

Food Safety Needs Assessment for Georgia Specialty Crops

Abstract

We conducted a needs assessment to determine food safety resources required by produce growers in Georgia. Most respondents were farm owners (52.5%), food safety managers (48.3%), and/or farm managers (34.2%). The most requested topics for training included how to improve food safety management skills and how to manage a food safety program. Of 120 respondents, 25 were unsure whether their operations were required to comply with the Produce Safety Rule. This information will guide Georgia food safety educators in developing materials and curricula for growers throughout Georgia. Additionally, our survey and findings may be of use to Extension professionals elsewhere in the Southeast and beyond.

Keywords: [needs assessment](#), [produce safety](#), [training](#)

Camila Rodrigues
Postdoctoral Research
Associate
Department of Food
Science and
Technology
University of Georgia
Athens, Georgia
crodrigues@uga.edu

Beth Oleson
Director of Education
and Food Safety
Georgia Fruit and
Vegetable Growers
Association
LaGrange, Georgia
boleson@asginfo.net

Laurel L. Dunn
Associate
Professor/Food Safety
Extension Specialist
Department of Food
Science and
Technology
University of Georgia
Athens, Georgia
laurel.dunn@uga.edu

Introduction

According to recent data from the Centers for Disease Control and Prevention (2018), approximately 48 million people in the United States are subject to foodborne illnesses each year, and nearly half (46%) of these cases are associated with contaminated fresh produce and nuts. The produce industry has experienced substantial economic losses due to illness outbreaks in recent history (Centers for Disease Control and Prevention, 2018). A multistate *E. coli* O157:H7 outbreak in 2006 resulted in over 200 illnesses in the United States and was traced to bagged baby spinach; the financial loss at the farm level was estimated to be around \$12 million (Centers for Disease Control and Prevention, 2006). A 2008 outbreak of salmonellosis associated with tomatoes resulted in economic farm-level losses of around \$25 million (Ribera et al., 2012). These and subsequent outbreaks highlighted the need for an overhaul of food regulations in the United States; accordingly, in 2011 the Food Safety Modernization Act was signed into law (U.S. Food and Drug Administration, 2017a). With the introduction of the Food Safety Modernization Act, food safety regulations shifted the regulatory framework from a system that reacted to foodborne outbreaks to a system built around preventive actions and protection of the food supply (U.S. Food and Drug Administration, 2018).

Over the years, abundant publications, curricula, and other resources geared toward the produce industry

have become available. Examples include Good Agricultural Practices (GAPs) training, Current Good Manufacturing Practices training, Hazard Analysis and Critical Control Points system training, and the Produce Safety Rule (PSR) Grower Training curriculum developed by the Produce Safety Alliance (U.S. Department of Agriculture, 2019; U.S. Food and Drug Administration, 2017a). The economic costs associated with implementing practices designed to protect food safety are far exceeded by the economic losses incurred across all segments of the industry. Educational resources and workshops are important for protecting public health and the produce industry (Ribera et al., 2012). However, appropriate training must be made readily accessible for growers, and without a formal assessment it is difficult for Extension educators to determine the needs throughout their territories (Strohbehm et al., 2018). Often, farm owners, upper managers, and food safety supervisors attend the available face-to-face workshops. These trainings cover massive quantities of material in a brief time, possibly compromising the learning experience. Therefore, it is often unclear whether the knowledge obtained during the training is implemented and difficult to determine where knowledge deficiencies may exist. Also, more research is necessary to determine whether the content covered by such trainings is appropriate for addressing the needs of individuals involved in the specialty crop chain.

Food safety educators frequently use needs assessments to identify knowledge gaps, determine training tools and resources needed by the industry, identify underserved demographics or industry segments, and assist in the overall goal of protecting consumers and local agriculture/industry from the impacts of foodborne outbreaks (Donaldson & Franck, n.d.). We conducted a systematic produce safety needs assessment to better serve the Georgia produce and nut industries by gauging educational deficiencies not currently addressed by Georgia food safety specialists and educators. Our goal was to identify educational deficiencies in Georgia's specialty crop food safety chain so that these educational partners may address those needs, thereby further protecting Georgia agriculture. Our survey and findings may be of use to Extension professionals elsewhere in the Southeast and beyond.

Methods

We collected data using an online survey administered through Qualtrics survey software. The survey was approved for use with human subjects by the University of Georgia institutional review board, PROJECT00000044.

The survey was developed and validated for content by Georgia Extension educators and food safety specialists other than ourselves to ensure that questions accurately measured all aspects of food safety training needing to be addressed. Questions were designed to address relevant topics on food safety training and potential knowledge gaps that had been reported previously in workshops and trainings offered throughout the state. The survey instrument, which consisted of multiple-choice and open-ended questions, was distributed in both online and traditional "pen and paper" formats to facilitate data collection. Respondents could choose to skip questions or select multiple answers per question. Key questions addressed types and sources of previously attended food safety trainings as well as interest in specific food safety topics for future trainings. Questions eliciting basic demographic information, including role/job title, language(s) spoken, commodities handled, activities performed at the farm, and farm location, were also included in the survey. Results of the survey were expressed as frequencies and percentages.

Data collection occurred July 7 through September 20, 2019. During this period, we shared the survey link weekly via an email list and a monthly member newsletter distributed by the Georgia Fruit and Vegetable

Growers Association. We also recruited participants via a targeted email to attendees of previous produce food safety workshops or events. Hard copies of the survey were distributed during Georgia Fruit and Vegetable Growers Association board meetings, workshops, and trainings. Overall, the survey was distributed to produce growers, harvesters, packers, shellers, food safety supervisors, and others involved in production. Our intent was to approach the maximum number of relevant stakeholders in the state without designating any excluding criteria. To avoid obtaining duplicate responses, we asked that respondents refrain from completing the survey if they already had done so.

Results

The survey was distributed to approximately 3,300 people via email and in a hard copy format. A total of 120 respondents completed the survey, for an estimated 3.6% response rate. Data collected via the online and hard copy survey instruments were consistent and homogenous, indicating no differences related to data collection format.

Demographics

Table 1 shows respondents' farm professional roles. Overall, participants were owners (52.5%), food safety managers (48.3%), and/or farm managers (34.2%), with 32.5% of participants reporting having multiple on-farm roles. The major languages spoken among farm employees were Spanish (53.3%) and English (45.8%). Commodities grown included blueberries (27.2%), vegetables (16.0%), pecans (7.0%), watermelons (7.0%), corn (6.6%), leafy greens (6.1%), and peaches (5.6%). Commodities accounting for less than 5% included citrus, cantaloupe, onions, apples, and muscadines or grapes. The majority of the activities performed on-farm included harvesting (21.5%), outdoor growing (20.8%), packing (16.7%), holding/cooler storage (14.2%), transportation (8.6%), and washing (6.2%). Almost half of the farms (48.1%) were located in southeast Georgia, 15.0% were in southwest Georgia, and 18.8% were outside Georgia, representing circumstances in which growers had multiple farm locations.

Table 1.
Respondent On-Farm Professional Roles

Professional role	Frequency	Percentage
Overall		
Owner	63	52.5%
Food safety manager	58	48.3%
Farm manager	41	34.2%
Clerical staff	19	15.8%
Single role		
Owner	36	30.0%
Food safety manager	28	23.3%
Farm manager	12	10.0%

Clerical staff	2	1.7%
Multiple roles ^a		
Owner and other roles ^b	16	13.3%
Owner and farm manager	8	6.7%
Food safety manager and clerical staff	5	4.2%
Manager and other roles	4	3.3%
Food safety manager and farm manager	3	2.5%
Owner and food safety manager	3	2.5%

^aRespondents reported having multiple on-farm roles that overlapped with other roles. ^bOther roles include three or more on-farm roles.

Training Topics

The Produce Safety Alliance Grower Training Course (29.7%) and GAPs training (28.2%) accounted for the majority of previously received training (Table 2). The leading topics participants were interested in receiving further training on related to becoming a better food safety manager (11.2%), managing a food safety program (9.9%), writing a food safety plan (9.4%), preparing for a third-party audit (9.4%), addressing packing facility design and sanitation (9.2%), implementing effective traceability/recall and crisis communication (8.5%), and conducting environmental monitoring (6.1%) (Table 3). All other topics each accounted for less than 6% of participants' responses (Table 3). Participants reported that their employees could benefit from harvest crew food safety practices training (34.1%), cleaning crew training (23.4%), personal hygiene training (22.3%), and sanitizer monitoring and management training (18.6%) (Table 4).

Table 2.
Previously Attended Food Safety Trainings

Food safety training	Frequency	Percentage
Produce Safety Alliance Grower Training Course	77	29.7%
Good Agricultural Practices training	73	28.2%
Hazard Analysis Critical Control Points system training	48	18.5%
Preventive Controls for Human Food training	25	9.7%
Hands-On Packing Shed Facility Sanitation & Environmental Monitoring Workshop	20	7.7%
Better Process Control School	2	0.8%
Preventive Controls for Animal Food training	1	0.4%
Foreign Supplier Verification Programs training	1	0.4%
Other	4	1.5%
Have not received food safety training	8	3.1%
Total	259	100%

Table 3.
Desired Topics for Further Food Safety Training

Food safety topic	Frequency	Percentage
How to be a better food safety manager (manage employees, productive food safety committee meetings, how to advocate for more resources with ownership, etc.)	46	11.2%
How to manage a food safety program (how to use data for improvement, what to do with all the data, etc.)	41	9.9%
How to write a food safety plan (create standard operating procedures, checklists, training, etc.)	39	9.4%
Preparing for a third-party audit	39	9.4%
Packing facility design and sanitation	38	9.2%
Traceability/recall and crisis communication	35	8.5%
Environmental monitoring	25	6.1%
Balancing conservation of wildlife habitat with food safety practices	23	5.6%
Responding to a third-party audit report	21	5.1%
Best handling practices for postharvest/wash water sanitizer	21	5.1%
Preharvest water management and disinfection	20	4.8%
Good produce handling and storage practices	20	4.8%
How to make food safe compost	17	4.1%
Safe use of soil amendments	14	3.4%
Product transportation	13	3.2%
Other ^a	1	0.2%
Total	413	100%
^a Other responses included Hazard Analysis Critical Control Points system.		

Table 4.
Desired Topics for Further Employee Food Safety Training

Food safety topic	Frequency	Percentage
Food safety for the harvest crew	64	34.1%
Cleaning crew training	44	23.4%
Personal hygiene	42	22.3%
Sanitizer monitoring and management	35	18.6%
Other	3	1.6%
Total	188	100%

When participants were asked whether their farms or operations were required to comply with the U.S. Food and Drug Administration PSR, 63 (59.4%) responded "yes," 25 (23.6%) responded "not sure," and 18 (17.0%) responded "no." Fourteen respondents (11.7%) did not answer.

Food Safety Training Information Sources

Most participants reported receiving information about food safety training through Georgia Fruit and Vegetable Growers Association emails (27.3%), the Georgia Department of Agriculture (21.1%), the University of Georgia Extension website (19.3%), and other university Extension websites (10.8%) (Table 5). Other sources, including commodity groups, neighbors, social media, newspapers, and radio, accounted for the remaining 21.0% of responses (Table 5).

Table 5.
Sources of Food Safety Training Information

Source	Frequency	Percentage
Georgia Fruit and Vegetable Growers Association emails	61	27.3%
Georgia Department of Agriculture	47	21.1%
University of Georgia Extension website	43	19.3%
Other university Extension websites	24	10.8%
Commodity groups	15	6.7%
Neighbors	8	3.6%
Social media	7	3.1%
Newspaper	2	0.9%
Radio	2	0.9%
Other ^a	14	6.3%
Total	223	100%

^aOther responses included food safety consultant, Community Financial Services Association of America emails, and GLOBALG.A.P.

Conclusions and Considerations

Our findings suggest that members of the produce industry in Georgia have the greatest need for tools to assist with developing soft skills among managers and developing and implementing food safety plans. The majority of produce-related offerings in Georgia thus far have focused on GAPs, the PSR, or the Hazard Analysis Critical Control Points system. Few resources or trainings addressing a systematic approach to building a food safety program have been offered by Georgia Extension educators. One example of such a program is the Hands-On Packing Shed Facility Sanitation & Environmental Monitoring Workshop, which was provided in August 2018 and April 2019 by Mérieux NutriSciences and the Georgia Fruit and Vegetable Growers Association, along with a partner from the University of Georgia (Mérieux NutriSciences, 2018). As with many food safety trainings, the primary focus of this workshop was data collection, and, specifically,

collection of environmental microbial samples (Mérieux NutriSciences, 2018). Little attention was given to data interpretation and management. Similarly, GAPs and PSR trainings focus on data collection and interpretation of microbial indicator counts in agricultural water (U.S. Food and Drug Administration, 2017b), with little conversation regarding data management. None of these trainings addresses soft skills required by individuals in upper management, nor do they discuss how food safety managers can engage their superiors in meaningful food safety conversations.

Our initial goal was to assess the needs of Georgia producers; however, nearly 19% of our survey respondents indicated involvement in agriculture in surrounding states. As agricultural practices and commodities throughout the Southeast share many similarities, we believe the additional surveys were a valuable contribution to the assessment. Nearly half of the respondents reported Spanish as the major language spoken among farm employees. This information was crucial for identifying the need to develop educational materials for trainings and workshops that appropriately approach this target audience. All respondents were either an attendant at a food safety workshop hosted by the University of Georgia or were a member of the Georgia Fruit and Vegetable Growers Association, indicating that they use offerings and information from both organizations. Growers frequently cross state lines to receive food safety and production-related training offered in adjoining states, and non-Georgia residents frequently attend courses in Georgia. Therefore, the data generated through our assessment would most likely bear striking similarities to findings from other states if such surveys were conducted and thus may be useful to educators at other land-grant programs throughout the Southeast.

In Georgia, the PSR growers' curriculum is administered by the Georgia Department of Agriculture in cooperation with University of Georgia Extension specialists. Continued outreach efforts are needed throughout Georgia as 23.6% of respondents were unsure whether their operations were required to comply with the PSR. The outreach team has used the top three outreach sources, Georgia Fruit and Vegetable Growers Association emails, the Georgia Department of Agriculture website, and the University of Georgia Extension website, to educate growers and notify them of workshop dates throughout the state. However, as a high number of respondents still have not been reached with the messaging regarding the PSR, novel outreach methodologies should be explored. Although the response rate of our survey was relatively low, a representative portion of produce growers in the state completed the survey that was distributed among board members of the Georgia Fruit and Vegetable Growers Association and attendees of previous workshops and training. However, the data may not reflect the educational needs of those involved in small operations, given that a considerable proportion of small growers were not addressed by the survey.

Educators and trainers need frequent updates regarding the impacts of their programs and priorities related to food safety topics to identify and correct these gaps, consequently minimizing the risks of produce contamination and future foodborne illness outbreaks (Ho, Pennell-Huth, Newman, Zansky, & Wiedmann, 2018; Tobin, Thomson, LaBorde, & Radhakrishna, 2013). Collecting this information directly from the target audience rather than relying on educators' and trainers' assumptions can be more useful for helping produce growers commit to and comply with food safety training requirements (Strohbehn et al., 2018), suggesting that other Extension professionals should consider conducting similar surveys in their states or regions. The survey was beneficial for helping trainers and educators in Georgia better address food safety topics in future trainings. The assessment findings can be further used to enhance the competitiveness of Georgia specialty crops through increased understanding and implementation of food safety measures throughout the industry. With this information, Georgia food safety specialists and educators will be able to effectively continue offering

food safety training to stakeholders throughout Georgia and even expand to other states. The same outcomes could be achieved through implementing similar surveys elsewhere.

References

- Centers for Disease Control and Prevention. (2006, October 6). *E. coli (Escherichia coli) O157:H7 infections linked to fresh spinach*. Retrieved from <https://www.cdc.gov/ecoli/2006/spinach-10-2006.html>
- Centers for Disease Control and Prevention. (2018). Estimates of foodborne illness in the United States. Retrieved from <https://www.cdc.gov/foodborneburden/2011-foodborne-estimates.html>
- Donaldson, J. L., & Franck, K. L. (n.d.). *Needs assessment guidebook for Extension professionals*. Retrieved from <https://extension.tennessee.edu/publications/Documents/PB1839.pdf>
- Ho, A., Pennell-Huth, P., Newman, A., Zansky, S., & Wiedmann, M. (2018). Foodborne illness outbreak investigation training needs: A survey among state public health staff in the northeast and mid-Atlantic United States. *Journal of Public Health Management and Practice*, 24(1), 34–40.
- Mérieux NutriSciences. (2018, August 28). Mérieux NutriSciences & The Georgia Fruit and Vegetable Growers Association presents: Hands-On Packing Facility Sanitation & Environmental Monitoring Workshop. Retrieved from <https://education.mxns.com/events/merieux-gfvga-presents-hands-on-packing-facility-sanitation-environmental-monitoring-workshop/>
- Ribera, L. A., Palma, M. A., Paggi, M., Knutson, R., Masabni, J. G., & Anciso, J. (2012). Economic analysis of food safety compliance costs and foodborne illness outbreaks in the United States. *HortTechnology*, 22(2), 150–156.
- Strohbehn, C. H., Enderton, A., Shaw, A. M., Perry, B., Overdiep, J., & Naeve, L. (2018). Determining what growers need to comply with the Food Safety Modernization Act Produce Safety Rule. *Journal of Extension*, 56(7), Article v56-7rb1. Available at: <https://www.joe.org/joe/2018december/rb1.php>
- Tobin, D., Thomson, J., LaBorde, L., & Radhakrishna, R. (2013). Factors affecting growers' on-farm food safety practices: Evaluation findings from Penn State Extension programming. *Food Control*, 33(1), 73–80.
- U.S. Department of Agriculture. (2019). Good agricultural practices (GAP) & good handling practices (GHP). Retrieved from <https://www.ams.usda.gov/services/auditing/gap-ghp>
- U.S. Food and Drug Administration. (2017a). FDA Food Safety Modernization Act. Retrieved from <https://www.fda.gov/food/guidance-regulation-food-and-dietary-supplements/food-safety-modernization-act-fsma>
- U.S. Food and Drug Administration. (2017b). How did FDA establish requirements for water quality and testing of irrigation water under the FSMA final rule for produce safety. Retrieved from <https://www.fda.gov/food/food-safety-modernization-act-fsma/how-did-fda-establish-requirements-water-quality-and-testing-irrigation-water-under-fsma-final-rule>
- U.S. Food and Drug Administration. (2018). Background on the FDA Food Safety Modernization Act (FSMA). Retrieved from <https://www.fda.gov/food/food-safety-modernization-act-fsma/background-fda-food-safety->

[modernization-act-fsma](#)

Copyright © by *Extension Journal, Inc.* ISSN 1077-5315. Articles appearing in the Journal become the property of the Journal. Single copies of articles may be reproduced in electronic or print form for use in educational or training activities. Inclusion of articles in other publications, electronic sources, or systematic large-scale distribution may be done only with prior electronic or written permission of the Journal Editorial Office, joe-ed@joe.org.

If you have difficulties viewing or printing this page, please contact [JOE Technical Support](#)