from 73 urban farms and gardens in five countries and is the largest published study to compare the carbon footprints of urban and conventional agriculture.

Three types of urban agriculture sites were analyzed: urban farms (professionally managed and focused on food production), individual gardens (small plots managed by single gardeners) and collective gardens (communal spaces managed by groups of gardeners).

For each site, the researchers calculated the climate-altering greenhouse gas emissions associated with on-farm materials and activities over the lifetime of the farm. The emissions, expressed in kilograms of carbon dioxide equivalents per serving of food, were then compared to foods raised by conventional methods.

On average, food produced through urban agriculture emitted 0.42 kilograms of carbon dioxide equivalents per serving, six times higher than the 0.07 kg CO_2e per serving of conventionally grown produce.

"By assessing actual inputs and outputs on urban agriculture sites, we were able to assign climate change impacts to each serving of produce," said study co-lead author Benjamin Goldstein, assistant professor at U-M's School for Environment and Sustainability. "This dataset reveals that urban agriculture has higher carbon emissions per serving of fruit or vegetable than conventional agriculture -- with a few exceptions."

Joshua Newell, professor and co-director of the Center for Sustainable Systems at SEAS, led the University of Michigan portion of the project. The U-M researchers formed an international team of collaborators from universities near the various food-growing sites. Ten of those collaborators are co-authors of the Nature Cities study.

Farmers and gardeners at urban agriculture sites in France, Germany, Poland, the United Kingdom and the United States were recruited as citizen scientists and used daily diary entries to record inputs and harvests from their food-growing sites throughout the 2019 season.

Inputs to the urban agriculture sites fell into three main categories: infrastructure (such as the raised beds in which food is grown, or pathways between plots), supplies (including compost, fertilizer, weed-blocking fabric and gasoline for machinery), and irrigation water.

"Most of the climate impacts at urban farms are driven by the materials used to construct them -- the infrastructure," Goldstein said. "These farms typically only operate for a few years or a decade, so the greenhouse gases used to produce those materials are not used effectively. Conventional agriculture, on the other hand, is very efficient and hard to compete with."

For example, conventional farms often grow a single crop with the help of pesticides and fertilizers, resulting in larger harvests and a reduced carbon footprint when compared to urban farms, he said.
The researchers identified three best practices crucial to making low-tech urban agriculture more carbon-competitive with conventional agriculture:

- **Extend infrastructure lifetimes**. Extend the lifetime of UA materials and structures such as raised beds, composting infrastructure and sheds. A raised bed used for five years will have approximately four times the environmental impact, per serving of food, as a raised bed used for 20 years.
- **Use urban wastes as UA inputs**. Conserve carbon by engaging in "urban symbiosis," which includes giving a second life to used materials, such as construction debris and demolition waste, that are unsuitable for new construction but potentially useful for UA. The most well-known symbiotic relationship between cities and UA is composting. The category also includes using rainwater and recycled grey water for irrigation.
- **Generate high levels of social benefits.** In a survey conducted for the study, UA farmers and gardeners overwhelmingly reported improved mental health, diet and social networks. While increasing these "nonfood outputs" of UA does not reduce its carbon footprint, "growing spaces which maximize social benefits can outcompete conventional agriculture when UA benefits are considered holistically," according to the study authors.

Co-authors of the Nature Cities paper are from McGill University in Canada, University Paris-Saclay and the Agroecology and Environmental Research Unit in France, the University of Kent in the United Kingdom, ILS Research in Germany, City University of New York and Adam Mickiewicz University in Poland.

Support for the project was provided by the UK Economic and Social Research Council, German Federal Ministry of Education and Research, French National Research Agency, U.S. National Science Foundation, Poland's National Science Centre, and the European Union's Horizon 202 research and innovation program.

Upcoming Extension Programs

The following programs have been scheduled for NE Ohio farmers. Check back each week as more programs are added to the calendar

Northeast Ohio Small Farm Financial College
March 9 and March 16, 2024
Learn more or register at go.osu.edu/NEOSFFC

Private Pesticide/Fertilizer Applicator Training
January 18, 2024 – Trumbull County
February 14, 2024 – Geauga County

March 11, 2024 – Ashtabula County
March 28, 2024 – Online via Zoom
Register at Go.osu.edu/NEOPAT

Northeast Ohio Agronomy School
March 27, 2024 - Registration Opens Feb. 1st

Pruning Classes
March 2nd – Hartford Orchard LLC
March 30th – Sage's Apple Orchard

CFAES

2024 Northeast Ohio Private
Pesticide Applicator Re-Certification &
Fertilizer Application Re-Certification Sessions

Private Pesticide Applicator Re-certification:

Does your Private Pesticide Applicator's License expire on March 31, 2024? If so, OSU Extension in Northeast Ohio has planned four pesticide re-certification sessions for producers. Each of these sessions will offer 3 credits for pesticide re-certification for CORE and All Categories (1-7). Private Pesticide Applicators are encouraged to choose the session which best fits their schedule.

Cost: $40/Person

Fertilizer Applicator Re-Certification:

Does your Private or Commercial Fertilizer Applicators Certification expire soon? A one-hour session will be held after the pesticide session for those who need to renew their Fertilizer Application Certification.

Cost: $10/Person

2024 Re-certification Programs:

- **Online via Zoom, Tuesday, December 14, 2023, 5:00 PM to 9:00 PM**
  - Pesticide starts at 5:00 PM, Fertilizer starts at 8:00 PM
- **Trumbull Co. Extension Office in Cortland, OH - Thurs, January 18, 2024, 5:00 PM – 9:00 PM**
  - Pesticide starts at 5:00 PM, Fertilizer starts at 8:00 PM
  - For more information call: 330-638-6783
- **Geauga Co. Extension Office in Burton, OH - Wed, February 14, 2024, 1:00 PM – 5:00 PM**
  - Pesticide starts a 1:00 PM, Fertilizer starts at 4:00 PM
  - For more information call: 440-834-4656
- **Ashtabula Co. Extension Office in Jefferson, OH – Mon, March 11, 2024, 1:00 PM – 5:00 PM**
  - Pesticide starts at 1:00 PM, Fertilizer starts at 4:00 PM
  - For more information call: 440-576-9008
- **Online via Zoom, Thursday, March 28, 2024, 5:00 PM to 9:00 PM**
  - Pesticide starts at 5:00 PM, Fertilizer starts at 8:00 PM

To register, please visit

Go.osu.edu/NEOPAT

2024 Northeast Ohio Private Pesticide Applicator Re-Certification & Fertilizer Application Re-Certification Sessions

If you are unable to register online, please fill out and mail in this form below to register for one of our 2024 in-person re-certification trainings. The registration fee is $40/per person for the private pesticide applicator re-certification. The registration fee is $10/per person for the fertilizer re-certification session. ***Pre-registration is required 7 days prior to the session date.*** An additional late registration fee of $25 per person will be added for any registration received after the registration deadline listed below.

Name________________________Pesticide Applicator Number____________________

Email address____

Phone Number _____________________County_________________________________

Categories Needed for Re-certification____

Session I will be attending (check one):

___Trumbull Co. Extension Office in Cortland, OH
Thurs, January 18, 2024, 5:00 PM – 9:00 PM

____Geauga Co. Extension Office in Burton, OH
Wed, February 14, 2024, 1:00 PM – 5:00 PM

____Ashtabula Co. Extension Office in Jefferson, OH
Mon, March 11, 2024, 1:00 PM – 5:00 PM

Fee Required (check all the apply):

___Pesticide Applicator Re-certification ($40 pre-registration)
___Fertilizer Applicator Re-certification ($10 pre-registration)
___Late Registration Fee ($25-if applicable)

Total Fee Due $______________________

Online registration is preferred
To register and pay online please visit www.Go.osu.edu/NEOPAT

Please make check payable to OSU Extension and mail to:

Ashtabula County OSU Extension, 39 Wall Street, Jefferson, Ohio 44047

For more information call Andrew Holden at 440-576-9008 or Holden.155@osu.edu

COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES

NORTHEAST OHIO SMALL FARM FINANCIAL COLLEGE

Small and beginning farmers are encouraged to participate in this new in-depth farm management educational program!

This course will offer 10 hours of farm management education that will help start your farm on the path to financial success.

Instructors include OSU Extension Educators Andrew Holden and Lee Beers, and Farm Management Field Specialist in, David Marrison.

This two Saturday course will feature both live, in-person lectures, recordings from other state specialist, hands-on activities, take home assignments, and the ability to apply what is taught directly to your new or current farming operation.

DATE: Saturday, March 9 and Saturday, March 16, 2024
TIME: 9:00 AM – 3:00 PM
LOCATION: TBD

COST: $100 per participant, $50 per additional family member

Register here: **go.osu.edu/NEOSFFC**
Call Andrew Holden at 440-576-90089 with any questions!

The Ohio State University
EXTENSION

MARK BRUNS AGENCY

Nationwide® is on your side

CFAES

Topics:

Starting Your New Farm Business
Goals and Expectations
Mission Statements
Business Plan
Farm Business Structure

Recordkeeping, Budgets and Taxes
Enterprise Budgets
Projecting Farm Income
Cost of Production
Introduction to Farm Taxes

Managing Your Small Farm's Finances
Balance Sheets
Cash Flow Statements
Financial Statements
Managing Income and Expenses

The Legal Side of Farm Financial Management
Farm Financing
Loan Options for Small Farms
Farm Leases and Contracts
Risks on the Farm
Liability Insurance

Sponsors:

OSU Extension-Ashtabula & Trumbull Counties

OSU Beginner and Small Farms Program

Farm Financial Management and Policy Institute (FFMPI)

Risser Farm Management Fund

Bruns Insurance Services

COLLEGE OF FOOD, AGRICULTURAL,
AND ENVIRONMENTAL SCIENCES

OSU EXTENSION AGRONOMIC CROPS TEAM PRESENTS

2024 Soil Health Webinar Series

Join us for a webinar series focusing on all things soil health. This series will offer standalone topics, so attendees can attend one, two, or all three sessions. Live webinars will offer CCA continuing education credits, and webinar recordings will be posted to the OSU Agronomy Team YouTube Channel for later viewing.

In this monthly series, farmers, industry, and academic experts will weigh in on practical steps to improve soil health and measure impact on crop yield and farm profitability. Please plan to join us for all three sessions!

DATES: January 11th, February 8th, and March 7th, 2024

TIME: 8:00–9:00 a.m.

LOCATION: Virtual via Zoom. Registration is required to receive the connection link

To register, visit go.osu.edu/SoilHealthWeb

For more information, contact Rachel Cochran at Cochran.474@osu.edu.

THE OHIO STATE UNIVERSITY
EXTENSION

CFAES

SESSION ONE

January 11th, 2024

Who's the J.A.M. at OSU?

Dr. Jim Ippolito, Dr. Asmita Murumkar, & Dr. Manbir Rakkar, The Ohio State University

SESSION TWO

February 8th, 2024

Cover Crop Info Drop

Grower Panel

SESSION THREE

March 7th, 2024

What's the beef with Soil Health and livestock?

Dr. Anna Cates, University of Minnesota, Dr. Mary Drewnoski, University of Nebraska-Lincoln, and Dr. Doug Jackson-Smith, The Ohio State University

Each webinar will feature speakers on the selected topics, followed by an interactive Q&A Session

SCAN QR CODE OR VISIT WEB LINK BELOW TO REGISTER:

go.osu.edu/SoilHealthWeb

CFAES OHIO STATE UNIVERSITY EXTENSION

Fertilizer Applicator Certification Training

FEBRUARY 29, 2024 6 – 9 P.M.

go.osu.edu/trumbullfert2024

Do you apply fertilizer to 50 acres or more for crops that are primarily for sale? If so, you are required by Ohio law to attend a training session or take a test to become certified. OSU Extension Trumbull County is offering a training session (no test) that will meet all certification requirements. **Pre-Registration is required a week in advance.** Cost for this training session is $35/person and includes training materials, and handouts. To register online with a credit or debit card please visit https://go.osu.edu/trumbullfert2024. You can also register by completing the back portion of this flyer and mail with check to the address below. Please make checks payable to Ohio State University Extension.

Location: OSU Extension Trumbull County, 520 West Main St, Cortland, OH 44410

Cost: $35/person

Contact information: 330-638-6783 or beers.66@osu.edu

THE OHIO STATE UNIVERSITY
EXTENSION

trumbull.osu.edu

CFAES OHIO STATE UNIVERSITY EXTENSION

2024 Fertilizer Applicator Training
Trumbull County

Name ____

Address ____

City ____________________ State_____ Zip___________________

Phone ______________________Email ______________________

Number of People Attending: __________ X $35/person ___________

____

Please make checks payable to: **Ohio State University Extension**

Mail form and payment to: OSU Extension Trumbull County,
520 West Main Street, Suite 1, Cortland, OH 44410

For questions, contact Lee Beers at 330-638-6783 or by email at beers.66@osu.edu