



Good Agriculture Practices (GAPs) for Food Safety

Indiana University

Condensed for IU Garden Volunteers

Introduction

- Produce is often implicated in foodborne illness outbreaks.
- Produce from IU gardens may end up in retail food establishments on campus to be consumed by the general public.
- Because of this, it's important to know how to provide safe produce for those who may consume produce from IU gardens and how to be compliant with local and state food safety regulations



Objectives



- This training will strive to provide volunteers:
 - An understanding of foodborne illness and the agents associated with produce.
 - Understand the difference between a virus, bacterium, and a parasite, and where they can contaminate produce.
 - Identify things that may contaminate produce.
 - Identify concepts of ‘Good Agricultural Practices’
 - Including personal hygiene and illness policies

Annual Impact of Foodborne Illness

- CDC estimates
 - 48 million illnesses a year
 - 128,000 hospitalizations
 - 3,000 deaths
- Some studies suggest produce accounts for over 35% of all foodborne illnesses (FBI).
Larger than any other category of food.



Why is FBI associated with produce increasing?



Some factors:

- Eating more produce
- Fresh produce is increasingly imported
- Large food distribution chains
- Newly emerging pathogens showing up in foods that were previously considered safe
- Changing demographics (more elderly)

Recalls and Outbreaks Associated with Produce

- In 1971 1% of outbreaks, now over 35%, are related to produce.
- Numerous cases, including:
 - *E. coli* – in lettuces, spinach, radish, sprouts
 - Salmonella – tomatoes, melons, sprouts, onions
 - Listeria – cabbage, cantaloupe
 - Hepatitis A – lettuce, raspberries, strawberries



Why is fresh produce a challenge for food safety?

- Contamination persists from farm to fork
- Lack of education from producers, handlers, distributors, consumers
- Often eaten fresh, uncooked, so there is no kill step involved

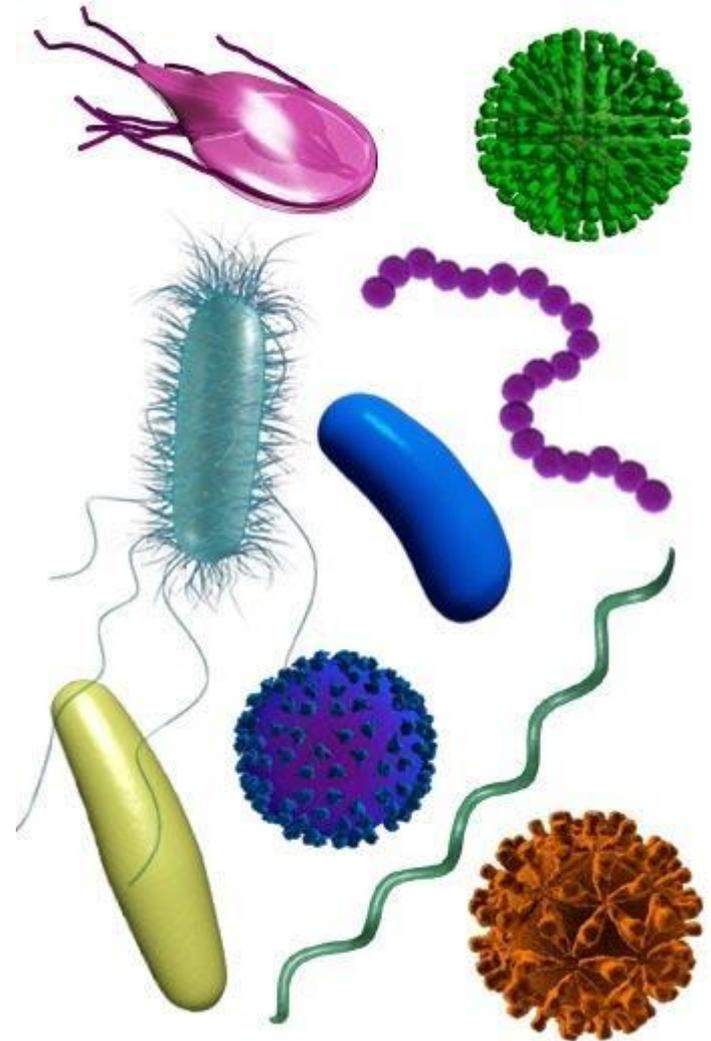


What is a Foodborne Outbreak?

- Defined as:
 - The occurrence of two or more similar illnesses in unrelated people, resulting from the ingestion of a common food.
- Pathogens that cause foodborne illness
 - Bacteria – single celled organisms that live independently
 - Viruses – small particles that live and can only replicate in a host
 - Parasites – intestinal worms or microscopic protozoa that live in a host animal or human

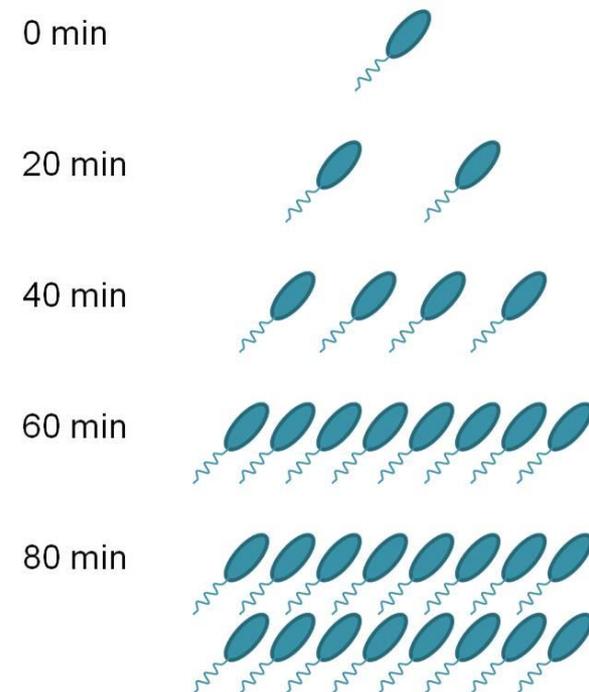
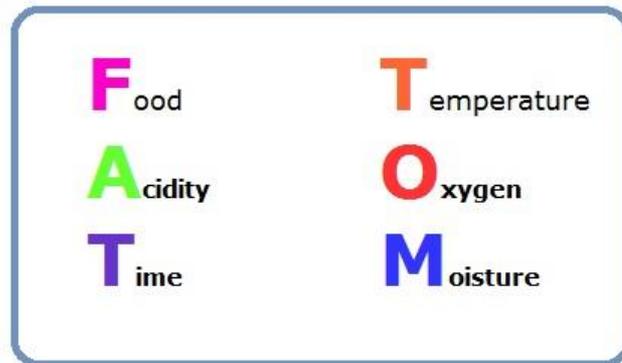
Where can these pathogens be found?

- Soil
- Manure
- Compost
- Water
- Workers
- Wildlife



Some Bacteria Associated with Produce

- E. coli, Salmonella spp., L. monocytogenes, B. cereus
- Bacteria reproduce by binary division
 - Can replicate every 20 minutes
 - Under right conditions:
 - 1 cell -> 24 hours -> 17 million cells



Where do Pathogens Attach?

- Rind
- Stomata - pore
- Damaged plant tissue
- Roots



Other contaminants include:

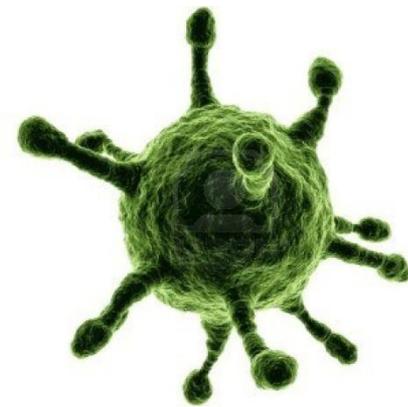
- chemicals, pesticides, metals, toxins, glass, stones, wood, personal items (jewelry, hair clips, pens, etc)

Pathogens

- Frequency:
 - Vegetables
 - *Salmonella* – 1-8%
 - *Listeria* – 2-30%
 - *Shigella* – 1%
 - FDA Imported Produce:
 - 4% tested positive for *Salmonella* and *Shigella*



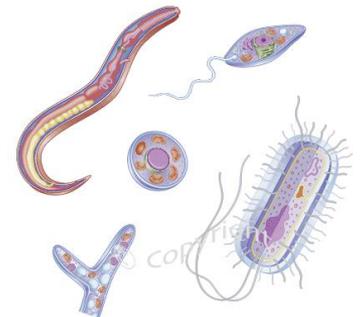
Viruses



- Viruses
 - Transmitted person to person contract through fecal contamination but can be spread through contaminated food and water
- Hepatitis A
 - Lettuce, raspberries, strawberries, green onion
- Norovirus
 - Very common illness – 23 million in US/yr
 - Leafy greens and fruits

Parasites

- Exist as single-celled cysts outside in water or food;
 - Require animal or human intestinal tract to multiply and spread
 - Spread by fecal contamination of water or fresh produce.
 - Examples found in produce:
 - Giardia, Cryptosporidium, and Cyclospora

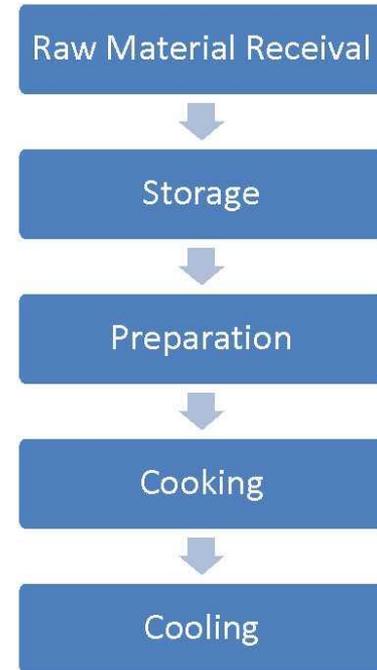


Pathogen Management throughout the Fresh Produce Chain

- Flow of produce

- Pre-plant
- Production
- Harvest
- Post-harvest handling
- Storage
- Transportation

- Chance for contamination in every step



What can you do?



Produce GAPs
Harmonization Initiative

- Follow Good Agricultural Practices
 - Follow your supervisors instruction and food safety plan
- Follow Proper Hygiene Practices
 - Practice proper and frequent handwashing
- Don't come to work if your ill
- Properly clean and sanitize utensils, containers, and equipment

Health and Hygiene

- Health:
 - Absence of illness, injury
- Hygiene:
 - Cleanliness, good handwashing practices
- Sick workers can introduce pathogens or germs to produce that can lead to illness and illness outbreaks.



Signs and Symptoms of Foodborne Illness

- Diarrhea
- Nausea
- Vomiting
- Abdominal Cramps
- Jaundice
- Boils and lesions
- Fever/chills
- Muscle aches



Do not come to the garden if you have any **RED** symptoms, limit your work with produce if you have any **PURPLE** symptoms. Read and agree to the Volunteer Illness Policy.

The 'Big 5'

- Do not come to the garden if you or anyone you live with is diagnosed with:
 - E. coli
 - Salmonella
 - Hepatitis A
 - Shigella
 - Norovirus
- You must get doctor and IU-EHS approval to return to the garden to work with produce.
- Acknowledge and 'sign' policy



How do germs get transferred?



- Contaminated water → produce
- Soil → produce
- Soil → human
- Human → produce
- Contaminated container/equip → produce
- Poor handwashing:
 - Oral → hand → produce
 - Fecal → hand → produce

Monitor Health and Hygiene



- Growers should have a set policy that encourages volunteers to report illness.
- Growers should monitor volunteer health.
- Growers should monitor handwashing
- Sick volunteers may not handle produce

Health and Restrooms



- Establish procedure to avoid body fluids contacting produce and surfaces
- Enforce bandages and glove use when workers have cuts or scrapes.
- Set up routine schedule to restrooms daily to ensure:
 - Cleanliness, paper towels, soap, covered trash can

Handwashing Stations



- Must be onsite, set up, and available on harvest days
- Equipped with:
 - Basin, water, liquid soap, disposable paper towels, and a waste container
 - Basin/bucket to collect gray water
 - Water needs to be able to be of continuous flow, potable, and preferably warm
 - Signage to alert workers, visitors, and others to wash their hands.

Handwashing Stations and When to Wash

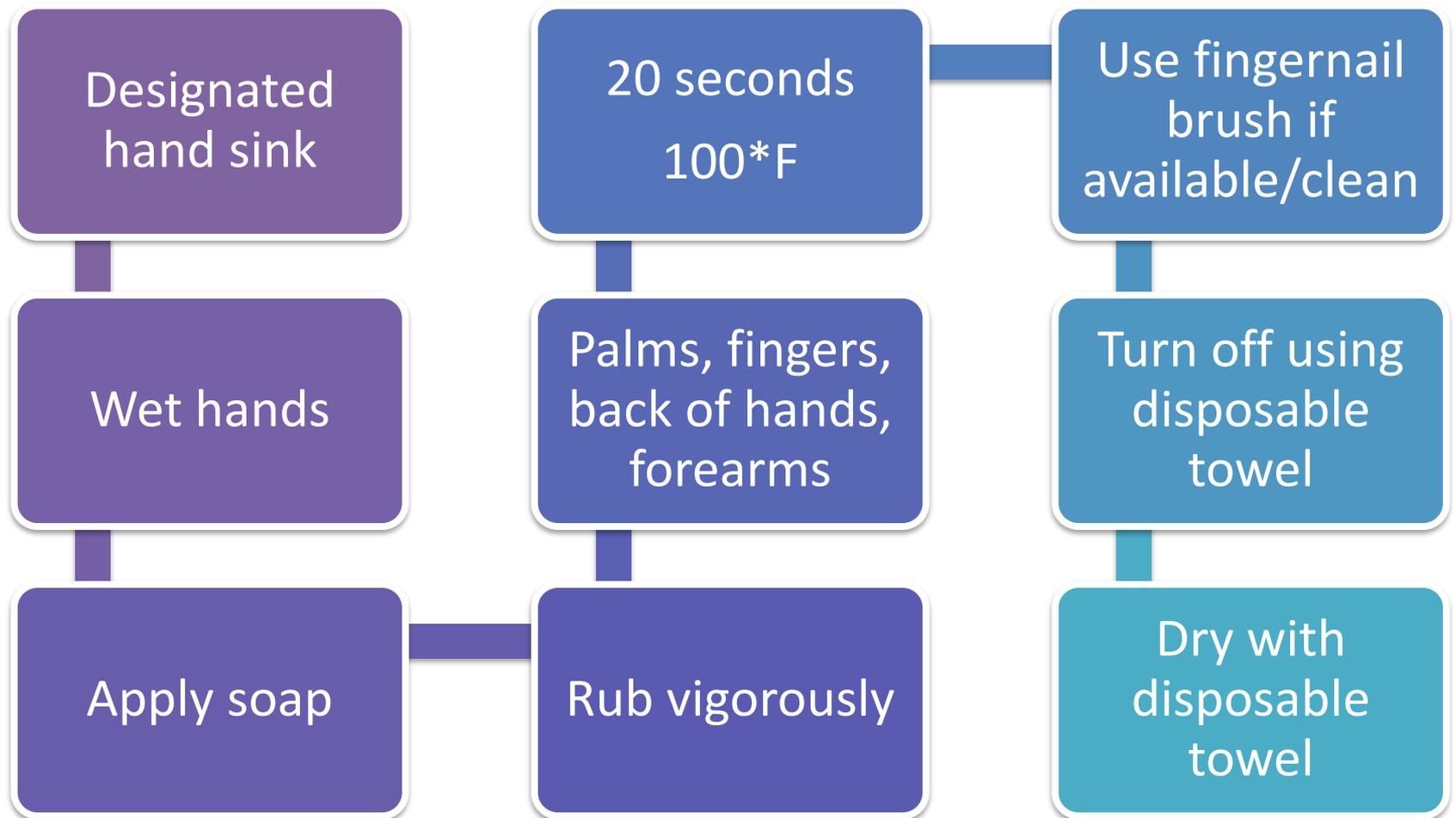
Proper Hand Wash Station



When to wash:

- Before work, harvest, or touching produce
- Before/after restroom
- Before/after eating, smoking, or other breaks
- After handling produce
- After touching face, nose, mouth, or other body parts
- Anytime hands become dirty or you change tasks

How to Wash



Now, you try

- Let's do a handwashing demonstration with our Glo Germ product...



Hand Sanitizer and Gloves



- Hand sanitizers – do NOT replace handwashing – only effective with clean hands.
- Gloves – can be used, and are often misused:
 - Must be used in combination with hand washing
 - Must be discarded, hands washed, and new gloves put on after switching tasks
 - Required with open wounds or sores.

Other Hygiene Practices



- Absence of jewelry
 - Harbor bacteria, makes handwashing more effective, possibly reduce job injuries
- Hairnets/caps
- Clean aprons
- Clean outer clothing
- Only eat in designated areas away from produce
- Drinks shall be covered with a lid

Cleaning and Sanitizing

- Difference between:
 - clean and sanitized



- Warewashing
 - Must be conducted for all equipment and utensils
 - If utensils cannot be placed in 3-bay sink, they must be cleaned-in place – using the same methods. May require to place sanitizer in spray bottle.

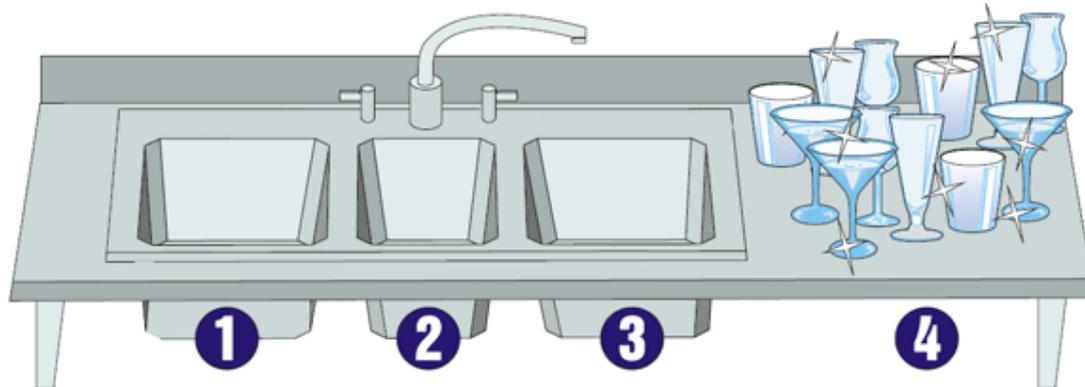
Proper 3-Bay Sink Usage



- Pre-scrape, rinse – if heavily soiled, do this outside with hose to remove field dirt.
- Submerge items fully in each bay - if possible.
- Wash –in 1st bay with detergent – 110°F water
 - Can use clean brushes and cloths to wash items
- Rinse – in clean water
- Sanitize – 7-30 second contact time*
- Air dry – do not cloth or towel dry items

Sanitizers

- Types:
 - Chlorine and Quaternary Ammonia
 - Read and follow label
- Concentration:
 - Chlorine – 50-100 ppm, 75*-100* F, 7-10 seconds
 - Quat – minimum 75*F, typically 200-400ppm, follow label

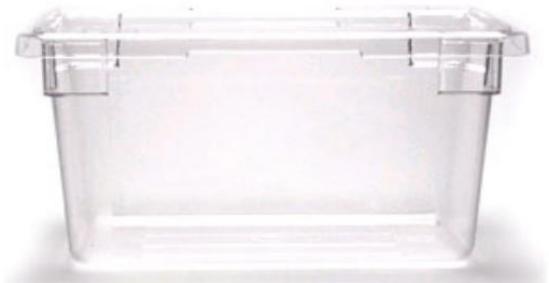


Sanitizers

- Test strips
 - Dip and read, color change
 - Check before each use and periodically while in use
- Storage
 - Away from food, food contact surfaces, clean equipment and utensils.
 - All chemicals must be labeled with common name
 - Read and follow manufacturer label
- Now you test....

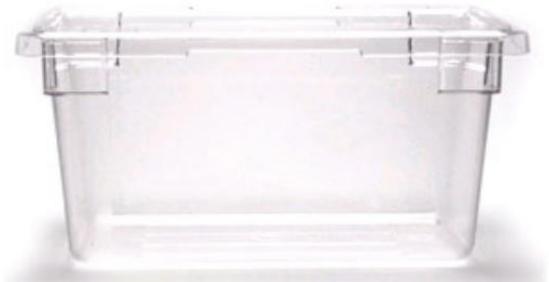


Storage and Containers



- Storage areas – should be cleaned and inspected regularly to ensure they are free of debris and pest activity.
- Clean and sanitized tools and containers shall be stored covered and protected.
- Other equipment and items that cannot be stored covered should be stored inverted where possible.
- All items should be stored away from chemicals.

Storage and Containers



- Restaurants that use IU produce shall provide cleaned and covered containers ready for your use.
 - If you see a container that is clearly not washed – do not use it and send it back to the restaurant.
- The garden is not equipped to properly clean and sanitize the containers used by the restaurant locations.
- Generally, containers used for packing and transport of produce should be:
 - Wash and sanitized prior to use and delivery to IU gardens
 - Smooth and easily cleanable, non-porous
 - Provided with tight fitting lids or covers
 - NSF certified for food use/food grade



Harvest Practices



- Clean, sanitize, and air dry harvest utensils prior to use or use previously cleaned utensils
- Do not rinse produce after harvesting
- If produce is wet or warm from field heat, let it dry and cool to room temperature before packing it for transport

Harvest Practices



- If necessary, produce may be stored indoors under climate control and uncovered while it dries and cools
- Containers can be placed in the field as long they are handled in a manner to prevent contamination
- Covers should be placed on the containers when not in use – during storage, harvesting

Harvest Practices



- After making a field cut, do not cut produce further other than minor trimming to remove items such as:
 - unsightly leaves, roots, stems – such as on heads of lettuce, cabbage, or corn.
- Do not process the produce any further
 - No additional cutting, washing, stripping, cooking, etc
 - Any additional production increases risk of contamination and would change regulatory designation
 - The washing and additional production is the responsibility of the restaurants receiving the produce
- Place produce in the provided storage bin

Pests and Wildlife



- Both can spread pathogens and/or be a source of illness.
- Outside:
 - Report sightings
 - Control – fencing, scare tactics, modifying environment
- Inside:
 - Protect outer openings – mice – $\frac{1}{4}$ "
 - Manage rodents and birds in packing and storage areas
 - Deny food, water, access, harborage
 - Report sightings and conducive conditions

Additional Resources

• IUEHS
website:

FARM, GARDEN, AND PRODUCE SAFETY

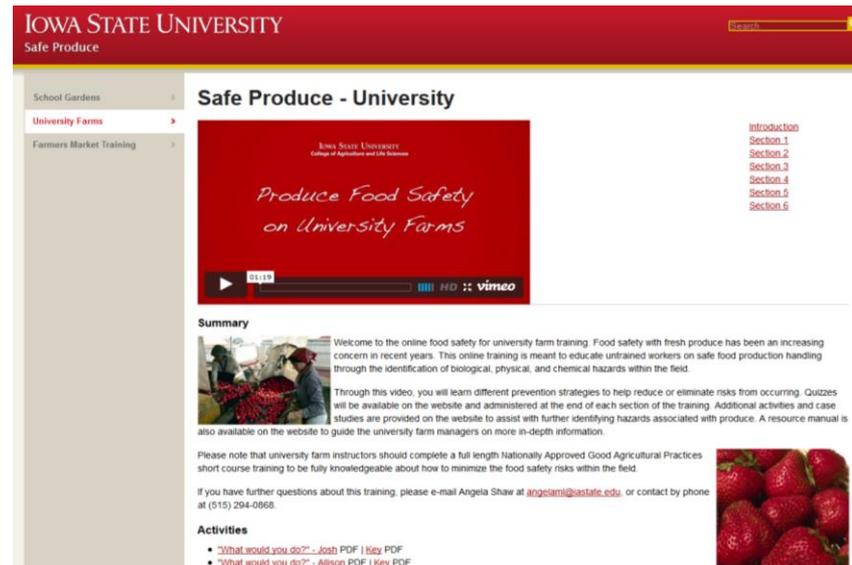
Campus Garden and Farm Online Produce Safety Training

 Good Agricultural Practices for IU Campus Garden Volunteers

 Indiana Guidance on Whole Uncut Fresh Produce

FDA Guidance for Produce Safety

- Iowa State
 - Online training, videos, activities, resources:



IOWA STATE UNIVERSITY
Safe Produce

School Gardens
University Farms
Farmers Market Training

Safe Produce - University

Introduction
Section 1
Section 2
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Section 4
Section 5
Section 6

Summary

Welcome to the online food safety for university farm training. Food safety with fresh produce has been an increasing concern in recent years. This online training is meant to educate untrained workers on safe food production handling through the identification of biological, physical, and chemical hazards within the field.

Through this video, you will learn different prevention strategies to help reduce or eliminate risks from occurring. Quizzes will be available on the website and administered at the end of each section of the training. Additional activities and case studies are provided on the website to assist with further identifying hazards associated with produce. A resource manual is also available on the website to guide the university farm managers on more in-depth information.

Please note that university farm instructors should complete a full length nationally Approved Good Agricultural Practices short course training to be fully knowledgeable about how to minimize the food safety risks within the field.

If you have further questions about this training, please e-mail Angela Shaw at angelsam@iastate.edu, or contact by phone at (515) 294-0668.

Activities

- "What would you do?" - Josh PDF | Key PDF
- "What would you do?" - Allison PDF | Key PDF



THANK
YOU

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