Proceedings

June 29–30, 2011
Omni Hotel, Orlando, FL
### Table of Contents

Welcome ................................................................. 3  
Acknowledgements .................................................. 5  
Agenda ................................................................. 7  
Biographical Sketches .............................................. 11  
Educational and Training Materials ......................... 15  
Conference Participants .......................................... 95
Welcome!

Welcome to the Produce Safety Alliance Good Agricultural Practices Education and Training Materials Conference! We are happy that you took time to participate in this conference and to experience many education and training programs focused on Good Agricultural Practices and produce safety. Many individuals and organizations have submitted field tested as well as newly developed educational and training materials for you to review. It is our hope that throughout this conference that you will not only learn about existing programs but that you will also share experiences and knowledge that you have to enrich the conference.

The main conference objectives are to:

- Promote collaborative working relations among actively engaged PSA stakeholders
- Review current produce safety education and training materials while highlighting the lessons that have been learned through development and delivery of Good Agricultural Practices and Co-management extension programs
- Provide an inventory of the existing produce safety educational and training materials including effective outreach tools that may be utilized to support the PSAWorking Committees and curriculum development
- Provide an update of PSA activities and encourage participation in the curriculum development process

We hope everyone has a chance to meet someone new or reconnect with old friends and colleagues. We encourage everyone to fully participate in this conference by sharing your thoughts, ideas, and perspectives. With everyone's participation, a successful and enjoyable conference is guaranteed.
Acknowledgements

The Produce Safety Alliance (PSA) Good Agricultural Practices (GAPs) Education and Training Materials Conference is bringing together individuals interested and involved in education and outreach in the area of produce safety. With a focus on increasing the understanding and implementation of food safety practices such as GAPs on farms and in packinghouses, the PSA strives to continually work to reduce risks to fruits and vegetables. This conference and the work of the PSA are supported through funding from the United States Food and Drug Administration and the United States Department of Agriculture. Their commitment to fruit and vegetable safety is evident in both the financial resources they invest as well as the technical expertise they provide through the participation of their dedicated and knowledgeable professionals. The PSA is particularly fortunate to have an Executive Committee that is engaged and generous with their time and expertise. These individuals are listed below and for their efforts, we are truly grateful.

Reaching the goals of this conference would not have been possible without the many individuals and organizations who took the time to submit GAPs educational and training materials that they have developed. Sharing these materials and the lessons they have learned as well as the knowledge they have gained are critical to the success of this conference. Their efforts are genuinely and sincerely appreciated since without them there would not be a program to present.

A very special thank you is extended to all of those who have embraced the PSA mission and generously volunteered to participate in the PSA’s Working Committees. These Working Committees have participants from all sectors of the produce industry and it is clear from the initial meetings that there is significant interest and commitment to move the understanding and implementation of produce safety practices forward.

Finally, we want to thank you, the participants, for your interest in fruit and vegetable safety and for taking time from your busy schedules to participate in this important conference. We hope you find it valuable.

Sincerely,

Elizabeth A. Bihn, Ph.D., Produce Safety Alliance Project Director

Produce Safety Alliance Executive Committee

Marion F. Aller, DVM, DABT, Florida Department of Agriculture and Consumer Services
Samir Assar, Ph.D., FDA Center for Food Safety and Applied Nutrition
Jennifer A. Dougherty, USDA, Agricultural Marketing Service
Bob Ehart, National Association of State Departments of Agriculture
James R. Gorny, Ph.D., FDA Center for Food Safety and Applied Nutrition
Robert B. Gravani, Ph.D., Cornell University
C. Wayne Honeycutt, Ph.D., USDA Natural Resources Conservation Service
Robert C. Keeney, USDA, Agricultural Marketing Service
Patty Lawrence, USDA, Natural Resources and Environment
Cathy McDermott, FDA Division of Federal State Relations
Rayne Pegg, USDA, Agricultural Marketing Service
Joe Reardon, FDA Office of Regulatory Affairs
Leanne L. Skelton, FDA Center for Food Safety and Applied Nutrition on detail from USDA
Ray Starling, North Carolina Department of Agriculture and Consumer Services
Stephen Stich, New York State Department of Agriculture and Markets
Agenda

Wednesday June 29, 2011

8:00 – 8:15 am .......... Welcome and Introductions

Jeff Farrar, DVM, MPH, PhD
Associate Commissioner for Food Protection
Office of Foods
U.S. Food and Drug Administration

Ann Wright
Deputy Under Secretary for Marketing and Regulatory Programs
United States Department of Agriculture

8:15 – 8:45 am .......... PSA Goals, Objectives, Organizational Structure, Timelines

Elizabeth Bihn and Robert Gravani
National GAPs Program
Cornell University

8:45 – 9:00 am .......... Discussion

9:00 – 9:15 am .......... Overview of Educational Outreach Review

Robert Gravani
National GAPs Program
Cornell University
Ithaca, NY

9:15 – 10:00 am .......... Small Scale Growers Group

Elizabeth Bihn
National GAPs Program
Cornell University
Geneva, NY

Raymond Yoder
Yoder’s Produce
Fredericksburg, OH

Johnna Hepner
Produce Marketing Association
Newark, DE

10:00 – 10:30 am ....... Break
10:30- 11:00 am........Small Scale Grower Group (continued)

   Wesley Kline
   Rutgers Cooperative Extension
   Millville, NJ

   Keith Schneider
   University of Florida
   Gainesville, FL

11:00 –12:00 noon .... Small Scale Growers with an emphasis on
Organic/Sustainable Growers Group

   Chris Gunter
   North Carolina State University
   Raleigh, NC

   Michele Schermann
   University of Minnesota
   St. Paul, MN

   Richard Molinar
   University of California Cooperative Extension
   Fresno, CA

   Jim Slama
   FamilyFarmed.org
   Oak Park, IL

12:00 – 1:30 pm.........Lunch on Own

1:30 – 2:00 pm.........Discussion: Small Scale Grower Programs

2:00 – 2:45 pm.........Medium and Large Scale Grower Group

   Trevor Suslow
   University of California
   Davis, CA

   Sergio Nieto-Montenegro
   American Mushroom Institute
   Washington, DC

   Andrew Kramer
   CA Strawberry Commission
   Watsonville, CA
2:45 – 3:00 pm .......... Discussion: Medium and Large Scale Grower Programs

3:00 – 3:30 pm .......... Break

3:30 – 4:15 pm .......... Incorporating Environmental Co-management into on-farm food safety training

Laura Giudici Mills  
LGM Consulting  
Spreckels, CA

Daniel Mountjoy  
USDA NRCS  
Salinas, CA

Jo Ann Baumgartner  
Wild Farm Alliance  
Watsonville, CA

4:15 – 4:30 pm .......... Discussion

4:30- 5:00 pm .......... Break and Educational Materials Showcase Set-up

5:00 – 7:00 pm .......... Educational Materials Showcase (Refreshments, Snacks)

Thursday- June 30, 2011

8:00 – 8:15 am .......... Reflections

8:15 – 9:00 am .......... Innovative Approaches to Produce Safety Education Outreach

Ben Chapman  
North Carolina State University  
Raleigh, NC

Marissa Bunning  
Colorado State University  
Fort Collins, CO

Elizabeth Bihn  
National GAPs Program  
Cornell University  
Geneva, NY

9:00- 9:30 am .......... Discussion
9:30-9:45 am .......... Building a Diverse Statewide Produce Safety Task Force: An Example of Collaboration
   Diane Ducharme
   *North Carolina State University*
   Kannapolis, NC

9:45 – 10:30 am .......... Review of Produce Safety Alliance Progress to Date
   Outline Working Committees
   Introduce Co-Chairs
   Discuss current curriculum development strategy
   Discuss timelines and focus group evaluation

10:30-11:00 am .......... Break

11:00 - 11:30 am ........ Integrating Educational and Training Materials with the PSA Curriculum
   Group Discussion
   Review educational and training materials highlighted at the showcase
   Identify areas where materials are best suited for integration into the curriculum

11:30 - 12 noon .......... Meeting Summary
   Conclusions
   Next Steps
   Program Evaluation

Adjourn at 12:00 pm
Biographical Sketches
Biographical Sketches

Jeff A. Farrar
Dr. Farrar is the Associate Commissioner for Food Protection in the FDA where he oversees and coordinates various efforts in the Office of Foods. Dr. Farrar was previously the Branch Chief of the Food and Drug Branch in the California Department of Public Health where he led a large, diverse state food, drug, and medical device regulatory program. Dr. Farrar graduated from the University of Tennessee College Of Veterinary Medicine in 1981 and received his Master of Public Health degree from the University of Minnesota in 1983 and his Ph.D. in epidemiology from the University of California-Davis in 1998. Dr. Farrar completed the Centers for Disease Control and Prevention’s Epidemic Intelligence Service two-year training program in 1985. Dr. Farrar lead numerous environmental investigations of foodborne outbreaks in California including salmonellosis associated with eggs, sprouts, and cantaloupe, E.coli O157 illnesses from leafy greens, unpasteurized apple juice and sprouts, and cyclosporiasis from berries. He has worked closely with numerous industries and agencies to develop preventive guidelines for safe food production and has co-authored numerous scientific publications.

Ann Wright
Ann Wright is Deputy Under Secretary for Marketing and Regulatory Programs at the U.S. Department of Agriculture. Most recently she served as Senior Policy Advisor to Senate Majority Leader Harry Reid on Agriculture Committee matters. Before joining the staff of Senator Reid she was a lobbyist for Consumers Union on energy and trade issues. Previously she worked with farmers and non-profit organizations at the Sustainable Agriculture Coalition in Washington, D.C. and served as a policy advisor on agriculture issues for Senator Paul Wellstone of Minnesota and Senator Paul Simon of Illinois. She is from central Illinois and earned her Bachelors Degree in Political Science from Illinois State University.
Educational and Training Materials
Multi-day GAPs Training and Farm Food Safety Plan Writing Workshop for New York Farmers

Elizabeth A. Bihn, Robert Hadad, Craig Kahlke, William Lyons
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Target Audience
Fresh fruit and vegetable growers. Most attendees operate small or medium sized farms. Have made modifications for organic farmers and Plain Farmers including Amish and Mennonite farmers.

Topics Discussed
• GAPs
• Risk assessment
• Farm food safety plan writing
• Third-party audits

Fresh fruit and vegetable growers are not just worried about the weather. Foodborne illnesses associated with fresh produce have kept produce safety concerns in the media and have resulted in many produce buyers requiring third-party audits of farms to verify they have implemented food safety practices such as Good Agricultural Practices (GAPs). A written farm food safety plan with record keeping is required for farms that would like to have a third party audit. Developing a farm food safety plan requires functional food safety knowledge and the ability to apply this knowledge through risk assessment.

A collaborative effort between Cornell Cooperative Extension Educators, National GAPs Program and the New York State Department of Agriculture and Markets has resulted in a productive outreach program for fruit and vegetable producers in New York State. This project includes a three day workshop series that provides farmers with information about fresh produce safety including Good Agricultural Practices, a day to write a farm food safety plan, and an opportunity to participate in a mock farm audit with auditors from the New York State Department of Agriculture and Markets. This project has been a multi-year evolution building on new ideas and existing programs to create an effective and efficient way for farmers to learn about GAPs and create their own unique farm food safety plans.

This collaboration is funded through the Northeast Risk Management Association and a special Smith-Lever supplement. The project provides growers with a hands-on opportunity to write their own unique farm
food safety plan with assistance from extension educators and to develop a record keeping system that is needed to successfully pass an audit. Not every grower may need an audit but with an impending FDA rule that could result in food safety regulations, every farmer, regardless of the size of their operation, should understand produce food safety practices and have a written farm food safety plan. This project is a stellar example of productive collaboration that benefits all fresh produce farmers in New York State as well as the many consumers who enjoy the bounty of New York’s agricultural industry.

**Summary of Evaluation Data**
Ten trainings were conducted over a 16 month period throughout New York State. Farmer owners and managers accounted for most of the 179 attendees but there were a few crop consultants, NYC Green Market personnel, NOFA-NY LLC certifiers and extension educators that attended as well. Trainings for the 2010-2011 season just finished but as a result of last years trainings, approximately 33% of the farms completed their plans and passed an audit within 1 year of attending the workshop. Several of the farms that did not complete an audit are not experiencing market pressure to do so because they are direct marketers such as pick your own operations. By the end of Day 2 of the workshops, more than half the participants had completed at least 76-99% of their FFSP, while 6% were completely finished. In addition to the information presented on the table above, over 90% of the workshop participants indicated the workshop exceeded expectations and was very useful, as rated a 4 or 5 out of a possible 5. There were no ratings in the 1 or 2 categories.

As part of the written evaluations, there was a voluntary comment section. Some direct quotes are shared below and highlight common opinions about the program. “Good $ value for the whole program”; “Overall, the class was time well spent. I appreciated both the lack of structure and number of people available for questions on day 2”; “Thanks. People involved were very patient and helpful”; “This was very helpful and educational, received great help and encouragement. Great teachers, very great information”.

**Training Materials**
Jump drive with template farm food safety plan, record keeping sheets, and electronic references including water disinfection guidance, harmonized audit documents, resources from Land-Grant Universities, USDA audit checklists, etc.
I attended my 8 grades of school education in a 1-room parochial school within walking distance of our family farm near Mt. Hope, Ohio.

Our first 10 years of married life were spent on a rented dairy/hog farm, but we could not make ends meet. So, in 1988, we relocated on 12 acres and grew vegetables profitably for 22 years with our family of 6 children.

A lot of my time the past 15 years has been devoted to helping to start produce auctions in areas where Amish-Mennonite families are trying to keep the small family farms profitable. These families are switching to growing vegetables because they can't make ends meet in other types of farming on small acreage.

Today, there are 90 wholesale produce auctions in America that I have spent some time with helping the growers with food safety education along with growing tips and standards which is a must if the growers and the auctions want to be profitable.

My strong point to get this education across to the these plain people with an 8th grade education is by talking to them in the German language on the same level as their education is. These growers can also understand English, but the real meaning of food safety and growing practices is understood better if it is taught out of experience in the same language that is used when working the fields, picking, packing, etc.

My education is done in a 2 hour class off of a flip-chart. Many of these people won't participate in a slide or Power Point class. I ask that all growers use the Farm Record Book that I'm presenting here for their day to day records.
My teachings are based on the book “Food Safety Begins on the Farm”, by Cornell University, plus experiences from using horses for power on the farm. Also, I focus on keeping produce fresh and safe without electricity.

It will take time and be a challenge to educate these approximately 25,000 farmers that grow produce and market it thru these 90 produce auctions on a wholesale basis. I feel these farmers are a very vital part of providing America with safe food. A large part of these growers are concerned about food safety and want to do all they can as long as it's financially sustainable.

I want to help in any way I can to provide education and training that these people, like me, can grow food for generations to come.

**Training Materials**

Farm Record Book. Training is conducted with handouts and flipcharts since Amish-Mennonite growers will not participate in trainings with slides or powerpoint presentations.
Food Safety for Small Growers

Johnna Hepner, Bob Whitaker

Produce Marketing Association
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Target Audience
Small to mid scale farmers.

Topics Discussed
- Evolution of food safety
- Components of building a food safety program
- Risk assessment and risk management
- Record keeping

PMA’s small grower training workshop is a comprehensive food safety overview that provides small to mid scale growers the tools needed to develop and implement an effective food safety program as well as resources available to them to help provide additional help with food safety. We begin the workshop with an overview of why food safety is important, what has change and what to expect in the future.

We invite a local chef to come talk about the importance of sourcing local produce as well as the challenges of consistent supply, and quality. These chefs are aware of food safety importance and communicating the importance of GAP’s is an important element to sourcing product for their restaurants. We also invite a local grower from the area where the workshop is taking place to also share his experiences and challenges of putting together a food safety program.

The bulk of the program is built around the components of a food safety program and the “how to” develop an effective program that is scalable to your operation. We will discuss the building blocks of a food safety program, risk assessment and risk management. Also included are the importance of employee training, documentation and record keeping.

We also invite third party auditing companies to participate in round table discussions regarding their programs, audits and other services they may offer for small growers. The roundtable discussions provide the attendees an opportunity to ask questions or even discuss current farm practices.
Current and Past Food Safety Outreach in New Jersey

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Target Audience
The primary audiences in the beginning were wholesale produce growers and distributors. This has expanded to include small-scale and retail growers both conventional and organic.

Topics Discussed
- Important pathogens
- GAPs for the farm and GHP for the packinghouse
- Writing a food safety plan
- Problems observed in audits
- Water testing and treatment
- Retailers role in food safety

Trainings start out with a single presentation to build awareness for food safety. These presentations point out outbreaks that have occurred, commodities involved, areas of major concern and are invaluable in exposing the industry to what is happening in food safety. However, the presentations do not provide sufficient information for growers to develop their own food safety plans. Therefore longer sessions are scheduled on specific subjects with several presenters. Both the short and longer sessions take place at regional or statewide meetings as part of a larger program.

Full day (4–5 hours) food safety/third party audit trainings take place on an annual basis in three or four locations around the state. Each session is tailored to the audience i.e. retail or wholesale growers, specific commodities, etc. All sessions include presentations on problems observed in past audits and what to include in a food safety plan. Other topics which are covered depending on location and audience are: important pathogens, water testing and management, retailer's prospective on food safety, good handling practices in the packinghouse and storage, proper handwashing and toilet use, good agricultural practices on the farm, traceability, etc. Each workshop participant receives a certificate of participation and a manual which includes step by step instructions and materials on how to write a food safety plan. At the end of the workshop, each participant is offered the opportunity to have someone carry out a mock audit (second party audit) after they finish their food safety plan. These mock audits take approximately the same length of time as a formal audit. The “mock auditor” reviews the operation’s food safety plan then does a walk through of the facilities. Anyone who has taken advantage of the opportunity has passed their formal audit.
These training activities are supported by information provided through a website which is updated at least monthly and weekly and monthly articles in Extension publications during the production season.

**Summary of Evaluation Data**
Since 1999 we have trained 2,324 individuals on food safety issues, 1,148 have gone through third party audit training and 100 have passed their audits. We averaged 18 mock audits per year (2007-10). More growers have written food safety plans, but have not gone through the audit process. The low numbers of actual audits relates to the retail industry not being consistent in requiring growers and distributors to pass audits.

Pre and post evaluations are given at all workshops to tailor future programs to the industry’s needs. We make changes to each workshop based on those results. The biggest challenge is convincing growers they need to develop food safety plans and pass audits. This perception is slowly changing as the industry is exposed to more information about the need and publicity concerning outbreaks and recalls. For this reason we write newsletter articles on a weekly and monthly basis as well as giving presentations at grower meetings around the state.

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**Training Materials**
The following material are suitable for any size operation:


Effective food safety standards, practices and education are critical to sustain and safeguard Florida’s high level of specialty crop production. It is essential to establish, utilize and maintain food safety guidelines to enhance food safety at every phase of agriculture production. A high priority placed on food safety education results in the safest product possible and enhanced consumer protection.

In order for Florida specialty crops to remain competitive and to ensure safe consumption, many practices must be followed to prevent and reduce microbial or chemical contamination. These practices must be followed in every phase from farm to consumer. Specifically, this includes the production, handling, packing, transporting and serving. Tomato Good Agricultural Practices (T-GAPs) for tomato farms and greenhouses and Tomato Best Management Practices (T-BMPs) for packinghouses and post harvest handling were developed from 2004-6; however, the basic food safety education and training to implement these requirements at all levels of tomato production from the farm to the consumer was not available or broadly offered before this program. Specialty Crop Block Grant funds provided for the development and implementation of specific training materials targeted to a broad and diverse audience from highly skilled and educated packinghouse managers and grower/owners to a less skilled and changing workforce.

Goals of this grant can be broken down into three main objectives: 1) develop and deliver food safety educational materials and training; 2) focused on providing...
training and materials statewide to producers, field workers, packers and repackers of fresh fruits and vegetables; and 3) develop a food safety program focusing on those fruits and vegetables associated with the highest risk of foodborne illness and at the greatest level of production in Florida: tomatoes, leafy greens, melons and berries.

In order to meet our goals, we partnered with several leaders in food safety that contributed to the overall success of this project. The grant partners played an important role to the success of this grant. Our two main partners, Cornell University and Pennsylvania State University (PSU) were instrumental in the creation and preparation of training materials. Additionally, the assistance of county Extension personnel cannot be emphasized strongly enough as they were instrumental with assisting in the scheduling and preparation of regional training events. The authors of this abstract comprised the instructor team.

With the workshop events we have trained 1027 attendees (approx. 700 persons; with some individuals attending two or more workshops). Of the 700 unique individuals, approximately 40 were Florida Extension agents. The majority of the non-extension attendees were management personnel, who in turn were tasked to trained their upper management employees and ultimately will in turn train the packinghouse and farm workers. If you estimate the number of employees who will be trained by those person we’ve trained, or through the use of our free educational materials and/or the Produce Safety Center website, you could multiply the attendee number by 10, possible 100 (or more) to estimate the overall impact this grant has had on Florida agriculture. These workshops possess a significant multiplicative effect.

One of the most impressive metrics of the success of this grant is that with approximately 1,000 persons trained, this program delivered training at a cost of only $200-210 per person. Even more impressive is that approximately 60-70% of the training costs were materials given directly back to the farmers and processors.

One of the major off-shoots of this project was the effort headed up by our County Extension agents who modified the presentations to become more size-appropriate for smaller farms. This “Build Your Own Farm’s Food Safety Manual” training has been delivered five times in the past year as a hands-on training through the University of Florida Small Farms Academy. Small farmers have participated in the trainings to begin taking responsibility on their farms to implement food safety GAPs even if their buyers have not required certification yet and to use this as a direct marketing tool.

### Training Materials

The training material used for this program was sourced from several places. The University of Florida prepared a Handwashing DVD (Eng. and Span.) and Handwashing poster (Eng. and Span.). GAPs materials were purchased from the Cornell National GAPs programs (Eng. and Span.) and a new Creole version of their DVD ‘Food Safety Begins on the Farm’ was created for this program. Lastly, a tailgate training flipchart was sourced from Penn. St. University (Eng. and Span.) and a new Creole version of this flipchart was created for this program.
Food Safety Plan and Crisis Communication Plan Development

Chris C. Gunter, Diane Ducharme, Ben Chapman, Trevor Phister

North Carolina State University
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Target Audience
Fruit and vegetable producers across the state. Target group includes large and small scale growers, sustainable and conventional producers.

Topics Discussed
The components of both a food safety plan and crisis communication plan are discussed. Also, the importance of these two plans in the overall strategy for fresh produce safety on the farm.

The North Carolina Fresh Produce Safety Task Force’s goal is to ensure that North Carolina has a competitive, vibrant and safe fresh produce industry supported through the research, teaching and outreach programs of NC State University, NC A&T State University, NC Department of Agriculture and Consumer Sciences, Farm Bureau and industry groups. We hope to minimize food safety risks and enhance the economic competitiveness of the NC fresh produce industry. This Task Force is co-chaired by Chris Gunter (Horticultural Science), Diane Ducharme (NC Market Ready), Ben Chapman (Family and Consumer Sciences), and Trevor Phister (Food, Bioprocessing, and Nutrition Sciences). This expertise, as well as the multi-disciplinary team that makes up the Task Force was instrumental in the development of the Fresh Produce Safety Plan that is currently being used by growers in the development of on-farm plans leading to GAP certification. This food safety plan is an integral part of the training program (Tier 2) that is in use by NC. To date over 130 growers have been trained using this plan. The Crisis Communication Plan, which has been developed, has been used for training growers in crisis communication in 5 states (NC, LA, MS, AR, and CA). The instruction in this plan took place via a multi-state webinar involving 47 participants. Many of these were commodity association leadership, which planned to use this crisis communication training for the benefit of their commodity groups. This training included on camera interviews as well as in class instruction on dealing with crises for the fresh produce industry.
Summary of Evaluation Data

While GAPs certification is not ultimately a sign of risk reduction, it does allow us to look at the numbers of farms being required by end markets to be GAPs certified and are implementing risk reduction practices. GAPs certification in NC, from only one certifier (USDA) has risen to from 17 farms to over 60 farms in 2011. At the Tier 2 training level, 138 growers since 2010 have received food safety plan training using this material. On the crisis communication plan side, 47 growers in 5 states have been trained using this material. It has been delivered via a webinar and also face to face training.

Training Materials


More wholesalers and schools who wish to buy local produce are requiring growers to be GAPs certified. Recent partnership agreements with the USDA Risk Management Agency, Community Outreach & Assistance Partnership Program, provided funding for the development of timely resources. Michele Schermann from the University of Minnesota started looking at adapting the national GAPs standards to better meet the needs of Minnesota’s fruit and vegetable producers. Producers gathered for a focus group with Betsy Bihn, National GAPs Coordinator, and provided feedback on next steps. Producers, faced with the thought of the documentation involved, said “We need a place to start. We need a template.” The result, with funding through the Minnesota Fruit and Vegetable Growers Association and Michele's hard work, was the “FSP4U” (Food Safety Plan 4 You template and workbook). Pahl Farms in Apple Valley, MN and Afton Apple Orchard in Afton, MN volunteered to go through a USDA GAPs demonstration audit and beta-testing of the FSP4U and invited growers to their farms to share their first GAPs audit experience. Their preparation for the audit started with the “FSP4U” material and they found it to be an excellent resource. As food safety becomes more of an issue, this resource will become more valuable.

Requests for the template have come from across the United States and have been used by individual farmers or as part of a larger training/workshop session which often includes a demonstration audit.

FSP4U is currently out of print but the materials are available for free download at http://safety.cfans.umn.edu/fsp4u.html. In pdf format the template has been downloaded 963 times between 1/1/2011 - 5/15/2011;
the MS Word version was downloaded 587 times during that time period. During 2010, the pdf version was downloaded 2,370 times and the MS Word version was downloaded 1,096 times. 3000 templates were printed in hard copy and included a CD-ROM; all were disseminated in 2009.

Funding was made available through the USDA-RMA to update and reprint the FSP4U. Suggestions from growers, auditors, and workshop trainers have been incorporated into the new version, as well as changes in the audit checklists. The updated version will be available summer 2011.

**Summary of Evaluation Data**
The template is available for download at http://safety.cfans.umn.edu/fsp4u.html. In pdf format it has been downloaded 963 times between 1/1/2011 - 5/15/2011; the MS Word version was downloaded 587 times during that time period. During 2010, the pdf version was downloaded 2,370 times and the MS Word version was downloaded 1,096 times. 3000 templates were printed in hard copy and included a CD-ROM; all were disseminated in 2009.

Workshops have been held throughout the US using the template as a resource or as part of the training. People have requested numerous copies of the printed version but have not provided any follow-up evaluation. My name and contact information is printed inside each template along with instructions to contact me with concerns, suggestions for improvement, or corrections. Generally all feedback from individual growers has been positive, similar to this example: “I am writing to thank you very much for producing such a comprehensive yet easy to understand tool to help farmers deal with the issue of food safety on their farms. It is a really great resource!”

When used in workshops, post workshop evaluation scores have typically been 4 to 5 on a 5 point Likert scale.

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**Training Materials**

A CD-ROM was created to go along with printed instructions and is enclosed with the printed version. The CD-ROM includes all the logsheets and the template in a Microsoft Word format.

Various powerpoint presentations were developed and adapted for different audiences (e.g. Hmong, Amish, beginning farmers, grower groups, CSA).

An updated version of the FSP4U is underway to reflect the changes in the USDA GAP audit checklist and to incorporate changes and suggestions from other users and growers. The new version will be available in hard copy, on a flash drive, and for web download.
Food Safety Training for Small Family Farms in Fresno, California

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Target Audience
Small and medium sized family farms - organic and conventional.

Topics Discussed
- GAP's, GHP's, food safety manual - development of traceback
- Individual sections of the audit
- ‘Farm Review’ audit,
- ‘Harvesting and Packing’ audit
- Mock audits
- Water analysis - microbial

USDA defines “small” commercial family farms as those with annual revenues between $1,000 and $249,999; in California, there were 50,425 such farms in 2007 and they represented 80% of the state’s commercial farms. Almost half of the 4,000 small farms in Fresno County are minority operated, and about 1,300 of those are refugees from Laos called the Hmong and Lao. Many of the refugee farms are on leased ground, and the farmers themselves have, at best, a fourth grade education. One large packing house in Fresno is requiring a food safety manual for each of the 120 minority and refugee farmers that they buy from for 2011, and within a year to be third party audited.

Food Safety with small family farmers is somewhat more challenging for several reasons. First the farmer is doing everything him/herself - from irrigating, pest control, and planting, to marketing. Finding the time to attend training, write a program for the farm, and acquire all of the necessary documents can be daunting. Larger farms can hire a food safety person to develop and implement a program. Second, many of the small farmers may not be fluent in English and will require translation into another language such as Spanish, Chinese, Lao, or Hmong. Many of the refugee farmers are even illiterate. This can easily double the training time required for them to understand the necessary principles. And Third, small farmers tend to be less organized, which means they require not only food safety training but also the A,B,C’s of record keeping. Having a food safety program on a small family farm is not insur-
mountable problem, but it does require a certain amount of extra time and effort on behalf of the trainers to explain the program in a way they do not become discouraged.

Fresno has offered workshops in food safety since 2007 following the spinach *E. coli* outbreak in Salinas, CA. Workshop classes were presented in Spanish and Hmong. In early 2010, UC Cooperative Extension received a USDA-NRI grant to develop a food safety program for Asian refugee farmers in Sacramento and Fresno Counties. As a result, a simple GAP’s program was developed that farmers could use on their farm that included traceback, and the UC researchers conducted informal audits of 10 farms in each county. In late 2010, Cooperative Extension in Fresno began a series of collaborations with the California Department of Food and Agriculture to train farmers specifically in the areas “Farm Review” and “Harvesting and Packing.” Also, as part of the training, CDFA has conducted two ‘mock’ audits on individual farms to further assist the farmers on how to be prepared for an audit. The response to the mock audits has been tremendous for other farmers attending and has better helped them to be prepared.

**Summary of Evaluation Data**

Attendance at various meetings ranged from 30 to 65. Depending on the clientele at the meetings, some were presented in Spanish, while others were translated into Hmong. In 2010 we worked closely with 10 Asian refugee growers to help them develop a food safety manual and several of us served as informal auditors to help the growers see what an audit entailed.

In late 2010 and 2011, I started working more closely with CDFA in meetings to discuss in more detail the elements of a USDA food safety review audit for the Farm Review and for the Harvesting and Packing Review. It was in these meetings that we had 40-60 people attending. Currently in 2011, we have had 2 mock audits on individual small family farms with 10 other growers in attendance at each. The first audit was on a Hmong farm and the second was a Hispanic farm. In both cases the farmer failed the audit but it was only with a couple of questions that are easily remedied. As we hold more mock audits we are confident that even these minority growers and refugee farmers will be able to pass. Language is probably the biggest hurdle, followed by having good records and receipts.

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**Training Materials**

The material we developed were as simplistic as we could make them, intended for small scale growers, including the minorities and Asian refugee. Richard Molinar was part of the team in both publications below to develop the manuals.

*Food Food Safety Manual* * Standard Operating Procedures for Good Agricultural Practices* - a publication developed with the USDA-NRI grant.

*“Your Farm” Family Farm GOOD AGRICULTURAL PRACTICES “GAPs” “SOPs”* - a publication of CAFF (Community Alliance with Family Farmers)
The On-Farm Food Safety Project

Jim Slama, Delia Hollbach

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**Target Audience**
Small and Mid-Scale Farmers

**Topics Discussed**
Create a Food Safety Manual: a free online tool and website that helps small and mid-scale farmers generate a food safety plan based on harmonized GAP standards.

FamilyFarmed.org provides technical assistance to small and mid-scale farmers selling into wholesale markets. As a result of this effort, we have identified a need to support these producers in developing on-farm food safety plans, the basic building block of a comprehensive food safety program.

The On-farm Food Safety Project training will provide an overview of the website and an opportunity for growers to see how to create a food safety plan using this free online tool (www.onfarmfoodsafety.org).

The On-farm Food Safety Project is a comprehensive national program that offers farmers, food safety professionals and agricultural extension specialists technical assistance to develop risk-based food safety programs. This is achieved by using this educational website and the free, easy-to-use on-line tool, which generates customized on-farm food safety plans based on user input. The tool is based on comprehensive, harmonized GAP standards developed by United Fresh and industry partners. It is designed for use by small to mid-scale growers and to provide them with a full set of record keeping tools to document their food safety program and to provide training to their employees.

The program software is based on a number of decision trees which assess and address food safety risks for each farm area. An easy to use web interface has been constructed that allows the user to identify and understand food safety risk areas applicable to their operation based on their answers to a series of yes/no response questions. The program then automatically generates all associated documents required to help address those risk areas. This website also includes best practice infor-
information for food safety and other information relevant to small and mid-scale produce farmers, food safety professionals and agricultural extension specialists.

**Summary of Evaluation Data**
Project not yet complete. These are questions that will be used to evaluate the project.
1. How many growers attended?
2. How many growers developed food safety plans using the On-Farm Food Safety Project online tool after attending?
3. What concerns or challenges were identified with the website and/or online tool?
4. Additional comments regarding the online tool (Best Practices presented, Forms and Training Materials, Resources, etc).

**Training Materials**
- PowerPoint presentation overviewing features of the On-Farm Food Safety Project website and online tool (onfarmfoodsafty.org)
- The On-Farm Food Safety Project Online Tool (soon to be completed).
Since arriving at UC Davis in 1995 I have been intimately involved in broad and diverse aspects of microbiological food safety relevant to the produce supply-chain incorporating basic and applied research, extension education and trainings, and production of a range of practice, risk-factor, and commodity-specific extension publications and training materials. Extension training and workshops have been conducted for target audiences at all scales of production at the local to international level. Training sessions focus predominantly on building risk awareness and hazard identification skills necessary to construct a dynamic and effective food safety prevention and management program. Workshop and extension outreach programmatic materials derive largely from personal ‘real-world’ on-farm and postharvest experience with a wide base of clientele and stakeholders. At this time, our trainings are not static or formatted to provide a repetitive course curriculum and as such do not lend themselves to be described as a singular entity or syllabus. However, as interest in produce safety compliance and preventive programs has increased in anticipation of pending federal regulations, we have begun to match the need with the development of of modular UCGAPs certification program for interested parties in the fresh produce industry and affiliated stakeholders.
Training Materials
UC ANR Online Publications Relevant to Produce Food Safety; all available at http://anrcatalog.ucdavis.edu. 7254, 7256, 8003, 8015, 8043, 8095, 8102, 8103, 8116, 8133, 8149, 8150, 8151, 8198.

UC GAPS Primer CD - Moving from Awareness to Action DVD - GAP Guidelines for the CA Cantaloupe Industry and With the Consumer in Mind; Growing, Handling, and Shipping CA Cantaloupes.

Multiple PPTs on diverse topics in GAPs and produce safety; general and commodity-specific.
Recognizing the importance of food safety, the mushroom industry’s initiative began with the development of a commodity-specific Good Agricultural Practices standard and guidelines, known as Mushroom Good Agricultural Practices (MGAP). A key component of the MGAP program is training employees on food safety issues. To assist the industry in implementing a MGAP program at their farms, the following training tools were developed and delivered to the industry.

1.) Introduction to MGAPs: Four training sessions were held with farm owners and managers to introduce them to the basis behind each of the MGAP standards, practical methods for implementing the standards, how to write a food safety plan and strategies for preparing for and passing a food safety audit. Authors: American Mushroom Institute Food Safety Task Force; Dr. Sergio Nieto-Montenegro, Hispanic Workforce Management, LLC; Dr. Luke LaBorde, The Pennsylvania State University

2.) Food Safety Training Kit: The food safety training kit (FSTK) is a two lesson handbook designed for production supervisors, quality control personnel, extension agents and/or industry consultants who wish to conduct food safety training at mushroom farms or packing houses. The lessons are targeted at workers who handle mushrooms before, during and after harvest. The lessons are presented in English and Spanish. The FSTK is comprised of a binder and accompanying CD which holds PowerPoint slides that can be used when presenting the training. Authors: Dr. Sergio Nieto-Montenegro; Dr. Luke LaBorde; Dr. J. Lynne Brown, The Pennsylvania State University

Food Safety Posters: A series of 8 posters were developed to emphasize the lessons taught in the FSTK. They are available in English and Spanish.
3.) Basic Food Safety Training for New Employees Poster & Commitment Form: The Basic Training poster and commitment form are intended to be used when employees are initially hired and before they have a chance to utilize the more comprehensive training as provided in the Mushroom Food Safety Training Kit or in the Flip Chart. The poster illustrates the 15 food safety areas in which employees must be trained upon hiring. The commitment form has short, written descriptions of each of the areas on the poster. Both are available in English and Spanish. Author: Dr. Sergio Nieto-Montenegro, Hispanic Workforce Management, LLC.

4.) The Mushroom Industry Food Safety Training Flip Chart: The Flip Chart kit contains five comprehensive lessons (delivered separately or collectively) designed to provide workers with the knowledge and skills they need to follow food safety rules at work. The lessons are:
- Foodborne outbreaks and the potential for mushroom contamination,
- Personal hygiene,
- Hand washing and glove usage,
- Cross-contamination in the farm,
- Food defense.
Author: Dr. Sergio Nieto-Montenegro, Hispanic Workforce Management, LLC

5.) Train the Trainer Sessions: Each time a new training tool is introduced the industry organizes “Train the Trainer” sessions. These sessions are offered in English and Spanish and led by Dr. Sergio Nieto-Montenegro. They are targeted towards the individuals who will be conducting training at mushroom farms and packing facilities.

Summary of Evaluation Data
Summary of evaluation data: Since the inception of the mushroom food safety initiative, more than 50 mushroom farms have successfully passed a Mushroom Good Agricultural Practices (MGAP) audit, with thousands of employees receiving food safety training at their workplace.

Challenges include:
- providing a variety of formats for various sized farms (flip chart developed as a “low tech” training option)
- encouraging growers to commit the time and resources needed to facilitate worker training (engaged packers to urge their growers to pass a MGAP audit)
- immediate training for new hires (initial hire poster and commitment form developed)

Training Materials
- MGAPs Training session for farm owners and supervisors.
- Food Safety Training Kit
- Food Safety Training Kit Train the Trainer Sessions
- Food Safety Posters
- Basic Food Safety Training for New Employees Poster & Commitment Form
- The Mushroom Industry Food Safety Training Flip Chart
- The Mushroom Industry Food Safety Training Flip Chart Train the Trainer Sessions
Target Audience
California strawberry growers, ranch managers and supervisors of all production sizes.

Topics Discussed
- Food safety practices for strawberry farms in the areas of worker health
- Use and maintenance of bathroom units, packing materials and tools
- Hand hygiene and glove use
- Eating/drinking in the field

The California Strawberry Commission’s Food Safety Training Program consists of a three course curriculum focused on food safety practices during the harvest of fresh and processed strawberries. The target audience of the program is strawberry growers, supervisors and ranch managers of the California Strawberry industry. Courses are taught principally in Spanish by three instructors with a maximum participant: instructor ratio of 30. Courses utilize small and large group activities, experiential learning techniques such as participant role plays and hands-on demonstrations, electronic audience response quizzes, and games. The educational tools that accompany the courses are the Strawberry Commission’s “Food Safety Practices for Strawberry Harvest Workers” flip chart and study guide. The flip chart and study guide contain illustrations and brief accompanying text in Spanish and English that convey the food safety recommendations specific to the harvest of strawberries. The large flip chart can be used by growers to train their harvest employees in the food safety practices while the personal study guide is designed as a food safety reference for growers, ranch managers and supervisors. The current three courses of the training program are: 1) Introduction to Food Safety for Field Supervisors 2) Teaching Food Safety and 3) Food Safety for the Harvest of Processing Strawberries. The Introduction to Food Safety class teaches participants the food safety practices that should be followed during strawberry harvest. The Teaching Food Safety class trains growers and supervisors to effectively train their picking crews in food safety practices with the flip chart. The Food Safety for the Harvest of Processing Strawberries class teaches participants recommended food safety practices specific to the harvest of processing strawberries.
Summary of Evaluation Data

Since the program’s inception in 2009, over 1800 different members of the California strawberry industry have participated in our training classes, including growers, supervisors and ranch managers. These participants represent 378 different strawberry farms in California, which is 85% of the California strawberry industry. We have evaluated our training programs through participant surveys and pre and post workshop learning assessments. Learning assessments are conducted through an electronic audience response system, where each participant answers questions with individual keypads. These two forms of evaluation correspond with the first two levels of Kirkpatrick’s Four Levels of Evaluation Model: Participant Reactions and Participant Learning. A summary of the learning assessments for the Introduction to Food Safety class are:

- The percentage of participants listing they had a high level of confidence in their food safety knowledge grew from 56% to 85% from the beginning to the end of the workshop.
- The percentage of participants listing they had a high level of competence in communicating with strawberry harvest workers regarding their food safety behavior grew from 55% to 85% from the beginning to the end of the workshop.

Participants’ responses to questions designed to measure their achievement of specific learning outcomes provided further insight into the level of effectiveness of training materials and classes and the challenges faced by target audience in implementing food safety practices on their farms.

Training Materials

Food Safety Practices for Strawberry Harvest Workers Flip Chart

Food Safety Practices for Strawberry Harvest Workers Individual Study Guide

Materials best suited to strawberry growers and/or field supervisors of any production scale.

Participants at our trainings range from growers with a few acres to a few hundred acres.
Growers have a variety of goals to balance within their farming operations: Cost Reduction/ Economic Viability; Resource Conservation: Erosion Control, Water Conservation, Water Quality, Wildlife Habitat, etc.; and, Minimizing Legal Liability from Compliance with Industry and Regulatory Requirements, Neighbor Issues, etc. Surveys indicate growers are often faced with choosing between natural resource conservation goals/environmental regulatory compliance or compliance with handlers, buyers and/or Third-party auditor food safety guidelines or requirements. Several recent publications suggest that growers, handlers and Third-party auditors lack science-based information to resolve these issues. We've identified the need to integrate on-farm food safety and conservation practices. Co-management, defined as an approach to minimize microbiological hazards associated with food production while simultaneously conserving soil, water, air, wildlife and other natural resources (Lowell et al. 2010), considers the implications of growers’ decisions regarding on-farm management practices. Resource and industry professionals endeavor to engage diverse stakeholder groups and address Co-management challenges through education, outreach and research cooperation.

Summary of Evaluation Data
Over 500 stakeholders have been educated on Co-management utilizing earlier training programs and/or educational materials (Lecture/PowerPoint presentations in workshop or webinar format and/or field tours). Co-management was considered a “regional” issue on the Central Coast of California until recently; however,
education and outreach efforts have generated interest and support at the state and national levels. Diverse stakeholders have been educated/trained, including FDA Produce Safety Staff, California Food Emergency Response Team (CalFERT) members, Growers, Handlers, Harvesters and Food Safety Professionals, Third-Party Auditors (AZ Dept. of Agriculture, CA Dept. of Agriculture, USDA, etc.), AZ and CA LGMA Technical Directors, USDA/NRCS California Conservation Planners, Resource Conservation Districts of California’s Central Coast Technical Service Providers, North American Pollinator Protection Campaign/Pollinator Partnership, etc. We are striving to reach Buyers and the aforementioned stakeholders throughout the United States.

### Training Materials


Co-Management of Food Safety and Conservation Practices, Mills and Robins 2011 (Growers, Shippers, Harvesters, Food Safety and Conservation Professionals, Third-Party Auditors, Policy Makers, Resource and Regulatory Agencies, Researchers, etc.)

Safe and Sustainable Report, Produce Safety Project: [http://www.producesafetyproject.org/reports?id=0007](http://www.producesafetyproject.org/reports?id=0007) (Same as above); FFSCN Poster.
Following several high profile foodborne illness outbreaks linked to produce sourced from the Central Coast of California, industry leadership and a range of regulatory bodies have increased focus on field operations and development of appropriate Good Agricultural Practices (GAPs) to minimize risk of pathogen contamination. On-farm management practices in many produce growing operations have changed in response to this increased focus on food safety concerns. These changes may include exclusion of wildlife, and removal of non-crop vegetation and water bodies from the growing environment. Both non-crop vegetation and water bodies are often components of conservation practices. Growers must manage their operations to minimize food safety risk while simultaneously managing natural resources. Basic knowledge is essential to allow growers to wisely manage their operations as they co-manage for both food safety and conservation objectives. Growers require accessible summaries of scientific understanding of both food safety risks in the growing environment and ways to effectively manage that risk. The training materials developed in this project will be distributed mainly to small and medium-sized growers, and organic and sustainable growers. The basic message of the materials is as follows: “Farmers can produce safe food without removing riparian habitat or other non-crop vegetation, despite what some food safety professionals have suggested. The usual justification for removing vegetation is that it attracts wildlife, which may carry pathogens. In fact, conservation practices can often reduce pathogen risk at the same time they provide many other benefits, such as soil and water conservation and habitat for pollinators and beneficial insects. Furthermore, research suggests that wildlife
pose a low risk. By explaining their rationale for management decisions, and by providing evidence to support that rationale, farmers can more effectively advocate for their farming practices with buyers and auditors.” The 8 page brochure discusses relative risk of wildlife, animal management strategies, risk mitigation in the event of animal intrusion, risks and benefits of compost and the importance of vegetation to mitigate food safety risk. The brochure is designed to be used as a stand alone tool to reach a wide audience, but may also be used in training workshops. When used in such environments, a short survey will be distributed to assess the farmer’s current food safety plan, how s/he co-manages for food safety and conservation objectives, what was learned in the workshop, if they are making plans to implement what was learned, and if they have additional concerns.

**Summary of Evaluation Data**

A short survey will be passed out during the workshop asking whether the farmer has a food safety plan, does it include co-management strategies, if any s/he has plans to include what was learned into food safety, and what concerns they have.

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<th>Training Materials</th>
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<td>Co-management brochure (8 pages).</td>
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Educational and Training Materials Summaries

Videos, Social Media and Practical Design of a Hand Washing Facility

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Target Audience
Small and large farmers (organic and conventional), Extension Agents, Farmers Markets (vendors and consumers), farm workers.

Topics Discussed
• Training Videos: GAPs, Mock Field Audit, Worker Health Hygiene.
• Website/Blog: Serves as comprehensive site for FPS resources.
• Hand Washing Facility: Design of a scalable, portable facility.

A website (www.ncfreshproducesafety.org) was developed to support the information stream and to provide a comprehensive platform for fresh produce safety information in NC, with supporting links to other state's resources. Included in these resources is information on traceability, postharvest quality, cost share opportunities, and Good Agricultural Practices (GAPs). The most visited pages are the GAPs section, Growers Resources, and the GAPs training calendar. Traffic to the portal was made up of about a fifty-fifty split between new and returning visitors, indicating a balance between those who consistently utilize the portal as a resource and those who are first discovering the website. The NCFreshProduceSafety Blog (http://ncfreshproducesafety.wordpress.com) was launched in January 2010 to complement the website and enable the rapid and regular entries of commentary, descriptions of events, or other materials such as graphics or video.

A series of training videos were developed in 2011 and posted on YouTube to extend farmers knowledge and give farmers the ability to reach their farm workers at convenient trainings already happening at farm meeting across the state. These videos include a mock audit and cover a range of issues that involve the farm workers from field practices to worker hygiene.

Currently we are working on development of plans and videos to educate farmers on how to build a scalable and portable hand washing unit to promote more frequent and thorough hand washing in the field. Two units have been built and are in the field for testing at his time. One is large, intended for commercial farm use, while the smaller unit will be useful for small farms and farmers markets.


**Summary of Evaluation Data**

Website/Blog: Since beginning in February 2010, The Fresh Produce Safety Portal has attracted 3167 visits at over 5 minutes per visit. The NC Fresh Produce Safety Blog has had 107,151 views since it began in January 2010.

Training Videos: These were completed and posted recently, so we have not begun to gather statistics on numbers of viewers.

Handwashing Facility Project: We are still developing the plans and educational materials for this project.

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**Training Materials**

All videos are posted on youtube. All video links can be found from the blog: http://ncfreshproducesafety.wordpress.com/

Video Titles: Fresh Produce Safety - NC Mock Field Audit http://www.youtube.com/watch?v=6ws1C_mmx24

Video 1- Worker Health and Hygiene Training; Video 2- Hand Washing Training Video 3- Sanitary and Hand Washing Facilities Training; Video 4- Cross Contamination Training; Video 5- Cleaning and Sanitation Practices Training; Video 6- Wash Water Monitoring Training; Video 7- Proper Food Safety Practices in the Home Training; Video 8- Infield Practices Training

In-process: Design plans for the scalable and portable hand washing facilities.
Farm-to-Table Food Safety for Colorado Produce Crops: A Web-based Approach

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Target Audience
Small scale growers, new farmers, fruit and vegetable producers.

Topics Discussed
- GAPs
- GHPs
- Irrigation water quality
- Management of manure and compost
- Food safety legislation

Fresh fruits and vegetables have been increasingly associated with cases of foodborne illness. Direct links of these outbreaks to specific farms highlights the need to employ strategies to reduce microbial contamination of fresh produce at this stage of the food system. One approach to fresh produce safety on the farm involves participation in voluntary audits based on Good Agricultural Practices (GAPs) and Good Handling Practices (GHPs). Currently, only a small percentage of Colorado producers employ this strategy. In response to new regulations and guidelines and changing food marketing patterns, Colorado producers need to have the flexibility to adopt programs that can help them meet the demands of providing a safe supply of food. In response to these issues, Farm to Table Food Safety for Colorado Producers, a series of three web-based GAPs/GHPs trainings, was developed following the guidelines of FDA, USDA, and the National GAPs Program. The trainings were implemented and evaluated targeting small farm producers of fresh fruits and vegetables based on an initial needs assessment to identify potential barriers and drivers for adopting these types of programs. In addition, a series of ten consumer-friendly, downloadable fact sheets with safe food handling and recommended storage guidelines was developed to help promote food safety of ten selected Colorado specialty crops: apples, berries, broccoli, leafy greens, melons, peaches, peppers, potatoes, squash, and tomatoes. The approach of developing technology-based training modules and educational materials allowed for improved accessibility to growers and produce consumers across the state while accommodating their variable time schedules and need for convenient, reliable information. Pre and post
questionnaires were used to measure self-assessed knowledge outcomes along with overall course evaluation items. As a result of participating in the webinar series, producers, buyers, and Extension professionals indicated that they plan to utilize the provided information and resources. Specific topics related to GAPs such as irrigation water quality, management of manure and compost, and food safety legislation were of most interest to the participants and exhibited the most significant increases (p<0.001) in self-reported knowledge, pre and post webinar. The course evaluation showed that produce buyers, Extension professionals, and other webinar attendees intend to utilize the material presented in the webinar series directly or indirectly in their professions, with average mean scores on a 5-point Likert scale (1=Very Unlikely and 5=Very Likely), of 4.2, 4.2, and 3.6, respectively. Feedback gained from the webinar and produce fact sheet evaluations will be a helpful tool in making improvements for future web-based on-farm food safety educational materials. The recorded webinars and other food safety materials are posted on the CSU Farm to Table website (http://farmtotable.colostate.edu/) and these materials will be promoted via the newly developed Colorado Farm-to-Market website (COFarmtoMarket.com), designed to provide food safety and regulatory information for Colorado farmers and direct marketers.

**Summary of Evaluation Data**

Colorado producers’ interest in learning more about food safety on the farm was supported by a positive, 78% response rate for interest to participate in the educational webinars. Pre (n=114) and post (n=61) questionnaires were used to measure self-assessed knowledge outcomes along with overall course evaluation items. As a result of participating in the webinar series, producers, buyers, and Extension professionals indicated that they plan to utilize the provided information and resources. Specific topics related to GAPs such as irrigation water quality, management of manure and compost, and food safety legislation were of most interest to the participants and exhibited the most significant increases (p<0.001) in self-reported knowledge, pre and post webinar. The course evaluation showed that produce buyers, Extension professionals, and other webinar attendees intend to utilize the material presented in the webinar series directly or indirectly in their professions, with average mean scores on a 5-point Likert scale (1=Very Unlikely and 5=Very Likely), of 4.2, 4.2, and 3.6, respectively. Feedback gained from the webinar and produce fact sheet evaluations will be a helpful tool in making improvements for future web-based on-farm food safety educational materials. The recorded webinars and other food safety materials are posted on the CSU Farm to Table website (http://farmtotable.colostate.edu/) and these materials will be promoted via the newly developed Colorado Farm-to-Market website (COFarmtoMarket.com), designed to provide food safety and regulatory information for Colorado farmers and direct marketers.

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**Training Materials**

The GAPs webinars and produce fact sheets are posted on our Farm-to-Table website and promoted via our Farm-to-Market website. The produce fact sheets were developed for produce growers, CSA managers, and direct marketers to provide for consumers.
National Good Agricultural Practices (GAPs) Program

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Target Audience
Fresh fruit and vegetable growers with emphasis on small to medium sized operations, farm workers including Spanish, Hmong, and Creole speakers, and secondary school students.

Topics Discussed
- GAPs
- Risk assessment
- Farm food safety plan writing
- Employee training
- Reinforcing training and adult learning

Since 1999, the National GAPs Program has been developing a broad range of educational materials and conducting trainings for the produce industry to increase the understanding and awareness of food safety practices such as GAPs and to encourage the implementation of practices on farms and in packinghouses. Based at Cornell University, one of the most significant attributes of the program are the collaborators at Land-Grant Universities throughout the US whose expertise and cooperation have lead to the development of several award winning publications that provide guidance to farmers and packers nationwide and internationally. Providing guidance to farmers through in person trainings so that they may learn how to conduct risk assessments of their own operations and develop their own farm food safety plans is a primary activity of the program. Acknowledging the important roll that farm workers play in produce safety, the National GAPs Program created a diverse set of educational materials focused on employee education and training that includes posters, videos, booklets, magnets, and photo novellas. All of these materials are available in English and Spanish with the video available in Hmong and Creole as well. Effective educational material development supported by dynamic, interactive trainings designed for farmers, packers, and farm workers have become the hallmark of the National GAPs Program.

Summary of Evaluation Data
National GAPs Program educational materials have been distributed to all collaborators and are available online. Cumulatively, over 200,000 copies of these materials have been distributed through trainings and through the online bookstore. In addition to printed
materials and in person trainings, the National GAPs Program also offers the Good Agricultural Practices Online Produce Safety course (GAPsOPSC). Long term impact of the GAPsOPSC on participant behavior was evaluated through a post course survey conducted 3-12 months after completing the course. This long term survey is in addition to the immediate post completion surveys that have been completed since the launch of the online course. Thirty seven percent of those completing the survey were employed on a fruit and vegetable operation (farm or packing-house), while twenty four percent were from government agencies and another twenty four percent indicated “other” as a category. Many of these individuals were directly involved in education or extension work at universities or secondary schools. Ninety three percent of respondents said their knowledge of produce food safety and Good Agricultural Practices (GAPs) was improved and eighty nine percent describe their ability to assess food safety risks during fresh produce production as improved. Sixty two percent reported being involved in the implementation of food safety practices in a fruit or vegetable operation while an additional eleven percent report being involved in the implementation of food safety practices in other types of operations since taking the GAPsOPSC. Eighty five percent of valid respondents either agreed or strongly agreed that participating in the course helped them to successfully implement food safety practices in their operations. This long term post course data indicated that taking the course had a positive impact on understanding and implementation of practices that reduce risks to fresh fruit and vegetables which is a very positive outcome and in line with the goals of developing this online training.

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<tr>
<td>• Food Safety Begins on the Farm: A Grower’s Guide</td>
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<td>• Food Safety Begins on the Farm: A Grower Self Assessment of Food Safety Risks</td>
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<td>• Fruits, Vegetables, and Food Safety: Health and Hygiene on the Farm</td>
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<td>• Field Hygiene Poster Series</td>
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<td>• Good Hygiene Protects Everyone</td>
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<td>• Did you know? In the field there is a need for hygiene too!</td>
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<td>• Did you know? Your kitchen could be a source of illness!</td>
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<td>• Fun Fruit and Very Vegetable Tour Coloring Book</td>
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<tr>
<td>• Refrigerator Magnets</td>
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<td>• Food Safety Investigation: A supplemental secondary science curriculum</td>
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<td>• GAPs Online Produce Safety Course</td>
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All materials available through www.gaps.cornell.edu website.
The Good Agricultural Practices (GAPs) Training Initiative incorporates many aspects and resources across NC, including the NC Fresh Produce Safety Task Force. At its educational core is the N.C. MarketReady Fresh Produce Safety - Field to Family curriculum that is a N.C. Cooperative Extension program that educates fruit and vegetable growers about measures to minimize fresh produce safety risks. N.C. State University and N.C. A&T State University personnel from numerous university departments, Cooperative Extension agents, industry, and N.C. growers developed this curriculum.

The initiative sets forth a tiered educational program developed to encompass the wide range of growers’ needs reflecting farm size, markets and associated commodity-specific risks. It is designed to give producers a proactive, educational and incentive based program for their individual needs. The initiative encompasses the Good Agricultural Practices (GAPs) and Good Handling Practices (GHPs) outlined in the FDA/USDA “Guide to Minimizing Microbial Hazards in Fresh Fruits and Vegetables.” It also addresses recent needs surfacing from USDA GAPs/ GHPs audits, other third-party audits, Food Safety Modernization Act, and the GAPs certification process. As such, this curriculum, consisting of nine peer-reviewed modules, serves as the basis for a progression of training tiers that are developed in totality. It is designed as a train-the-trainer resource with an emphasis on increasing an understanding of the microbial risks associated with producing, harvesting, washing, sorting, packing and distributing fresh fruits and vegetables and resources to train and support the
network of North Carolina Extension Agents and other agricultural professionals in the implementation of Good Agricultural Practices (GAPs). Tier 1 is the basic level of fresh produce safety training covering in seven hours of instruction the topics of fresh produce safety basics, pathogen introduction, GAPs for field practices, Good Handling Practices (GHPs) for packing facilities, proper health and hygiene, water quality, site selection and manure management. Tier 2 focuses on risk identification and management covering in seven hours of instruction the topics of transportation, traceability and recalls, liability and insurance options, crisis strategy and risk management. Tier 3 focuses on risk implementation workshops that offer greater depth and flexibility to address the changing rules and offer interactions to aid farmers in the process of attaining GAPs certification. Topics include updates from new laws and regulations, outbreak and crisis information, and traceability and performance standards.

The initiative training began in 2008 with 152 Cooperative Extension agents’ effectively creating food safety trainers and providing the knowledge and structure to allow for the broadening of the fresh produce safety program and resources necessary for adoption by farm operations. Utilizing the curriculum towards grower audiences, over 400 educational presentations have been made to NC, SC, AR, AK, and NE on this curriculum and combined with social media outreach (website, blog, news articles and interviews) this initiative has reached an estimate of over 420,000 participants.

Summary of Evaluation Data

Three regional train-the-trainer sessions were held across NC in 2008 and 2009 to facilitate a total of 46 counties and 152 agents being trained on this curriculum. These Extension Agents (61%) moved from a moderate level of knowledge (know about this topic but there are more things to learn) to feeling confident to deliver the fresh produce safety curriculum. Utilizing the curriculum towards grower audience, over 400 educational presentations have been made to NC, SC, AR, AK, and NE on this on this curriculum and combined with social media outreach (website, blog, news article) this initiative has reached an estimated of over 420,000 participants. Specifically, NC agents have certified 604 farmers in attending Tier 1 and Tier 2. This number represents over 156,975 acres of production and 7,773 workers increasing their awareness of risks on the farm. GAPs certification in NC, from only one certifier (USDA) has risen from 17 farms in 2008 to over 60 farms in 2011. Tier 1 evaluation data remains with Extension Agents. Some data from pre/post training evaluation (74% response rate) indicated that 41% of participants improved their knowledge, 56% were likely to create a food safety plan, 54% said they would develop a recall plan, 17% were already doing this, 46% would initiate microbial testing, 57% also said they would write crisis talking points as a result of the training. Evaluations have been conducted and results have been compiled from agents, growers, mock audits, webinars, and out-of-state curriculum trainings. The training consists of a lot of material, most of the comments mention having the training being broken into a couple of days.

Training Materials

N.C. MarketReady Fresh Produce Safety-Field to Family Training Curriculum (Tier 1 and Tier 2).

Tier 1 (pre and post test evaluations, direct market checklist).

Tier 2 requested resources (pre and post test evaluations, Fresh Produce Safety 2010 Impacts).
Texas GAPs and GHPs Program

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**Target Audience**
Fresh fruit and vegetable growers, primarily small to medium sized operations, including packing sheds and distributors.

**Topics Discussed**
- GAPs
- Microbiology
- Water concerns
- Employee training
- Sanitation
- Documentation.

In 2008 growers began expressing interest in farm food safety plans. As a result we started helping interested growers develop individualized food safety plans for their operations. That led to the realization that there was a lack of educational materials and resources for farm food safety in Texas. Growers could find information from other states, but wanted information specific to Texas. We began to develop an all inclusive curriculum that would be used for GAPs training workshops. The workshops were held around Texas and attracted a broad range of people from the industry. As well as educating growers and managers, we also train entry level employees at the request of growers and food safety managers.

The trainings are also available online at www.agrilifefoodsafety.tamu.edu.

**Summary of Evaluation Data**
Evaluation results indicate that the majority of attendees are completely satisfied with the training material and most comments were positive. Also, the majority expressed a gain in knowledge from attending the training.

- Over 1,100 people have been reached in food safety topics.
- 65 producers and managers have been trained in food safety in TX.
- 80 farm food safety manuals developed for TX producers.
Training Materials
Texas GAPs and GHPs Food Safety Training Curriculum; Extension Publication B-6244 (11/10)
Material is suited for anyone in the industry wanting to learn about GAPs and GHPs.
Co-authors: Elena Castell-Perez, Alejandro Castillo, Brent Clayton, Ashley Gregory, Renata Ivanek, Ron Knutson, Bruce Lesikar, Joe Masabni, Mark A. Matocha, Justin Mechell, Rosana Moreira, Mechel Paggi, Marco Palma, Sang Shan Park, Don Renchie, Luis Ribera, Ty Schmidt, Greta Schuster.
Training Oklahoma produce farmers in Good Agricultural Practices has included several methodologies. Following their initial training for food safety in 2001 at the Southern Region ASHS conference in Ft. Worth, Texas the authors utilized varied teaching methods. Trainings have included lectures, hands-on demonstrations at meetings and field days, and extension publications. Live presentations have been carried out at multi-state conferences, state extension meetings, field days, short courses, and at ½ day food safety workshops. Training material used in live presentations originated with power point sets generated from the initial training the authors received and the National GAPs program slide sets. As training has evolved, much of the original presentations have been altered to fit our clientele. Support literature has been developed several ways. First, chapters covering Good Agricultural Practices and post-harvest handling of fresh produce have been included in two different crop guides including the Cucurbit Integrated Crop Management guide (E-853), and the Oklahoman's Guide to Growing Fruits, Nuts, and Vegetables (E-995). Second, two fact sheets have been developed to assist fresh produce farmers in developing a food safety plan for their operations. FAPC-167 Fresh Produce Production Food Safety Plan Logs and Worksheets was developed from documents originally written by Robert Gravani and Elizabeth Bihn at the Cornell University Department of Food Science. A second fact sheet FAPC-168 Developing a Food Safety Plan for Your Fresh Produce Operation was targeted specifically at Oklahoma fresh produce farmers. In addition, the authors developed a food safety chapter for the Oklahoma Department of Agriculture, Food, and For-
ustry’s (ODAFF) Farm to School publication titled “Tips, Tools & Guidelines for Food Distribution & Food Safety which was distributed to farmers growing for Farm to School programs across the state. Other support material utilized in Oklahoma has included National GAP materials such as the Food Safety Begins on the Farm grower’s guide, hand washing signage, and the video on Food Safety Begins on the Farm.

**Training Materials**

FAPC-167 Fresh produce production food safety plan logs and worksheets.

FAPC-168 Developing a food safety plan for you fresh produce operation.
**Enhancing Foodborne Illness Crisis Management Capacity Within the NC Specialty Crop Industry**

_Audrey Kreske, Chris Gunter, Diane Ducharme, Trevor Phister, Ben Chapman_

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4-H Youth Development and Family & Consumer Science
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**Target Audience**
Produce industry stakeholders (producers, small and large, regulators, shippers, extension personnel, commodity group leadership).

**Topics Discussed**
- Crisis management
- Working with media
- Developing messages
- Outbreak investigations
- Risk factors

Produce items have been increasingly associated with foodborne illness outbreaks. Once a product is implicated in an outbreak, all growers are affected with economic losses although the contaminated product may have come from one grower in a different state. Produce industry members must be prepared to deal with a crisis and respond to the media attention appropriately. As a result of these gaps, a novel foodborne illness outbreak simulation workshop was designed and delivered to enhance the crisis management capacity of the fresh produce industry through the development of crisis communication plans and media training. These workshops were designed to teach good outbreak management practices and raise awareness of potential pitfalls to industry members through active participation in a simulated crisis situation. The development of an interactive outbreak simulation focusing on crisis management and communication enhanced the participants’ awareness of crisis management gaps and increased changes to the infrastructure. Through a pre-test/post test evaluation construct, participants (n=126) self-report behavior changes including increased focus on crisis preparedness the implementation of crisis management plans. Follow-up interviews with participants at 6 months (n=26) suggest that change has been sustained as crisis management plans are in development and participants sought further food safety training.
**Summary of Evaluation Data**

Evaluation of the effectiveness of the role-play workshops was conducted through pre/post-tests (n=126) and follow up interviews (n=26) using likert scale (1-7) and open-ended questions.

Baseline survey demonstrated only 26% of growers surveyed in NC have a crisis management plan compared to 74% who employ GAPs or food safety programs. Workshop participants who have experienced a crisis reported attitudes of feeling prepared to deal with another crisis and understand how difficult it is to recover. After completion of the workshop there was a significant increase in participants' perception of the likelihood of their products being contaminated with microbial hazards. There were also a significant increases seen in participants’ opinion of how important it is to be prepared for a crisis. There was a significant decrease in participant's attitudes as to ability to recover from a crisis (due to optimistic bias or lack of understanding of reach prior to workshops). In follow-up interviews participants reported an increase in crisis plans in place, identifying areas they needed to improve as a result of attending the workshop. The majority of surveyed participants also reported that as a result of the training they sought further food safety resources or training.

<table>
<thead>
<tr>
<th>Training Materials</th>
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<tbody>
<tr>
<td>2 PowerPoint presentations</td>
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<tr>
<td>(one as the scenario unfolds, one to step participants through media)</td>
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<tr>
<td>Participant roles</td>
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<tr>
<td>Sample agenda</td>
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<tr>
<td>Value chain interaction maps (for traceabilty)</td>
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<tr>
<td>Other role-play documents</td>
</tr>
<tr>
<td>Being developed (completed by end of project in Fall 2011)</td>
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<tr>
<td>Facilitator's guide</td>
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<tr>
<td>Videos to supplement media discussion</td>
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</table>
Good Agricultural Practices Highlighting Worker Health and Hygiene

B. Susie Craig
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Target Audience
GAPs overview presented to growers of all sizes. Craig focuses on small scale growers (retail), U-pick operations, and community groups raising produce for food banks.

Topics Discussed
GAPs, personal implementation on-farm, and 3rd party mock audit. Craig focuses on worker health and hygiene with hands-on experience and group discussion of facilities and improvements.

Training programs include multi-disciplinary teams from Washington State University Extension presenting two, day-long sessions and the additional opportunity for a mock audit. B. Susie Craig provides outreach and workshop sessions for small retail farm stand/market growers, U-pick operations, master gardeners, and community members growing produce for food banks in metropolitan areas. The four-hour workshop provides an overview of food safety concerns linked with produce, GAPs, and special consideration for U-pick operations, small growers, and community gardens with an emphasis on health and hygiene practices using Germ City. Germ City, an interactive hand washing education program is used with all audiences. Germ City is a USDA/NIFSI funded, national award winning program developed at Washington State University by B. Susie Craig. Germ City program adopters include FDA and state departments of agriculture. Germ City works well with large groups such as packing operations and with ESL audiences. Workshop participants are encouraged to participate in the two-day GAPs session offered by Washington State University as appropriate and to use existing on-line resources.

Web-based programming for consumers in under-development and implementation: http://cahnrsnews.wsu.edu/foodsafety. Food Safety in a Minute (FSIAM) messages include produce safety, interacting with GAPs and growers at farmer’s markets, and using GAPs in your home garden.
Training Materials

- Worker Health and Hygiene PowerPoint: Small and medium scale growers
- GAPs Overview PowerPoint: Small growers, U-pick operations, and community growers for food banks.
- Germ City: Any size group. Germ City units are in use by the FDA and state agriculture departments.
- Food Safety in a Minute: Consumers and community growers for food banks. http://cahnrsnews.wsu.edu/foodsafety/
- Rate your growing operation: Health and Hygiene Practices.
In October of 1998, the U.S. Department of Agriculture and U.S. Food and Drug Administration jointly issued a guidance document for the fresh fruit and vegetable industry that provided general guidelines for reducing the possibility of contamination of fresh produce by microbial organisms. The document, “Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables,” provides discussion about high risk areas for contamination and how to avoid or reduce the possibility of such contamination. Shortly thereafter, many wholesale produce companies began requesting their suppliers to provide assurance that the supplier was following Good Agricultural Practices (GAP) and Good Handling Practices (GHP) that the document recommended.

As a result of requests from shippers and growers in various States to provide some type of service to satisfy the wholesalers’ needs, the Association of Fruit and Vegetable Inspection and Standardization Agencies (AFVISA) began investigating the possibility of providing a national audit service in cooperation with USDA to satisfy the shippers and growers needs. In August 2001, USDA approved the program and a draft auditor checklist. In January 2002, the USDA implemented the GAP&GHP audit verification program. Additional information and a copy of the current checklist may be found at www.ams.usda.gov/gapghp.

The USDA provides information on its Good Agricultural Practices and Good Handling Practices Audit Verification Programs at a trade shows, educational conferences, grower trainings, and other venues. Pre-
sentations are given utilizing power point and are modified to address the intended audience. Supporting materials include a Good Agricultural Practices and Good Handling Practices Audit Verification Program User’s Guide and an USDA, AMS, Fruit and Vegetable Programs, Good Agricultural Practices and Good Handling Practices (GAP&GHP) Audit Services-One Page Brochure.

**Training Materials**

All materials are published and authored by USDA-AMS-Fruit and Vegetable Programs.


USDA, AMS, Fruit and Vegetable Programs, Good Agricultural Practices and Good Handling Practices Audit Services-One Page Brochure.

Website: www.ams.usda.gov/gapghp.
Food Safety at Direct Marketing Venues

Diane Eggert, Katherine Lang, Rosalind Cook, Amanda Root

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Target Audience
Direct Marketing Farmers and Cooperative Extension Educators.

Topics Discussed
Food safety recommendations for direct marketing farm products: farmers markets, CSAs, on-farm markets, agritourism and direct delivery.

Food Safety at Farm Direct Marketing Venues examines the potential risks associated with various direct marketing activities, such as farmers markets, CSAs, on-farm markets, agritourism and direct delivery. In order to reduce food safety risks and prevent the likelihood of foodborne illness outbreaks at farm direct marketing venues, each farmer needs to understand how to identify risks and implement practices to mitigate these risks. The Food Safety at Direct Marketing Venues Guidelines is intended to help farmers understand what microbiological, chemical, and physical hazards exist, assess if their operations have any of these risks, and adopt outlined recommendations that can reduce these risks.

A training curriculum will be developed to allow Cooperative Extension Educators and others working with farmers and direct marketing operations to assist and train farmers in their counties and regions. The curriculum, a toolkit and the final Guidelines will be available on the Farmers Market Federation of NY website, www.nyfarmersmarket.com

Training Materials
Recommendations for Food Safety at Direct Marketing Venues
Target Audience
Producers, storage intermediaries and packers of fresh fruit and vegetables.

Canadian-grown fruit and vegetables have always been recognized for their high level of production safety and for their positive impact on the health of consumers. Recent cases of food-borne illnesses have increased consumer awareness of the potential for contamination of produce. In order to reassure buyers and maintain a high level of consumer confidence, the Canadian Horticultural Council (CHC) has taken a lead in developing food safety programs on the farm for fruit and vegetables. CanadaGAP is the name for the CHC’s On-Farm Food Safety (OFFS) Program. The program consists of national food safety standards and a certification system for the safe production, storage and packing of fruit and vegetables. Six crop-specific manuals, developed by the horticultural industry and reviewed for technical soundness by Canadian government officials, are designed for growers and packers implementing Good Agricultural Practices (GAPs). The manuals contain comprehensive guidance based on a rigorous hazard analysis using HACCP principles.

In 2008, the CHC began offering producer/packer certification to the CanadaGAP program standards. The certification program is open to suppliers who need to demonstrate to their customers that they are following the On-Farm Food Safety Manuals. Program participants are required to pass a third party audit specifically based on the manuals. The CHC manages and oversees program delivery. Auditing and certification is outsourced to separate, internationally-accredited Certification Bodies, who are responsible for review of the audit results and certification decisions. CanadaGAP certification options B and C have been formally recog-
nized by the Global Food Safety Initiative (GFSI). CanadaGAP is also undergoing benchmarking to the GlobalGAP standard in order to obtain formal recognition and satisfy customer requests for GlobalGAP equivalency.

**Benefits to Program Participants**

- **Consistency of Audits:** The audit is based specifically on the requirements of the CanadaGAP (OFFS) Manuals. There are no surprises or additional requirements. Auditors have to pass the CanadaGAP-specific training before they do on-farm audits.
- **Oversight of Auditor Performance:** The auditors are monitored and overseen by the Certification Body, who also reviews all audit results and ensures the integrity of the assessments. Any complaints or disputes related to the audits will be handled by the Certification Body. Ongoing, regular review of auditor performance is required.
- **Choice:** Several different certification options are available.
- **Access to International Markets:** CanadaGAP-certified companies have the benefit of using a made-in-Canada program to meet the food safety requirements of the international marketplace.

**Benefits to Customers**

- GFSI-recognized program (certification options B and C)
- Consistency of audit results
- Objective, third party certification of suppliers
- Internationally accredited Certification Body
- Certification Body is arm’s length to both the standards owner (CHC) and the customer
- Auditors trained specifically on requirements of the CanadaGAP Program
- Trained professionals responsible for assessing supplier conformance to technical requirements
- Ongoing oversight of Certification Body and auditor performance
- Complaint and dispute management mechanisms

**Training Materials**

On-Farm Food Safety Producer and Packer Training Resource Kit.

- FAQs and Pamphlets (OFFS, ag water, water quality, record keeping, ag chemicals, key practices, personal hygiene, tips for u-pick, cleaning and sanitizing equipment)
- Signs and Posters (hand washing, hand sanitizing, employee illness, chemical storage, Food Safety tips).
- Other resources (form management templates, guide to creating employee food safety handbook)

One-on-one Farm/Packing/Processing Food Safety Coaching


University of Hawaii at Manoa / CTAHR
3050 Maile Way • Gilmore Hall 112
College of Tropical Agriculture and Human Resources • Honolulu, HI 96822
Phone: (808) 956–9539 • Fax: (808) 956–6967 • E-mail: hollyer@hawaii.edu

Target Audience
Our target audience is any size farm, packing house and processor. We also work with conventional and organic farms and with aquaponic farmers.

Topics Discussed
All topics required to get ready for the Primuslabs.com suite of third party audits: ranch, packing crew, packing house and processing. Including water quality, pesticide handling, human hygiene, animal.

The College of Tropical Agriculture and Human Resources (CTAHR) at the University of Hawaii at Manoa is the only food safety coaching service for Hawaii agricultural entrepreneurs. We have a collaborative coaching - auditing relationship with the auditors at the Hawaii Dept of Agriculture and private sector third party auditing companies (Primuslabs, NSF-Davis Fresh). We communicate often and solve problems together. Our website is: http://manoa.hawaii.edu/ctahr/farmfoodsafety/.

Our farm food safety coaching work started back in 1999 when Safeway, Inc. submitted a letter to growers saying that farmers needed third party audits or would be cut from the Safeway supplier list. This result never happened, but CTAHR scientists and extension specialists and agents saw the future and built a one-on-one coaching program that meets international audits, but is tailored to the specific needs of the agricultural entrepreneur’s operation. We work with conventional and organic farms from 16 square feet to many hundreds of acres. We work with large packing shed operations and well as small processors.

We have developed over a dozen supporting publications, short videos, aluminum farm signs, and a 30-minute television show on GAPs. We have been
involved in giving feedback on the next update to the FDA-promulgated GAPs and the Winrock/United Fresh Produce Association’s audit harmonization project. We also have been pioneering work on food safety with aquaponic operations and are well informed on the Produce Traceability Initiative (PTI).

**Summary of Evaluation Data**

Our evaluation is currently based on how many business complete their first third-party audit. Our coaching process is 100% one-to-one. We have found that group processes do not accomplish much and web courses are not something that farmers are interested in. So, we work with the agricultural entrepreneur at their operation and give them advice that is specifically tailored to their needs and passing the audit. Many of our business people are not native English speakers so we use translators when need. Many farms, and Hawaii has 99% of its farms under the $500,000 cap of the FSMA, will start the coaching process but not finish for a variety of reasons. On the other hand, packers typically have their buyers pushing them, so they are much more likely to finish with the coaching process. We do not follow-up farms to find out why they do not complete the program because some farmers are quite vocal and sensitive, and we manage the relationship carefully. We know the transformation of the US food system is a long process, so we are patient. All businesses that third-party pass audits are immediately listed here: http://www.hifarmsafe.org/

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**Training Materials**

- Best on-farm food safety practices: Documenting trace-back and trace-forward of harvested produce
- Best On-Farm Food Safety Practices: Reducing Risks Associated with Rat Lungworm Infection and Human Eosinophilic Meningitis
- Box labeling
- Farm food safety behavior signs
- Good food safety practices: managing risks to reduce or avoid legal liability
- Student and Food Safety: Best Practices for Hawaii School Gardens (final draft)
- On-farm food safety: Aquaponics
- On-farm food safety: Questions growers frequently ask
- Pest management systems to control rodents in and around packing sheds
- The Produce Traceability Initiative (PTI): A Primer for Hawaii’s Small-Farm Operators
- First visit recon sheet
- We also have a 30 minute television show and a number of short “how-to videos”.

William C. Hurst, A. Estes Reynolds, Mark Harrison, Darbie Granberry, Jim Daniels, Joe Frank, George Boyhan, James Gorny, Dave Gombas, Barry Eisenberg Donald J. Graham, Karan Khurana, Oscar Jeter, Rudi Groppe, Drew Falkenstein Arnold Best, Chris Gunter, Doug Sanders

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Target Audience
Fresh-cut produce processors, plant managers, quality assurance personnel, production supervisors, field inspectors, marketing directors, third-party auditors, inspectors, and anyone responsible for designing and implementing field and fresh-cut food safety programs.

Topics Discussed
Food safety concerns, water sanitation, microbial testing, using HACCP principles to develop and monitor a HACCP food safety plan, sanitary plant and equipment design; HACCP certification is earned upon completion of course and passing exam.

The “Hands-On HACCP for the Fresh-Cut Industry” workshop was developed by Dr. Bill Hurst in 1999 and has been offered annually by UGA. This program is the only one specifically designed for the fresh-cut industry in the U.S., and is accredited by the International HACCP Alliance.

The goal of this program is to provide participants with the skills and knowledge to design, implement, document and maintain HACCP for a fresh-cut processing business. This short course provides a unique program of lectures and work group discussions from a broad-based faculty of food microbiologists, HACCP experts, and authorities from academia, industry and government. The work group sessions provide interaction with HACCP authorities who have developed and implemented successful HACCP programs in fresh-cut processing plants.

Speakers at the workshop over the past 12 years have included Drs. William C. Hurst, A. Estes Reynolds, Mark Harrison and George Boyhan of UGA, Drs. James Gorny, Dave Gombas and Barry Eisenberg of United Fresh Produce Association, Donald J. Graham of Graham Sanitary Design Consulting, and Karan Khurana of Pulse Instruments.

Summary of Evaluation Data
This workshop is the only HACCP-certification short course in the U.S. that is specifically geared to the fresh-cut produce industry. The agenda and course notebook
are updated each year to reflect changes in regulations or issues in the industry, with appropriate scientific references and other resources included.

Each speaker is rated by content of their presentation as well as delivery using a 5-point scale (0 poor, 5-excellent). Those who score below 4.0 are not invited to present again.

The overall workshop rating is consistently above 4.50 over the past 12 years, and the workshop resources notebook, food service and logistics also rate above 4.7.

Many of our participants work for companies who have sent employees to previous workshops, or who have found out about this workshop from colleagues who have attended. This workshop is also a favorite for third-party auditors, state and federal inspectors, to learn the fresh-cut produce industry and how to audit fresh-cut processing plants.

**Training Materials**

The participant’s notebook for this course contains the handouts from presentations given in the workshop, as well as appropriate reference materials and supporting documentation that would be useful in preparing and monitoring a food safety plan in a processing facility. A copy of this notebook will be available at the PSA conference. Brochures about the current workshop can be downloaded or printed from our website at www.EFSonline.uga.edu - click on the calendar link.
Developing & Implementing GAPs and GMPs for HACCP-Based Food Safety for the Fresh Produce Industry

William C. Hurst, A. Estes Reynolds, Mark Harrison, Darbie Granberry, Larry Beuchat, George Boyhan, James Gorny, Dave Gombas, Barry Eisenberg, Jeff Brecht, Keith Schneider, Mark Ritenour, James Rushing, Chris Gunter, Dennis Osborne, Jorge Fonseca, Lt. Col. Hap Carr

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Target Audience
Fresh produce growers, packers, shippers and distributors, assisting them in developing and customizing their own food safety/security programs. Managers, supervisors and food safety specialists of the fresh fruit and vegetable industry, as well as third party auditors in charge of assessing food safety/security programs; USDA, FDA and state agricultural personnel.

Topics Discussed
All GAP safety concerns (i.e., fertilizer use, irrigation water, health and hygiene, equipment sanitation, transportation issues), water quality/testing, microbial testing, using HACCP principles to develop a food safety plan.

The UGA short course entitled “Developing & Implementing GAPs and GMPs for HACCP-Based Food Safety for the Fresh Produce Industry” has been offered annually since 2001, developed and coordinated by Dr. William C. Hurst of UGA. In 2010, the course was accredited with the International HACCP Alliance and now offers HACCP certification upon completion of the course and passing a HACCP exam.

This hands-on workshop teaches participants how to develop and document Good Agricultural Practices (GAPs), Standard Operating Procedures (SOPs), Sanitary Standard Operating Procedures (SSOPs) and Good Management Practices (GMPs) for farm and field operations, packing facilities, cold storage operations and produce shippers.

Specific break-out sessions use HACCP principles to teach participants to identify and prevent food safety hazards, set preventive/control measures and control limits, develop control and monitoring procedures, document and verify the results of their efforts, as established by the International HACCP Alliance.

Speakers at the workshop over the past 10 years have included Drs. William Hurst, A. Estes Reynolds, Mark Harrison, Darbie Granberry, Larry Beuchat, and George Boyhan of UGA; Drs. James Gorny, Dave Gombas and Barry Eisenberg of United Fresh Produce Association; Drs. Jeff Brecht, Keith Schneider and Mark Ritenour of the University of Florida; James Rushing of
Clemson University; Chris Gunter and Dennis Osborne of NC State; Jorge Fonseca of the University of Arizona; and Lt. Col. Hap Carr, Food Safety Coordinator for Titan Peach Farms in Ridge Spring, South Carolina.

**Summary of Evaluation Data**

This workshop is one of the first GAPs/GMPs/HACCP-type food safety workshops specifically geared to the fresh produce industry and has been presented annually in the U.S. since 2001. In 2010 this workshop received HACCP accreditation and now offers HACCP certification to participants who pass the HACCP exam.

Each speaker is rated by content of their presentation as well as delivery using a 5-point scale (0 poor, 5-excellent). Those who score below 4.0 are not invited to present again.

The overall workshop rating is consistently above 4.30 over the past 10 years, and the workshop resources notebook rated above 4.5 every year. The workshop agenda and materials in the notebook are updated annually to address current industry concerns, and to provide scientific documentation to be used in developing a food safety plan.

Many of our participants work for companies who have sent employees to previous workshops, or who have found out about this workshop from colleagues who have attended. This workshop is also a favorite for third-party auditors, state and federal inspectors to learn the fresh produce produce industry.

**Training Materials**

The participant’s notebook for this course contains the handouts from presentations given in the workshop, as well as appropriate reference materials and supporting documentation that would be useful in preparing and monitoring a food safety plan for an on-the farm or packing house facility. A copy of this notebook will be available at the PSA conference. Brochures about the current workshop can be downloaded or printed from our website at www.EFSonline.uga.edu - click on the calendar link.
Washington State University
Good Agricultural Practices (GAPs) Program

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Target Audience
Produce growers representing conventional or organic management for small-scale, diversified agriculture systems with regional distribution to large-scale systems with international distribution.

Topics Discussed
- GAPs
- Produce Food Microbiology
- Irrigation Water Quality
- Water Quality Sampling
- Manure Management
- Worker Health and Hygiene
- Sanitation during Harvest
- Storage and Distribution
- Regulations

The Washington State University Good Agricultural Practices (GAPs) team: Drs. Karen Killinger, Richard Dougherty, Craig Cogger and Mr. Andy Bary, developed a two workshop series funded by the Western Center for Risk Management Education (2008-2012). Session I focused on increasing knowledge and Sessions II and III, delivered 2-4 months after Session I, were focused on implementation. Topics included: liability, food safety, water quality, manure management and composting, worker health and hygiene, post-harvest handling and regulations. The GAPs workshops were presented by an experienced, multi-disciplinary team, including WSU faculty, as well as representatives from the Washington State Department of Agriculture and Department of Health Food Safety Programs. Furthermore, development, promotion and delivery of the workshops were supported by several cooperating stakeholder organizations. From November 2008 through March 2011, the WSU GAPs program reached over 500 producers through Session 1 workshops, and 180 participants attended Session II follow-up workshops. Performing workshops from November to March (outside of the growing season) was important for grower attendance. To date, 14 Session I, 10 Session II workshops and 1 Session III workshop were offered. Written evaluations of each workshop and 6-month and 1-year online, follow-up evaluations were performed to document impacts. Participation in GAPs workshops resulted in increased knowledge of GAPS, on-farm GAPs implementation as well as adoption of operational GAPs training and recordkeeping practices.
Summary of Evaluation Data
See WSU GAPs final report for documentation of program outcomes and impacts from 2008-2010. A program overview can be viewed at: http://www.agrisk.umn.edu/ProjectSearch/SearchProjects.aspx and searching for projects performed in Washington on food safety liability topics. Project name: “Managing Food Safety Risks Through Good Agricultural Practices (GAPs) Education”.

Training Materials
- WSU GAPs Session I Evaluation
- WSU GAPs Session II Discussion Guide
- WSU GAPs Session II Evaluation
- WSU GAPs Irrigation Water Factsheet
- WSU GAPs final report 2008-2010

Presentations for workshops are also available. Materials were developed for small-scale growers.
Trainings for Small Fruit and Vegetable Growers

Ashley Kulhanek, Doug Doohan, Mark Koenig, Hal Kneen

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Target Audience
Fruit and vegetable growers, specifically small farms and ethnically distinct groups such as the Amish community ( clarification- by small we mean those farms that tend to sell at markets and stands or within the state).

Topics Discussed
Water (what science tells us, options for appropriate quality, water risks), Soil (focus on composting and manure), Good Handling (GAPs related to works, harvesting & handling), and Trace. Intro on why food safety is important, customer views, mapping, and getting started.

The Ohio State University Extension Fruit and Vegetable Safety Team was formed from collaboration between growers, extension educators, and Ohio State Researchers due to repeated requests from local growers and the Ohio Produce Growers and Marketers Association for food safety education. The Team began to develop a risk analysis-based produce safety program that could be tailored to the variety of growers that exist in Ohio, and address issues most relevant in Ohio. This program is science-based, and addresses produce safety from a risk assessment perspective. The goal is to educate growers about produce safety in order to help them get in compliance regardless of which set or sets of regulations they wish to comply with. The program was based on mental models research conducted with midwestern farmers and used extensive feedback from focus groups of Ohio farmers, extension specialists, and input from grower organizations. We also drew on existing peer-reviewed science and resources including Cornell GAPs and those developed by the Center for Innovative Food Technology (CIFT). The 3-hour program is presented by two extension educators who use a lecture/discussion format. The presentation and workbook are designed to encourage growers to assess their own farms for risks and brainstorm possible solutions that work for their operation, budget, and capabilities, thereby avoiding a “one-size-fits-all” solution to food safety on the farm. The workbook is largely a take-home tool to begin this farm-specific assessment. It offers additional resources beyond the scope of the 3-hour presentation including a template for standard operating procedures, contact
information for local government offices and laboratories, and suggested additional reading materials by OSU and other institutions.

Summary of Evaluation Data

- Eighty-nine responses have been collected from voluntary participants since January 2011.
- Attendee Farm Size: 24.7% under 10 acres, 37.1% 10–99 acres, 21.3% 100–499 acres, and 7.9% >500 acres.
  - 50.6% of respondents had attended some food safety program before.
  - 39.3% claim they have a food safety plan for the farm already in place.
- Program informativeness (1–4 likert scale) 1 = not informative to 4 = very informative.
  - 1 = 0% 2 = 9% 3 = 34.8% 4 = 51.7%
- Likelihood workbook will be used on farm (1–4 likert scale) 1 = not likely to 4 = very likely.
  - 1 = 2.2% 2 = 9% 3 = 29.2% 4 = 56.2%
- Only 22 took both pre & post-test. Tests were analyzed with paired T-test. Results: Average test scores were statistically different from pre to post. p<0.05.

Observation: It was the larger farms that tended to find our information and workbook less useful. Comments included that they already were implementing similar programs due to 3rd party audits and mandatory efforts enforced by their affiliations with companies such as Dole or buyers. These observations support our selection of smaller farms as the audience best suited by our program.

Training Materials

- “Fruit and Vegetable Safety Workbook” (best for non-Amish farmers, amish version in progress)
- “Food Safety for Fruits and Vegetables” Factsheet (ANR-25-10 any audience appropriate)
- Pre & Post Tests
- General Purpose FS Poster Series (4) a. “Why should you be concerned about produce safety?” b. “The risks of contamination on a farm” c. “What farmers can do to help” d. “What consumers can do to help” (general audiences for awareness and GAPs promotion)
- “Facts Fables and Fiction of Food Safety” in review factsheet (general audience)
- “A History of Food Safety” in review factsheet (any audience)
Keeping Fresh Produce Safe Using Good Agricultural Practices (GAPs)

Luke F. LaBorde, Daniel Tobin, Joan Thomson

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In the winter of 2011, Penn State Extension held a series of one-day workshops at eight locations throughout Pennsylvania; specifically, North East, PA (1/19), Greensburg, PA (1/20), Lancaster, PA (2/15), Dupont, PA (3/1), Mifflinburg, PA (3/3), Chambersburg, PA (3/21), Altoona, PA (3/22), and Leesport, PA (3/29). A total of 221 individuals attended the workshops. Direct mailings inviting growers to attend were sent using lists provided by wholesale buyers (e.g. restaurants, grocery stores, distributors). The event was also marketed to the general agricultural community through extension newsletters.

Because the event was primarily marketed to wholesale growers, emphasis on conveying skills required to document farm food safety practices were emphasized. Handouts included a template GAP food safety plan and a self audit that growers could use to prepare for existing or anticipated buyer documentation requirements. Lectures were titled: 1) Produce Safety Introduction; 2) Safe Use of Water; 3) Animals, Manure, and Sewage; 4) Worker Health, Hygiene, and Personal Practices; 5) Harvest and Post-Harvest Sanitation; 6) Cleaning and Sanitizing (with demonstration); 7) Documenting Trace-Back and Trace-Forward; and 8) Preparing for Audit Questions Using the Penn State GAP Template Plan. The USDA AMS Fresh Produce Verification Program standards for GAP practices and documentation were used as the basis for content, recommendations for practices, and handout materials.

Evaluation forms were handed out before the lectures began. In order to assess changes in knowledge, attitudes, skills, and intent to use the material, partici-
pants were asked to fill in questions 1, 2, and 3 before the presentations began and then again at the end of the workshop. They were also asked to complete the remaining questions by the end of the workshop. Of those attending, 176 completed evaluations for a response rate of 80%.

**Summary of Evaluation Data**

The data presented below indicate the 2011 GAP workshops were very effective in increasing participant confidence in their skills related to documenting GAP practices. The majority of growers also indicated their intentions to write a food safety plan and conduct a self-audit for the coming growing season but most do not intend to prepare for a audit to achieve third party certification (TPC). Variability in this response is likely due to difference in GAP policies among wholesale buyers. High intention values before and after the workshop are probably the result of the way the workshop was marketed. Lists of growers were obtained from supermarket chains operating in Pennsylvania, most of which had some level of requirement for GAP training or documentation in the near future.

Most of the growers surveyed would likely to be exempt from the Food Safety Modernization Act given the high number with sales under $500,000. However, requirements from wholesale buyers remain a powerful incentive to develop GAPs plans. The findings from this study also suggest that the most growers have some knowledge of GAPs even though they may have not attended a formal workshop. Our strategy of moving toward skills development rather than only knowledge dissemination for this motivated group appears, therefore, to be justified.

A follow-up survey will be administered after the coming growing season to determine grower retention of knowledge, skills, and attitudes, and will also document follow-through among growers in writing a food safety plan, conducting a self-audit, and applying for TPC. The results from the follow-up survey will help indicate areas of content that need improvement.

For future 1-day workshops, the majority of time should be dedicated to material related to preparing for GAP documentation or inspection requirements. Lecture content and materials may have to be modified since FDA produce standards are currently under development and any differences between these and the USDA AMS standards we used as the basis for this workshop remain unknown.

In addition, because many growers pack their own produce, post-harvest handling is another important content area. To maximize the impact of future workshops, Extension should consider developing two tracks for workshops; introductory level training for growers new to GAPs and more advanced in-depth skills development workshops.

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**Training Materials**

1) PowerPoint lecture slides, 2) Penn State Farm Food Safety Template Plan, 3) Preparing for Audit Questions Using the Penn State GAP Template Plan, 4) Pre-harvest Checklist, 5) Harvest Checklist, 6) Grower Self-Audit. Supporting materials: 1) “Food Safety Field Training Kit for Fresh Produce Growers” (Illustrated self-supporting flip chart for training harvesters and handlers. English and Spanish text. 2) Keep Fresh Produce Safe — Use Good Agricultural Practices (Illustrated water proof, light resistant 2’ X 3’ color poster. Printed in English on one side, Spanish on reverse side. Reinforces Field Training Kit.)
The Arizona Leafy Greens Food Safety Training Kit
(Arizona LMGA FSTK)

Teressa Lopez, Sergio Nieto-Montenegro, America Chavez-Martinez

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Target Audience
Production supervisors, quality control personnel, extension educators, handlers and/or industry consultants who wish to conduct food safety training at leafy greens ranches.

Topics Discussed
- Foodborne outbreaks and leafy greens contamination
- Personal hygiene and handwashing
- Cross-contamination in the field

Instructor’s Guide: The Instructor’s Guide contains important information for planning and implementing an effective training session at a leafy greens facility. Because this section of the AZTK can make training sessions run more smoothly, it is strongly recommended that instructors become familiar with this material before training begins. In addition there is information on the importance of follow-up training and continuous enforcement of food safety rules. Make sure to discuss these points with the upper management at the company where the training program is being held.

The following lessons are included: Lesson 1. Foodborne Outbreaks and Leafy Greens Contamination. The instructor will describe the outbreak which occurred in 2006 as a result of contaminated bagged spinach distributed nationwide. The lesson discusses governmental actions, their impact on industry, and their economic effect. The effect that a similar outbreak could have on the Arizona Leafy Greens industry is presented. Finally, the three categories of leafy greens contaminants are presented and examples of contamination that can occur in the ranch are also discussed.

Lesson 2. Personal Hygiene and Handwashing. The instructor will describe the concept of personal hygiene and its importance to food safety. The instructor will cover three areas of personal hygiene that are critical for safe leafy greens production: 1) protective garments and clothing, 2) personal practices, 3) personal health and wounds. For each of these areas, the instructor will explain and demonstrate appropriate procedures and behaviors for lowering the risk of leafy greens contami-
nation, with emphasis on good personal hygiene practices by explaining the purpose of and the correct procedure for handwashing as well as correct glove usage.

Lesson 3. Cross-Contamination in the Field. The instructor will describe the concept of cross-contamination, its causes, why it is a problem for leafy greens and its importance to food safety. Prevention strategies and ways to prevent cross-contamination are also covered. The instructor will describe situations that can happen in the ranch that might lead to product contamination. These events include animal intrusion discovery, glass in the field, blood in harvested product, and unsuitable packaging materials. For each of these areas, the instructor will explain and demonstrate appropriate procedures and behaviors for lowering the risk of leafy greens contamination.

Additional Resources: This section contains posters that can be used as message enforcers after the training and to remind employees of the need to follow good food safety practices every day. An example of a log to document each training session is included in this section. Also included is a knowledge test to evaluate the extent to which the participants learned the material. A certificate of attendance template can be printed for presentation to participants at the end of the training.

AZ Leafy Green Technical Subcommittee 2009–2010: Vicki Scott – Chair, Arnott Duncan, Hank Giclas, Tom Mack, Bob Mills, Kevin J. Watson, and Kami Weddle. The following also provided technical insights and suggestions: Nye Joell Hardy and Mike Villanueva. The Arizona Leafy Greens Food Safety Training Kit was prepared by: Sergio Nieto-Montenegro, Ph.D. and America Chavez-Martinez, Ph.D. / Hispanic Workforce Management, LLC., 2300 George Dieter Dr., El Paso, TX 79936.

Summary of Evaluation Data
The AZ LGMA Marketing Committee provided two full kits to each of its members and one tailgate flip chart kit to every Arizona Leafy Green Grower. Arizona LGMA FSTK is available through the AZ LGMA office.

Arizona LGMA FSTK was first marketed on October 21, 2010 and has since held five Train-the-Trainer workshops at no charge for those that plan to utilize the kit. There have been three workshops in English and two in Spanish.

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<tr>
<th>Training Materials</th>
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<tbody>
<tr>
<td>Overview of the AZ Food Safety Training Kit</td>
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<tr>
<td>Section 1. Instructor's Guide</td>
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<tr>
<td>Section 2. Lesson Plans:</td>
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<tr>
<td>- Lesson 1- Foodborne outbreaks and leafy greens contamination</td>
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<td>- Lesson 2- Personal hygiene and handwashing</td>
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<td>- Lesson 3- Cross-contamination in the field</td>
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<td>Section 3. Additional Resources:</td>
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<tr>
<td>- Posters, Training Log, Quiz, Certificate of Attendance</td>
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The Indiana-Illinois Food Safety Initiative for Fresh Fruits and Vegetables is a collaborative effort of Extension staff from Purdue University and the University of Illinois. The Initiative develops and presents educational programs to fruit and vegetable farmers in the two states. Single presentations introducing food safety and GAPs, or covering one key topic have been included in other events. Four to 8-hour sessions have been held in conjunction with the Indiana Horticultural Congress, and also as independent events. One full-day session focused on writing a food safety plan and included time to start writing a plan. A 4-part webinar series covered key topics. For this series, a host introduced pre-recorded presentations and moderated questions after each presentation. A live audience attended at the main host site. The recorded presentations and handouts remain available online to registered viewers, and new registrants are welcome. Additional hosted viewings may be scheduled in the future. We expect to re-record presentations or add additional presentations as needed, linking them to the same webinar home page. The slide presentations used at the educational programs have been adapted for our audience and region from materials developed by the National GAPs program, Cornell Cooperative Extension, the North Carolina State Market Ready GAPs curriculum, Purdue Food Science, University of Minnesota, Rutgers Cooperative Extension, and others. Key presentations include: Introduction to GAPs and Food Safety; Health and Hygiene; Water Quality and Treatment; Animals, Animal Products, and Manure; Harvest, Packing Facilities, Storage, and Transportation; Traceability and Recordkeeping; Writing a Food Safety Plan.
ucts, and Manure; Harvest, Packing Facilities, Storage, and Transportation; and Traceability and Recordkeeping. Programs at the Indiana Horticultural Congress have also included out-of-state speakers. A representative from the USDA Food Safety GAPs Audit program has spoken at several of the events.

The audience for this effort is mainly small-scale vegetable and fruit growers marketing to local wholesale buyers or individual consumers. A significant proportion practices a plain lifestyle and relies on horses for traction. The programs have reached about 300 people in Indiana and Illinois from January through April 2011. We intend to survey program participants 6 to 9 months after the event to determine what changes they actually make. The group has also organized training for Extension staff. We used the North Carolina State Market Ready GAPs curriculum to teach Extension educators about Food Safety and GAPs during a two-day program. As part of the program presenters and attendees discussed what modifications to the curriculum would be useful for audiences in our region. Notes from these discussions were used when the presentations were later modified for use in programs described above.

**Summary of Evaluation Data**

Approximately 400 people have attended the various programs. We have only limited response to preliminary evaluations. Over 85% of the participants who returned evaluations at longer food safety programs (n=17) planned to make changes on their farm based on something they learned from the presenters. Over 35% of people who heard a food safety presentation as part of a multi-topic program (n=46) said they planned to make changes based on what they learned about food safety.

All participants at webinars and the food safety plan writing workshop who responded (n=9) indicated that because of interactions with Extension in the last year, their knowledge about food safety issues in the fresh produce industry has increased, and they have begun to assess food safety risks on their farm. In addition, over 85% have changed practices to reduce food safety risks on their farm.

Informal feedback frequently includes requests for the information to be more relevant to small direct-market producers, hands-on activities, specific information about sanitizers for various situations, a concise list or chart of all relevant federal/state/local food safety regulations, understanding which regulations apply to a particular operation, examples of recordkeeping systems, and a desire for less burdensome recordkeeping. Positive response to representative from USDA AMS and to producer with GAPs experience as speakers.

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**Training Materials**

Many of the materials we have used are not original, but have been adapted from materials developed by others. The following presentations used in the webinar series are a good examples.

- Introduction to GAPs and Food Safety
- Health and Hygiene
- Water Quality and Treatment - Parts 1 and 2
- Animals, Animal Products, and Manure
- Harvest, Packing Facilities, Storage, and Transportation
- Traceability and Recordkeeping
Practical Food Safety for Produce Growers

**Ginger Nickerson, Hans Estrin, Lynn Blevins**

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**Target Audience**

Large and small scale diversified produce growers - both those that are intending to be GAPs certified and those that are not intending to be GAPs certified, but want to improve food safety practices.

**Topics Discussed**

Food safety practices in general and preparing for GAPs certification.

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**Human-Animal Interactions on the Farm** (appendix to Vermont’s GAPs manual). This appendix is based on the Compendium of Measures to Prevent Disease Associated with Animals in Public Settings, 2011, available at http://www.cdc.gov/mmwr/pdf/rr/rr6004.pdf. The appendix will cover recommendations to reduce the risk of transmission of disease from animals to humans. Information will be presented in both bulleted text (examples below) and diagram format covering three main topics: animal management, human behavior, and facility design. Case studies and fascinating facts will be displayed in a sidebar format, consistent with the general format of the rest of the GAPs/Produce Safety Manual. The manual and appendices will be illustrated as much as possible with images from local farms. Sample signs for animal areas, including hand-washing, will also be included.

**Animal Management**

- Monitor animals daily for signs of illness and do not allow visitors access to animals that are sick.
- Animals should be under the care of a veterinarian, including vaccination (i.e., rabies) and parasite control.
- Do not allow animals to be overcrowded or otherwise stressed, which can increase fecal shedding of pathogens that can make people sick.
- Do not allow visitors to have contact with aggressive or unpredictable animals.
- Avoid visitor direct contact with newborn animals or birthing by-products (e.g., placenta).
Facility Design
- If possible, design the animal area for one-way traffic with hand-washing facilities at the outlet.
- Construct a barrier (e.g., fence) to separate animal and human areas.
- Animal waste and tools used for animal waste removal should be stored in areas restricted from visitors.
- Avoid transport of manure and soiled bedding through areas accessible to humans, if possible. If unavoidable, be careful to contain and clean-up any spillage.

Human Behavior
- Eating should not be allowed in the animal area.
- Encourage visitors to wash their hands with soap and water after visiting the animals.
- Do not provide animals food in containers that can be eaten by humans (e.g., ice cream cones).
- Pacifiers and baby bottles should not be used in animal areas.
- Young children should be closely supervised to prevent thumb sucking, nail biting and other hand-to-mouth activities.
- Inform visitors that some people (older adults, pregnant women, young children, and persons with compromised immune systems) should be extra careful around animals.

Summary of Evaluation Data
We post the Harlow Case Study on our website. We have not conducted any formal evaluations. We have received positive comments on it however - mostly from agricultural service providers wanting to learn about what GAPs means for farmers and from state-level policy makers trying to understand how GAPs is/will impact our growers 2 and 3. We are still in the process of developing these other materials, so no evaluations yet.

Training Materials
- Here Comes GAPs Certification! The inside story of a Vermont farmer going for USDA GAPs certification. Compiled by Hans Estrin, UVM Extension Farm-to-Institution Coordinator, with support from Vermont Agency of Agriculture.
- Spreadsheet on Estimating Costs of GAPs certification - this is a tool we are still piloting and refining, so we have not done any evaluations yet.
- Appendices to UVM GAPs Manual - tailored to diversified growers. We are creating produce safety training manual with appendices tailored to the special concerns of small and/or diversified growers. We will bring one appendix on Human-Animal Interactions to the PSA event.
Developing a Statewide GAPs Training Team to Deliver GAPs Training

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In fall of 2010, the University of Nebraska Rural Initiative hosted a 2-day train-the-trainer session and brought Bob Gravani and Betsy Bihn, National GAPs Program Director and Coordinator, respectively, to conduct the workshop. Eight Extension Educators were identified and invited to become part of the Nebraska GAPs Training Team.

Upon conclusion of the train-the-trainer session, the Rural Initiative hosted a 2-day retreat where the GAPs Training Team met to identify and develop topics and format for delivering Farm Food Safety Training to local fruit and vegetable growers. Cost for planning and delivering the farm food safety training with GAPs was facilitated by an RBEG grant received from USDA Rural Development. After the retreat, the GAPs team members worked to develop powerpoint presentations for each of the modules. It was decided to hold trainings at five locations across the state. Each training was two days, with a week between the first and second day. The week-long interval allowed producers to work on homework assignments and conduct individual farm self-assessments prior to coming to the second day of training.

GAPs Team Members were present throughout the two-day session, which allowed producers to develop a working relationship with the presenters and facilitated better interaction and questions among participants.

Target Audience
Fresh fruit and vegetable growers.

Topics Discussed
- Microbiology
- On-Farm Risks
- Worker Health & Hygiene
- Animals & Site Selection
- Pack Facility Sanitation
- The Three T’s
- Managing Liability & Risks
- Writing SOPs
- Audit Breakdown
After the first day, participants were encouraged to do their “homework” assignments and encouraged to ask questions or seek additional help during the second training day.

Participants were provided with a USB flash drive that had templates for developing SOPs and a farm food safety plan — and comments were very positive from producers on the benefit and ease of using the templates as a starting point and then modifying the template to fit their individual operation. While many growers were not at the point to go through a GAPs Audit, most realized the benefit of developing a farm food safety plan and working towards removing or minimizing potential risks that could cause food contamination and other issues.

Over 150 producers completed the 2-day GAPs training at five locations throughout the state. The GAPs Training Team will continue to conduct additional trainings as needed, most likely late fall or winter to early spring when producers are more likely to attend.

**Training Materials**

- **3-Ring Binder**: Organized by 24 tabs, which correspond with ‘Food Safety Begins on the Farm: A Grower Self Assessment of Food Safety Risk’. Provides a self-assessment and sample forms and logs that relate to each section. Also included is a Nebraska GAPs contact list, a Farm Food Safety Plan template and additional resources.

- **USB Flash Drive**: Provides an electronic version of the binder. Organized in folders that match the 24 tabs, most documents have two versions — one that can be printed off to use as is, and one that is editable, allowing producers to modify the document to meet individual needs.

- **GAPs PowerPoint Series**: Ten PowerPoints were developed to facilitate trainings. The PowerPoints are equipped with electronic polling technology, which allowed for active participation in the training sessions.
Mock Audits and Grower Training

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Target Audience
All small and large-scale organic, sustainable and conventional growers attended the training. The trainings occurred at both larger conventional farms and an organic/sustainable cooperative.

Topics Discussed
The auditors discussed how an audit works, why a company would receive an automatic fail what the audit follow-up consisted of and what a food safety plan would look like.

The North Carolina Fresh Produce Safety Taskforce has used mock audits to train large, small conventional and organic growers from around the state. To date, we have conducted 4 audits with over 105 participants. The audits were conducted using actual auditors from various audit firms on a variety of farms. Over the two days the participants would have a power point presentation describing the audit process and then participate in an audit of both the farm and the packing facilities. The auditor would describe what he was looking for and why someone would fail or pass. This generated a lot of discussion in the field, an environment most participants preferred to the classroom portion of the workshop. The most recent mock audits were evaluated using a pre and post-test and a survey (35 people). Approximately 56% of the participants said they were likely to create a food safety plan. From evaluations, the overall quality of the workshop was rated at a 3.35 out of 4. Attendees liked the fact that it was a real audit with an open discussion and walk around the farm to identify potential risks associated with on-farm practices and did not like the power point from the first day which seemed too long and at times irrelevant. Evaluations included questions pertaining to the participants’ confidence in implementing GAPs going from a 3.7 before the workshop to a 4.1 out of 5 after the workshop. In all areas, the participants increased their confidence (manure, managing animals, water, and worker hygiene). Videos are available for two of the four audits and have been used.
in further trainings. This program has fit in nicely to our overall curriculum and been the catalyst for further participation in our trainings for a number of growers.

**Summary of Evaluation Data**
Overall 105 people have gone through one of our 4 mock audits. The most recent mock audits were evaluated using a pre and post-test and survey (35 people). Approximately 56% of the participants said they were likely to create a food safety plan. From evaluations, the overall quality of the workshop was rated at a 3.35 out of 4. Attendees liked the fact that it was a real audit with an open discussion and walk around the farm to identify potential risks associated with on-farm practices and did not like the power point from the first day which seemed too long and at times irrelevant. Evaluations included questions pertaining to the participants’ confidence in implementing GAPs going from a 3.7 before the workshop to a 4.1 out of 5 after the workshop. In all areas, the participants increased their confidence (manure, managing animals, water, worker hygiene).

**Training Materials**
- Video of the audit
- Pre and posts tests
Rhode Island GAP - Training and Certification

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Target Audience
Rhode Island farmers - all considered very small or small when compared to farms nationwide.

Topics Discussed
All pertinent GAP topics. In addition, we have added other regulatory issues that might impact the RI farmers. The consumer outreach initiative is briefly discussed.

The RI GAP program began in 2000 with an USDA/NIFSI grant that was awarded to the New England (NE) states to use good agricultural practices (GAP) to integrate food safety principles into small farm production; thus, develop/adapt GAP that would target small growers. Upon completion of the award in 2005, members of the RI working/advisory group decided to continue the program - making it the only state run GAP program in the country-through a University of Rhode Island (URI)-Department of Environmental Management/Division of Agriculture (RIDEM/Div. Agr.) partnership. While the foundation of the current RI GAP certification program was originally developed through the efforts of all the food safety contacts in the NE states, the RI GAP initiative has been evolving with updated guidelines and audit requirements and training revisions to reflect current topics. Once an RI farm meets all critical areas of the RIGAP guideline/audit requirements, RI Department of Environmental Management/Division of Agriculture staff complete an on-farm audit. This program includes on-site visits to ensure a farmer has met the requirements and the program coordinators will only put farms forward that will successfully complete the audit. We continue to work with those farmers who need help and even though some may not achieve certification, improvements are always made and therefore, there is always a degree of success.

RI GAP certificates are issued by RIDEM/Div. Agr. and farms must undergo yearly recertification which requires successfully passing re-inspection of the farm. Since this program is voluntary, we provide farmers resources (brochures, signs with RI GAP logo) that help market the program to their customers. Over the last
3-4 years, there has been a real interest in the certification program due, in part, to two developments: 1) farm to school/buy local and 2) increase in farmers markets (state and private). All purveyors of school lunch programs in RI require GAP certification before farmers can sell to the districts. In addition, most RI universities that buy local have the same requirement. With an increase in farmers markets, many RI growers have found that their certification has helped sales. In an effort to optimize the marketing component of the program, URI has developed a consumer awareness campaign that is used at the markets throughout the state. Displays and resources are in Spanish and English and provide explanations of the program and its relation to the safety of produce - from harvest to home handling and storage. Finally, the program partners have been able to provide the training and certification free of charge to the RI GAP farmers through yearly grants awarded through USDA Specialty Crop Enhancement program.

**Summary of Evaluation Data**

RI GAP, a partnership between the University of Rhode Island/Nutrition and Food Sciences Department CE Education Program and RI Department of Environmental Management/Division of Agriculture has been training growers since 2002/2003. However, up until the most recent training (March 2011), most of our “evaluation” came via anecdotal comments from farmers and the on-farm site visits and audits. In the recent training, an evaluation was completed by the participants (N=26) using a 5 point Likert scale (5=strongly agree, 1=strongly disagree) which assessed whether they understood the key elements of the program - RI GAP guidelines, microbial hazards, use of manure, health and hygiene, sanitation, importance of record keeping, traceback and importance of a food safety plan. The overall rating of the training was 4.3±0.6 with ranges from 3.7±0.8 (understanding the food modernization act) to 4.5±0.6 (understanding microbial hazards, guidelines for safe water use, sanitation practice guidelines, worker health and hygiene guidelines and importance of record keeping). The final evaluation is, of course, determined by passing the audit. Currently, there are 38 RI farms that are certified with 4-6 in transition. This represents about 40% of the RI farms that are growing and selling produce.

**Training Materials**

The materials developed for RI GAP are best suited to small-scale growers - conventional or organic. Each grower gets a three-ring binder with the RI GAP guidelines and audit, fact sheets concerning the issues and solutions of microbial hazards of fresh and minimally processed produce and other resources that add to their knowledge. Also included this year was information about the FDA Food Modernization Act and its potential impact on the RI farmers. In addition, we provide examples of the consumer outreach resources which help market the RI GAP program. Since RI farmers lead the nation, on a percentage basis, in direct consumer market sales (roadside stands, pick-your-own and farmers markets), the program has some emphasis in this area with critical requirements at retail farm stands and Pick-Your-Own operations.
JIFSAN GAP International Train-the-Trainers Program for Fresh Produce Food Safety

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Target Audience
The international audience consists of growers, handlers, educators, representatives of government agencies and any others who are involved in supplying foreign produce to the U.S.

Topics Discussed
Regulatory concerns and all topics relative to GAP and GMP.

In 1996, the Joint Institute for Food Safety and Applied Nutrition (JIFSAN) was established by agreement between the University of Maryland and the U.S. Food and Drug Administration (FDA). It has a foundation of public and private partnerships that provide the scientific basis to help ensure a supply of safe, wholesome food as well as to provide the infrastructure for contributions to national food safety programs, in the U.S as well as in foreign countries. One of its missions is to deliver training programs and supporting materials that focus on the safe production and handling of fresh fruits and vegetables. Instructors are recruited from academia, government agencies and the food industry. The Train-the-Trainers Program includes presentations and supporting materials on microbial and chemical food safety hazards and GAP and GMP common to the growing, harvesting, cleaning, washing, sorting, packing and transporting of fruits and vegetables sold to consumers in an unprocessed or minimally processed (raw) form. The framework of the 5-day course includes lectures, one day of visits to production and handling facilities, and case studies that require classroom participation from all participants. Since 2000, the Train-the-Trainer program has been offered thirty one times in fifteen foreign countries to over one thousand five hundred participants. Follow-up evaluations indicate a multiplier effect amounting to several thousand additional persons receiving training.
**Summary of Evaluation Data**

All participants at the end of the course complete an evaluation. Additionally, a follow-up evaluation questionnaire is sent to all participants approximately two months after the course offering which is designed to estimate the multiplier effect and to determine challenges for GAP implementation within the host country. Data relative to the four program programs conducted in 2010 are as follows: A program conducted in April in Ica, Peru had 52 participants, 6 of whom responded to the follow-up questionnaire. The six respondents indicated that they had trained approximately 572 persons. A program conducted in September in Guadalajara, Mexico had 45 participants, 10 of whom responded to the follow-up questionnaire. The 10 respondents indicated that they had trained approximately 727 persons. A program conducted in October in Turrialba, Costa Rica had 57 participants, 10 of whom responded to the follow-up questionnaire. Some of the Costa Rican respondents provided total numbers of people they had trained during their careers and the total was 5,540. A program conducted in December Ensenada, Mexico 60 participants, 20 of whom responded to the follow-up questionnaire. As with the Costa Rica evaluation, some respondents provided career totals which numbered 7,145 persons. Indications are that the JIFSAN program has a significant multiplier effect within the host countries.

**Training Materials**

A training manual entitled ‘Improving the Safety and Quality of Fresh Fruits and Vegetables: A Training Manual for Trainers’ (approximately 200 pages) is available for download at no charge from the JIFSAN website: http://www.jifsan.umd.edu/training/gaps.php.

PowerPoint presentations and case studies are not currently posted at the website since these are updated with each program offering.
Development of a Web-based Educational Program: Agrifood Safety Minute

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Target Audience
Produce growers, young or tech savvy farmers.

Topics Discussed
• Making maps
• Risk assessment
• Writing a mission statement
• Input source verification
• Visitor logs
• Traceback
• Mock Recall
• Basics of worker training
• Sanitation unit logs
• Water testing
• and more

Given the task of statewide coverage of Good Agricultural Practices Education and no travel dollars for statewide education, MSU Extension created a web series that picked apart very specific areas of crafting GAP Manuals that had given many growers problems in the past. The web series consisted of a short (1-5 minute) Youtube video as well as a guidance document that further broke down a specific topic and any appropriate logs or record sheets that may be required for a topic. In addition, each episode has a three question Survey monkey survey that assesses helpfulness as well as any resultant behavior change. All of these components were compiled as part of a website, the Agrifood Safety Minute (located at www.gaps.msue.msu.edu/afsm.html, verified 4-28-11).

The episodes are updated on a weekly basis and an e-mail list of “subscribers” is kept that are alerted when the website is updated. The site, www.gaps.msue.msu.edu, went live March 1, 2010. As of January 1, 2011, 510 discrete visitors made 1190 visits to the Agrifood Safety Minute Website. Of these, 32 visitors responded to a SurveyMonkey survey and 84 percent of the respondents found the site very helpful or somewhat helpful.

Summary of Evaluation Data
The site, www.gaps.msue.msu.edu, went live March 1, 2010. As of January 1, 2011, 510 discrete visitors made 1190 visits to the Agrifood Safety Minute Website. Of these, 32 visitors responded to a SurveyMonkey survey and 84 percent of the respondents found the site very helpful or somewhat helpful.
Viewers of the Agrifood Safety Minute have reported the following changes to their operation as a result of viewing...

- Use of Google Maps to create a map of their farm. (2 Viewers)
- Drawing an accurate map of their farm. (1 Viewer)
- Writing a wildlife risk management plan for their farm. (1 Viewer)
- Writing a mission statement for their farm (2 Viewers)
- Implementation of a visitor policy. (1 Viewer)
- Posting signs to alert visitors to sign in at entrances to their fields. (2 Viewers)
- Write a handwashing SOP. (1 viewer)
- Implement tactics to minimize vertebrate food safety problems. (1 viewer)
- Assess my readiness for a GAP Audit. (1 viewer)
- Conduct a quality risks assessment. (1 viewer)

**Training Materials**

- **005 Input Source Verification**
- **007 Traceback**
- **008 Mock Recall**
- **021 Irrigation Water Sources**
- **022 Writing a Water Testing SOP**
- **023 Taking a Water Sample**
- **024 Interpreting Water Test Results**

This list is a sampling of the 36 guidance documents that are complete.
The LGMA Food Safety Training Program is aimed at those individuals with direct responsibility for ensuring that the LGMA’s accepted food safety practices are fully implemented and performed. As individuals who oversee these programs, it is critical that they have a thorough understanding of the LGMA GAP program. As such, this training program, “Conducting Pre-Harvest and Daily Harvest Assessments” allows for review of selected “scenarios” as depicted through actual field photos of typical situations which occur during the assessment of field conditions prior to harvest (typically 5-7 days before) and on the day of harvest. The course is divided into two sections to reflect the different responsibilities required. The pre-harvest assessment is normally done by the handler and/or grower food safety person(s) while the daily harvest assessment is generally done by the harvesting crew supervisor. Because there is overlap between the two assessments, it is important that the relationship between the two be established so that the findings from pre-harvest assessment are used to enhance the findings of the daily harvest assessment. The use of actual photos to create realistic “scenarios” and “what if” are extremely effective establishing interaction between the instructor and the attendees. Facilitation by the instructor encourages attendees with different food safety responsibilities to participate in group discussion intended to identify immediate concerns along with situations which could lead to undesirable conditions occurring prior to or after commencement of harvest. By moderating the discussion, the instructor can lead the group to decisions on how best to resolve the various problems and issues identified as depicted by the photos. At the end,
attendees should leave with a better understanding of what they may encounter as they conduct pre-harvest and daily harvest assessments and what types of solutions can be identified to effectively resolve and/or mitigate situations involving food safety.

**Summary of Evaluation Data**

To date, the program has conducted (14) training sessions on “Improving Audit Performance and Results” and “Conducting Environmental Assessments.” Over 300 people have attended the training with approximately 10% of those being growers. The main objective of the training is to improve the performance in the key categories of the LGMA GAP program and conducting pre-harvest assessments. The measure of improvement as a result of the training is based upon improvement in audit results based upon a reduction in the number of violations assessed as a result of the field audits. A comparison of results for Crop Year 2009/2010 thru 2010/2011 shows a significant reduction in those audit categories most critical to ensuring food safety. Examples of these reductions include: 1) 29% reduction in field observations; 2) 36% reduction in field sanitation; 3) reduction in worker practices and a 50% reduction in environmental assessments. These results demonstrate that the training improved the understanding and awareness of the LGMA GAP program and communication between personnel assigned to conduct the audits.

A (5) question evaluation completed by attendees at all workshops reflected a very favorable acceptance of the program. A summary of responses included: 1) please conduct more of these types of workshop; 2) group discussion really enhanced the workshop; 3) the photos accurately reflect what we encounter on a daily basis and 4) this training is what growers need to better understand how to implement the LGMA GAP program.

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**Training Materials**

- LGMA Audit Checklist.
- List of questions on audit checklist most often assigned violations.
- Copies of photos showing real conditions encountered in the field.
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