

PROJECT REPORT

October 16, 2023



Sanitization and Cleaning Resources for yoUr Business

a.k.a Training and Technical Support to Help Small Vegetable Farms Meet the Cleaning and Sanitization Requirements of the Produce Safety Rule.

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The SCRUB
Project's
Approach

- Meet growers where they are
- Track production flow from fields to transport
- Focus on bottlenecks that increase risk
- Plan and implement solutions together



Executive Summary. This 3-year project was funded by the USDA Food Safety Outreach Program for a total of \$451,217. Project partners were University of Vermont Extension (project lead), Cornell Cooperative Extension, Lean and Clean LLC, Michigan State University Extension, and the National Farmers Union Foundation. The goal of the project was to support adoption of improved cleaning and sanitizing practices on small, diversified vegetable farms that are not fully covered by the Produce Safety Rule of the Food Safety Modernization Act. These farms often face challenges implementing produce safety practices because they have limited financial and management resources. We focused on grower-identified information needs and developed educational resources to address them, including 93 blog posts, case studies, and videos. These have been viewed by 11,638 people to date. We held 29 virtual trainings and 22 educational presentations attended by 1,168 farmers and agricultural service providers. Direct technical assistance was provided to 219 farms with a total of 2,654 acres of field vegetables and 1.8 million sq. ft. of greenhouse vegetable production, with estimated aggregate annual vegetable sales totaling \$56.4 million. Of these, the 151 farms that reported adopting new or improved produce safety practices manage 2,065 acres of vegetables and 1.4 million sq. ft. of greenhouse vegetable production with estimated aggregate annual sales of \$43.7 million.

The goal of this project was to support adoption of improved cleaning and sanitizing practices on small, diversified vegetable farms in Georgia, Michigan, New England, and New York.

The primary audience for our work was farms that are not covered or are qualified exempt from the Produce Safety Rule (PSR) of the Food Safety Modernization Act (FSMA). These farms often face challenges to implementing produce safety practices because they have limited financial and management resources, compared to larger farms.

Nationwide, most vegetable farms do not have to fully comply with the PSR. Farms with sales under \$25,000 annually are exempt. Farms are eligible for a qualified exemption if they had average annual food sales less than \$610,182 between 2019-2021 and over 50% of their sales are to consumers, restaurants, or retail food establishments in the same state or within 275 miles. The most recent Census of Agriculture found only 11% of farms nationwide have annual sales of vegetables of more than \$500,000. That percentage is 3% in New Hampshire and Vermont, 6% in Massachusetts and Georgia, 9% in New York, and 12% in Michigan.

Our pedagogy focused on ‘co-learning’ with growers through:



- “Active listening” to inform educational resource development.
- Facilitating peer-to-peer sharing of experience and knowledge.
- Capturing grower-driven solutions and “best practices.”
- Recognizing the unique needs, barriers, and mix of factors influencing grower decisions.

We started with a needs assessment. To inform the project's work, an e-survey on the food safety perspectives of vegetable farmers was conducted. There were 88 responses, primarily from Georgia, Michigan, New York, and Vermont. Key takeaways:

- Growers are motivated to adopt food safety practices by a personal commitment to a safe, high-quality product and to meet regulatory requirements.
- Most growers said that they have, or intend to, implement new food safety practices.
- Key factors limiting implementation of food safety practices are infrastructure and time.
- Growers are most likely to learn a new skill from websites, trainings, and videos.

We held Diversity, Equity and Inclusion listening sessions.

Two virtual listening sessions were held with members of historically underserved audiences. These were in the evening, and attendees were compensated. We welcomed participants and introduced the project in advance by email; then we asked open ended questions to prompt discussion about challenges, needs, and suggestions for collaboration. Our key conclusions:

1. *People want to see themselves in materials* and be able to identify with the types of farms and the farmers covered in educational materials. This has to do with how the farms and farmers “look,” where they farm, how they farm, their level of business development, and who they farm for. This conclusion helped the project team think more broadly about what we consider a farm and how our project outputs may land with different audiences
2. *Farmers need and want low-tech, low cost, durable, solutions.* The level of investment required, and the availability of scale-appropriate solutions can be barriers to adoption. Our team worked to capture, curate, annotate, and share examples of low cost, no cost, low tech solutions to common small-scale cleaning and sanitizing challenges.
3. *There is a range of stakeholder literacy;* not all farmers are literate at the level of most published educational resources. This informed our approach to the type of resources we developed, and channels used to distribute them. We produced resources in print, responsive web, and video formats emphasizing visual and graphic presentation of topics.
4. *Many don't know what Extension is* or what we do. We need to build relationships and use approaches that make people feel welcome rather than assuming people are familiar and comfortable with us and our affiliated organizations.
5. *Emphasis on cost/benefit is important.* Farmers were clear about resource limitations, especially early-stage capital. They are business savvy and emphasized the need to understand the cost and benefit of recommended practices, not just whether something is optimal.
6. *Urban agriculture is unique.* Many small farm operations we work with are based in urban centers and this brings unique challenges around adjacent uses, diverse markets, soil health, contaminant sources and pathways, pest pressure, water management. Solutions must be tailored to the urban landscape of these farms.

7. *Maintaining connections is key* to ensuring our work during this project, and beyond, remains relevant to diverse audiences.

The role of partner farms. Ten partner farms in GA, NH, NY, and VT with a total of 404 acres in production were engaged early in the project to identify specific produce safety needs, gaps in educational resources, and to develop templates for future workshops.

Initial 90-minute needs assessment meetings were held, attended by an average of two people per partner farm. These were followed by 90-minute small-group workshops focused on specific practices a farm wanted to take, attended by other partner farms. Meetings focused on each farm's unique situation and technical assistance needs. The project team followed up with each farm to plan and implement improved produce safety practices, addressing emerging needs and incorporating lessons learned into new educational resources.



Growers asked for advice about tools for cleaning harvest containers, wash/pack lines, and other food contact surfaces. In response, the University of Vermont Extension Agricultural Engineering team tested a variety of brushes for design features that optimize on-farm cleaning. A [blog post](#) and six short [videos](#) were produced to share the results. Free samples of high-quality brushes were provided to 14 vegetable farms in 5 states.

Peer-to-peer webinars. In 2021, six 90-minute virtual workshops were held to address specific cleaning and sanitizing information needs identified by SCRUB partner farms. Farmers with experience in addressing these needs were recruited as presenters.

A total of 96 people attended including 80 small-scale farmers representing 408 acres of vegetable production in GA, MA, ME, MI, NH, NC, OH, NY, VT and Ontario, plus 16 presenters and service providers. Online recordings of the meeting have been viewed by a total of 660 people to date. Farmers attending the workshops identified improvements and/or new practices they intended to make on their farms as a result of what they learned. The workshops were:

Bin Blitz. Experienced farmers and UVM’s Ag Engineering team presented strategies and cleaning tools to increase efficiency and efficacy of bin cleaning, sanitation, and management practices. Farmers described their bin systems, and lessons learned.

Doing More with Less: Low Cost, High Value. Experienced farmers described inexpensive improvements they made related to produce safety, and summarized lessons learned, including trade-offs of spending money (or not) to lower risks and increase efficiency.

Wash/Pack Floors. This workshop highlighted concrete repair, cleaning and sanitation techniques, water management, products and resources, as well as “show and tell” from experienced farmers and UVM Ag Engineering staff.

Fundamentals of Managing Produce Wash Water. Farmers described their wash water management, including use and monitoring of sanitizers.

Tools for Employee Management and Empowerment. Experienced farm managers described strategies to retain and empower workers, while improving morale and culture, which support adoption of best practices for produce safety.

Bubblers/Aerators for Greens Washing. Feedback was shared by farmers who built / improved their own systems. Bubbler designs and DIY resources were shared, as well as perceived quality and efficiency gains from bubblers as compared to other washing methods.

After these workshops 13 farms reported adopting new practices, including:

- A 2-acre farm in GA designed a new/wash pack facility for better product flow and to reduce produce safety risks.
- An 8-acre organic vegetable farm in VT purchased new dedicated harvest totes and warmer gloves for employees. They developed plans to add a new greens bubbler.
- A ½-acre vegetable and herb farm in MI started using a doser for measuring the addition of sanitizer to wash water and implemented turbidity monitoring of postharvest wash water.
- A 1-acre elderberry farm in VT developed plans to build a low-cost wash pack shed.
- A 3-acre vegetable farm in NY planned improvements to their irrigation system and wash/pack infrastructure.

In 2023, six more webinars were held to address emerging needs identified by farmers. These were attended by a total of 73 people, including 58 farmers and 15 service providers. Online recordings of the meeting have been viewed by a total of 985 people to date. These were:

Honing Your Management Style to Recruit and Retain a Lean and Clean Farm Crew. Experienced farmers discussed strategies they use to avoid inefficiency and food safety risks part by hiring and retaining a reliable and productive farm crew. (13 participants)

Payback on Purchasing New Wash/Pack Equipment. Experienced farmers discussed how they determine when it is worth buying expensive equipment such as rinse conveyors.

Workarounds in Washing Greens that You Can't Live Without. Farmers discussed tips for implementing produce safety practices when processing leafy greens.

Parent, Farmer, and Wash-pack Manager! Farmer-parents shared challenges and lessons learned from running their businesses while running after their kids, including time management, food safety with kids, employee training to help with kids on the farm.

What NOT to Do to Save Time in the Packshed. Experienced farmers discussed the benefits and timing of “dry cleaning” ...and other things NOT to do (or clean) in your wash pack.

How to Talk to Contractors About Your Farm Building Construction Project. Experienced farmers and the UVM Ag Engineering team discussed considerations when building wash, pack and cold storage facilities, including drainage, produce safety, pest prevention, lighting, etc., and best practices for working with contractors.

A total of 43 participants completed post-meeting evaluations; of these 41 said they learned something new and 34 said they intended to adopt a new practice as a result, including:

- Strategies for encouraging employee feedback
- New systems around water tanks for greens
- Washing improvements for better flow, and drying--fan and washer conversion
- Using the blue hanging hose in our wash/pack.
- Using a two-spout measuring pourer and sanitizer calculator
- Forced air cooling of greens
- Put greens in cooler after washing, prior to packing
- Bagging station on wheels
- Vented crates to cool greens
- Air cooling before bagging
- Stone under landscape fabric for better floor drainage and drying in greens processing
- Complete SOPs prior to season, so we can have plenty of time to train

The SCRUB project web site www.go.uvm.edu/scrub was developed to house educational resources in multiple formats, to serve different learning styles: fact sheets, blog posts, standard operating procedures (SOPs), case studies, and videos developed. These were primarily produced by the UVM Extension Agricultural Engineering team. The site received 3,263 page views during the project. See a complete list of educational resources in Appendix 1.

YouTube channel with SCRUB videos. A total of 27 videos were developed and posted including 17 [one-minute SCRUB videos](#) on: Cleaning Brushes, Vikan UST Brushes, Squeegees, Tool Hangers, Hygienic Buckets, Bucket Hanger, Floor Brushes and Brooms, Food Hoe, Handles, Hygienic Shovel, Handles, Pipe or Tube Brushes, Pipe Brush, Scrapers, Scrubbing Pads, Rough Floor? Use a foam bladed squeegee! Quickly Rinsing CSA Totes at Root 5 Farm, and Purchase Locations for Cleaning Tools. These videos have had a total of 8,125 views to date. Recordings of 12 educational [SCRUB webinars](#) are also posted on YouTube. These have had a total of 1,645 views to date.

Educational presentations. A total of 51 presentations were given at conferences, on-farm workshops, meetings, and webinars attended by a total of 1.168 farmers and service providers. See Appendix 2 for a list of some of these presentations.

Technical Assistance. One-on-one technical assistance on a wide range of cleaning and sanitization issues and related produce safety needs was provided to 219 farms in 23 states and one Canadian province. (Table 1).

Table 1. Characteristics of farms that received one-on-one technical assistance.

State	Number of farms engaged with technical assistance	Number of farms adopting new practice(s)	Produce acreage of farms engaged	High tunnel area (sq. ft) of farms engaged	Produce acreage of farms adopting new practice(s)	High tunnel area (sq. ft.) of farms adopting new practice(s)
AZ	1	0	-	-	-	-
CA	1	0	-	-	-	-
CT	1	0	5	600	-	-
GA	29	20	146	71,780	136	65,780
IA	1	0	-	-	-	-
MA	10	2	347	63,100	14	9,500
MD	4	0	20	-	-	-
ME	4	1	15	14,080	11	10,080
MI	30	11	96	39,420	28	11,400
MN	1	0	3	-	-	-
MT	2	0	10	8,000	-	-
NC	2	0	1	10,000	-	-
NH	6	9	143	162,080	143	162,080
NY	30	22	432	187,420	413	166,020
OH	1	1	2	3,000	2	3,000
OR	1	0	-	-	-	-
PA	1	0	-	-	-	-
QC	3	2	57	9,300	41	300
RI	1	1	15	8,000	15	8,000
TN	1	0	-	-	-	-
TX	1	0	-	-	-	-
UNK	4	0	-	-	-	-
VA	1	0	-	-	-	-
VT	79	81	1,340	1,238,120	1,264	941,560
WI	4	1	24	4,500	-	-
Totals	219	151	2,654	1,819,400	2,065	1,377,720

The 219 farms receiving direct technical assistance have a total of 2,654 acres of vegetables, or an average of 12.1 acres per farm, and 1.8 million sq. ft. of high tunnel (greenhouse) vegetable production, or an average of 8,308 sq. ft. per farm.

U.S. Census of Agriculture data (2017) combines fresh market and (lower value) processing vegetable sales, reporting per-acres averages of \$6,908 for Vermont, \$3,033 for NY, \$3,231 for Michigan and \$5,211 for Georgia, for a combined average of \$4,596 per acre. Based on these data, the 219 farms we engaged with direct technical assistance have aggregate annual sales of field vegetables estimated to be \$12.2 million.

To develop a more realistic estimate of small farm, fresh market vegetable sales, we used data from [Kolbe, 2017](#); [Pesch and Tuck, 2011](#); [Stoner, 2008](#); and [Hendrickson, 2005](#), which reported gross revenues per acre of mixed vegetables to be \$15,139 and \$9,335 and \$33,160 and \$12,518, respectively. Using the average of these findings, \$17,538 per acre, we estimate the 219 farms we engaged in direct technical assistance to have \$46.55 million in aggregate annual sales of field vegetables.

Using 2017 U.S. Census of Agriculture data reported for greenhouse vegetable production area and sales in Vermont, New York, Michigan, and Georgia, we calculate the average gross revenue to be \$5.46 per sq. ft., allowing us to estimate that the 219 farms engaged in technical assistance by our project have \$9.9 million in aggregate annual sales of high tunnel (greenhouse) vegetables. Thus we estimate the farms we engaged through direct technical assistance over three years to have aggregate annual vegetable sales of \$56.4 million.

The 151 farms that reported adopting new or improved produce safety practices manage 2,065 produce acres and 1.38 million sq. ft. of vegetable production with estimated aggregate annual vegetable sales of \$36.22 million and \$7.52 million, respectively, for a total of \$43.7 million.

Testimonials

“Thanks for organizing the greens washing twilight. I really enjoyed the deep dive and detail covered. Rarely do we get to the details of farming in workshops and that really makes or breaks and operation.” - Benard Farm, Cambridge, NY

“We have never prioritized wash/pack and SCRUB gave us the kick in the behind we needed. One improvement we made was investing in an upgraded spray gun. Employees love it...When you are spraying down hundreds of bunches of roots, having a nozzle that does it in half the time with half the effort pays for itself very quickly. We use it to clean roots - bunched and loose roots - and our SOP is all the roots get sprayed down outside first and then go into the dunk tank. Meeting as part of the SCRUB project inspired a couple nights of motivation...and we made an employee training book. Everyone gets a packet and signs off on it. It has farm policies and SOPs on handwashing and injury/illness. Also made a wash/pack manual that now sits in the wash/pack station. Old employees LOVED it!” - Big Branch Valley Farm, Blairsville, GA

“Wow, I feel like I'm watching a glamor video of a wash pack pavilion, what a stunner, this is great! Our Farm needs this kind of helpful information.” - Bumble Prairie Growing, Lafayette, LA

“Through involvement with the SCRUB project, this farm developed new methods for cleaning and sanitizing harvesting bins. These developments included simple changes such as adding user friendly SOPs for workers and keeping harvest bins off the ground in the field. The farmer reported these improvements saved the farm crew on average 30 minutes at the end of each harvest day.” - Fenton's Produce, Batavia, NY

“A huge thank you for all the help with the design and implementation of our wash/pack, it's been a great experience for us, we've learned a lot. The suggestions on workflow and placement of different parts of the process have really been a big help.” - Cardinal Farms, South Lyon, MI

"We spent a lot of time researching what equipment would be best suited to our farm needs, and the videos that were produced about the rinse conveyer through the University of Vermont Extension group were a big help in understanding what might be possible. We've been using it [AZS Rinse Conveyor] for just about a month now, mostly focused on sanitizing harvest and produce bins, but also washing potatoes and bunched carrots. We're curious to hear about how others have used the conveyor and expand our own use of it." - Close to Home Organics, Abbotsford, British Columbia

"Thanks for all the work you do. Your blog has been an important resource for me." - Creelman Farm, Vinalhaven, ME

“Cleaning and sanitizing is a priority and the opportunity for all of us to get together and share what we do on farms is important.” - Georgia Organics, Atlanta, GA

“Wonderful discussion! Improved my understanding /insight on parenting and farming, together, Will help improve efficiency, flow in post-harvest production--while parenting! Will help improve farm viability as a farmer-parent.” Homefront Farmers, Redding, CT

“This workshop provided us a sense of camaraderie. It's helpful to know that other people are facing the same challenges and be able to discuss solutions to those challenges with them... It drove home the importance of the need to be able to see other models (farms) to look to and learn from.” - Love is Love Farm, Mansfield, GA

“After a farm visit by SCRUB team members, the farmer reported saving time in wash/pack activities. New improvements in the wash/pack area involved changing how water discharged from tanks so it emptied entirely allowing for quicker water change over and easier cleaning. Other improvements included new ways to clean and sanitize harvest bins, adding an aerator/bubbler to washing greens and changing their wash/pack layout to save time workers spent cleaning at the end of the day.” - McCollum Orchards & Gardens, Lockport, NY

“I have gone back and looked at the recording of "Bins" several times too. I am hoping to get some of the Orbis tomato crates based on that session, and the bin management videos may inform some of our future Wash/Pack planning (i.e., bases on wheels, drain design, flow into cooler, etc.). So yes, I absolutely intend to make improvements based on information shared in those sessions. I thought they were great.” – Philo Ridge Farm, Charlotte, VT

“We have been wanting to do this for a while. Thank you for making the space for this, I just need someone to hold me accountable! Now that I have a template, I can work on it - starting from scratch was too much.” - Rag and Frass Farm, Jeffersonville, GA

Appendix 1. Educational Resources on the SCRUB Project Web Site

Produce Safety Planning

A Small Farmer's Guide to Food Safety | [PDF](#)

A Guide to Cleaning, Sanitizing, and Disinfecting | [Web Page](#), [PDF](#)

Farm Food Safety Plan Writing Resources | [Website](#)

Food Safety Resource Clearinghouse | [Website](#)

Improving Hand washing Stations | [Web Page](#), [PDF](#)

Labeled Sanitizers for Produce - Excel Tool Version 4 | [Download](#), [Instructional Video](#)

On-Farm Food Safety: Cleaning and Sanitizing Guide | [PDF](#)

Planning an Efficient and Safe Wash/Pack Area | [Web Page](#), [Video Webinar](#)

Sanitation and Postharvest Handling | [Web Page](#)

Top 5: Working with Contractors on a Postharvest Project | [Web Page](#)

Water

Infiltration in Produce During Washing | [Video](#)

Introduction to Selecting an EPA-Labeled Sanitizer | [PDF](#)

Managing Humidity and Condensation in Coolers | [Web Page](#)

Safely Dispensing Sanitizers | [Web Page](#), [PDF](#)

Hygienic & Sanitary Design

Backflow Prevention on Produce Farms | [Web Page](#), [PDF](#)

Bins Buckets, Baskets & Totes | [Web Page](#), [Video](#)

Cleaning Tools & Supplies for Produce Farms | [Web Page](#), [Video](#)

Drains for Produce Farms | [Web Page](#), [PDF](#)

Farmer's Favorites: The AZS Rinse Conveyor | [Web Page](#)

Farmer's Favorite: Univerco Barrel Washer | [Web Page](#)

Finish Surfaces for Produce and Food Areas | [Web Page](#), [PDF](#)

Floor Design for Vegetable Wash, Pack, and Storage Areas | [Web Page](#), [PDF](#)

Hygienic and Sanitary Design for Produce Farms | [Web Page](#), [PDF](#)

Rats & Rodents | [Web Page](#), [PDF](#)

Repairing Cracks and Pitting in Concrete Floors | [Web Page](#), [Video](#)

SCRUB Shorts Series | [Video](#)
Spray Tables for Produce Farms | [Web Page](#), [Podcast](#)
Vegetable Wash Sinks | [Web Page](#), [PDF](#)

Standard Operating Procedures (SOPs)

Bubbler/Aerator Cleaning | [Factsheet](#), [Editable Cleaning SOP \(Word doc\)](#)
Cleaning Produce Washing Equipment: Root Barrel Washer Checklist | [PDF](#)
Cleaning and Sanitizing Cold Storage for Produce Safety | [Video](#)
Cleaning the Conveyor in a Brush Washer System | [PDF](#)
Detergents for Farm Food Contact Surfaces | [Webpage](#)
"Dry Cleaning" on Produce Farms | [Webpage](#)
Farm Cooler Checklist | [Web Page](#), [PDF](#)
How to Clean Bins | [PDF](#)
How to Clean and Sanitize | [Video](#)
How to Use Sanitizer on a Vegetable Farm – | [Video](#)
The 4 Steps to Cleaning & Sanitizing on Produce Farms | [Video](#)
What are SOPs? | [Video](#)

Training

Farm Vehicle Operation for Produce Safety | [Video](#)
Food Safety for Wash Pack Facilities on the Farm | [Video Presentation Playlist](#)
Introduction to Cleaning and Sanitizing for Produce Safety | [Video](#)
Power Washing Aerosolization, Considerations for Produce Safety | [Video](#)
Washing Machine Cleaning Tips | [Web Page](#), [Video](#)

Culture & Case Studies ([Web Page](#))

Building a small-scale open packshed on leased land at Flywheel Farm | [Video](#)
Easy Breezy Three Season Packshed at Stout Oak Farm | [Web Page](#), [Video](#)
Expanding to accommodate business growth at Jericho Settler's Farm | [Video](#)
Farmer's Favorites: Shipping Containers and Their Use on Vegetable Farms | [Web Page](#)
Giving a Dairy Barn New Life at New Leaf Organics | [Web Page](#), [Video](#), [PDF](#)
Last Resort Farm Not Stalled by Dairy Barn Conversion | [Web Page](#), [Video](#), [PDF](#)
Mighty Clean and Comfortable – A New Wash and Pack Shed at Mighty Food Farm | [Web Page](#), [Video](#), [PDF](#)
New Metal Building from Scratch at Hall Brook Farm | [Web Page](#), [Video](#), [360 Tour](#)
Renovating an old dairy barn to a year round packshed at High Meadows Farm | [Video](#)
Sharpening the Edges: Wash/Pack Efficiencies in a New Farm Building at Small Axe Farm | [Web Page](#), [Video](#), [PDF](#)
The BarnHouse: Optimized for Modern Day Vegetable Farming at Footprint Farm | [Web Page](#), [Video](#), [PDF](#)
Twilight Highlight Webinar's | [Video](#)
Wheels Keep Things Rolling at Root 5 Farm | [Web Page](#), [Video](#), [PDF](#)

Appendix 2. Selected Presentations Given by Project Team Members

- 3/4/21. *SOPs to Reduce Microbial and Chemical Threats*. Maine Organic Farmers and Gardeners Association, virtual.
- 6/29/21. *SCRUB Project Overview*. 2021 FSOP Project Roundtable. Virtual
- 3/17/22. *Mindful Employee Management*. Vermont Vegetable and Berry Growers Association, webinar
- 5/24/22. *Training and Technical Support to Help Small Vegetable Farms Meet the Cleaning and Sanitization Requirements of the Produce Safety Rule*. 2022 FSOP National Project Director's Meeting. Orlando, FL
- 6/6/22. *The SCRUB Project: Up to Our Elbows in Suds and Bubbles*. PSA Educators webinar
- 6/26/22. *Managing Agricultural Water*. Ontario Produce Auction grower twilight meeting. Canandaigua, NY
- 7/11/22. *Managing Agricultural Water*. Seneca County NY Produce Auction twilight meeting, Romulus NY
- 7/20/22. *Introduction to Produce Safety*. UVM Farmer Training Program, S. Burlington VT
- 9/9/22. *Post Harvest Planning: Precooling and Storage*. UMass Extension and Harvest Farm, Whately MA
- 8/26/22. *SCRUB Resources for Wash/Pack Cleaning Improvements*. Refugee/immigrant urban farm incubator program, Providence Farm, Orchard Park NY
- 10/18/22. *Greens Spinner Workshop*. Patchwork City Farms, Atlanta, GA
- 10/20/22. *Farming with Kids*. Levity Farms, Madison, GA
- 4/2/23. *Back to the Basics: Post Harvest Cleaning & Sanitizing*. University of Idaho, virtual

Appendix 3. Food Safety Outreach with the Plain Communities in New York State

In New York State, Plain communities (Amish and Mennonite settlements) are growing and farming is an essential part of these cultures. Most of their marketing is through Amish – run produce auctions and cooperatives. We estimate there are close to 1300 Plain community farms in NY, and these farms account for more than \$8.1million in produce sales.

Farm food safety acceptance and training can be a tough sell to any farmer. There are many reasons for this, from not believing they could make consumers sick since they haven't yet, to finding it too costly to make changes, to not having enough time in the day to get to it. For the Plain farming communities, there are additional barriers including literacy and cultural norms that are not readily apparent to outsiders. What works for "English" farmers don't work for Plain farmers. They will simply say they are not interested and turn away.

To make educational headway with Plain farmers, one must gain their trust and acceptance. Each community is different. Introductory meetings where we listen to them talk about their farming and marketing issues are important, to get a feel for what topics resonate with them. They are uncomfortable with hearing jargon of any sort, particularly scientific. To make progress with outreach, one must meet them where they are at, and in a setting that allows them to work together. We modified existing food safety resources to make them more accessible to our Plain communities.

Our Plain farmers are eager to improve their markets, which are community-owned produce auctions. Attracting buyers to these auctions is key to their success. Improving produce quality is one way to do that, and it can also lead to increased prices. Focusing on this, we emphasized the connection between improved wash/pack management (and other farm food safety improvements) and the level of produce quality that buyers are looking for.

As part of the SCRUB project, we organized meetings with Plain farmers selling at community-owned produce auctions, reaching over 100 farmers. We intend to expand our connection to other Plain communities. Farmers talk with relatives and friends, and word of mouth is powerful advertising for the benefits of food safety practices for Plain farmers.



Summer twilight meeting with Mennonite vegetable farmers in New York.

Appendix 4. Working with Urban Farms in Michigan

Urban growers have unique and significant challenges with respect to cleaning and sanitizing food contact surfaces, access to potable water, and lack of secure land tenure, necessitating the adoption of portable infrastructure. MSU Extension personnel collaborated with Michigan Conservation District Produce Safety Technicians to assess the specific needs of 17 urban farms in the greater Detroit area, and then to work with growers to develop and implement produce safety plans and new practices.

This effort provided over 200 hours of education and training to 73 people that own or work on urban farms. Technical assistance was provided through 34 on-site visits and 127 email/phone conversations. Farmers served as partners in delivering 3 on-site and 2 virtual educational workshops. These 17 farms have a total of 138.4 acres in vegetable crop production and 18,640 sq. ft. of high tunnel vegetable production. Changes in production practices were documented by 11 farms with a total of 4.6 acres and 14,040 sq. ft. in high tunnel production because of their participation in this project

An example of technical support provided took place on an urban farm with concerns about the location of wash water discharge from their wash pack area, given that it had the potential to contaminate an adjacent well. Working within the small footprint of the farm, we designed a new wash pack area layout with sufficient distance between the water discharge and the wellhead, alleviating a potential food safety risk.

Another example was with an urban farm that lacked an on-site source of clean water. They had a covered area to wash and pack produce, and to store harvest containers, but needed a system to manage potable water brought to the farm for washing produce. After consulting with the farmer, a plan was developed to outfit the postharvest area with a potable water tank (below).



Appendix 5. Working with Small Organic Farms in Rural Georgia

Billy Mitchell, principal of Lean and Clean LLC, providing ongoing consultation to small, rural farms primarily located in Georgia, along with farms in Mississippi, N. Carolina, and Texas. Most of these farms are certified organic or follow organic practices. He worked directly with 17 farms, many of which served as partners in delivering on-site and virtual educational workshops, and 5 conference presentations. These farms have a total of 45.25 acres in vegetable crop production and 38,060 sq. ft. of high tunnel vegetable production.

One example of an improvement supported by this project is at Rag and Frass Farm in Jeffersonville, Georgia. They wanted to reduce the amount of puddling in the wash/pack area resulting from an uneven, uncovered floor that was increasing food safety risks. Technical assistance included several email and phone conversations to identify possible solutions and then a plan to fix the floor and redirect the wash water. The farm crew leveled the dirt floor, dug a drainage ditch, installed drainage pipes from the wash sink, and covered the dirt floor with durable rubber material.

Feedback from the crew was immediate and positive. "It will be way more enjoyable to work in here!" and "I can't believe we worked all summer on that floor."



Appendix 6. Supporting and Sharing Farmer-Led Innovations through Case Studies

The Northeast is home to many small-scale, highly diversified fruit and vegetable farms. These farms face the challenge of washing, handling and storing a wide range of crops for a variety of markets. The scale of these farms often leaves them "in between" systems that range from inexpensive but manual approaches to mechanized but costly designs developed for larger farms. Necessity being the mother of invention, many farms turn to novel solutions to meet their needs. Members of the SCRUB team supported farms during visioning and planning, project implementation, and assessment to understand how the project went. This approach ensured technical support when farms needed it as well as co-learning among the farmers and the SCRUB team. This work resulted in a [collection of 13 case studies](#) that illustrate not just what was done, but how and why it was done to address a variety of infrastructure situations, crop mixes, scales, and specific farm cultures and motivations. These case studies capture a wide range of wash/packshed design solutions for small-scale farms, and they were developed in 3 formats to promote accessibility: a responsive web page on the UVM Extension Ag Engineering Blog, a downloadable and printable PDF for offline sharing and reference, and as videos on the UVM Extension Ag Engineering YouTube Channel.



Three-season 20'x40' wash/pack pavilion. Stout Oak Farm, Brentwood NH.

Barn renovation to create a 25'x36' modular, easy to clean wash/pack/storage space. Root 5 Farm, Fairlee VT.



Off-the-grid, 2-story, 25'x28' grow/wash/pack building with office space upstairs. Small Axe Farm, Barnet VT.

Old dairy barn renovation to create 23'x68' wash/pack/store area with office space and loading dock. Last Resort Farm, Monkton VT.

