PURDUE EXTENSION | LOCAL FACES COUNTLESS CONNECTIONS



Food Safety Starts @ Planting

Karen Mitchell

Ag and Natural Resources Extension Educator

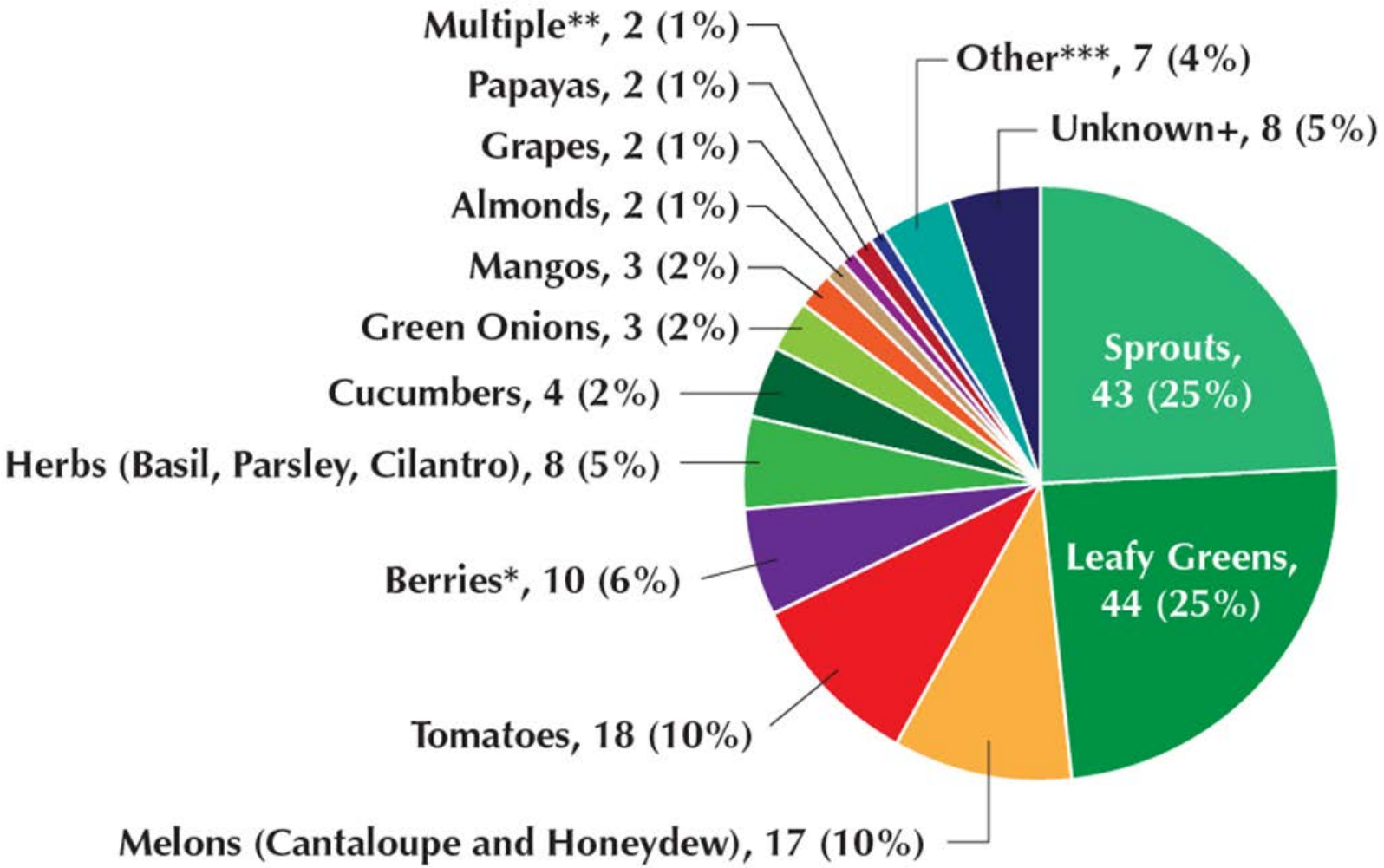
March 23, 2017

PURDUE UNIVERSITY

Only you….

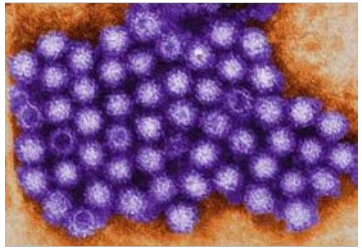
- You can prevent and reduce food safety risks in the garden
- You know your garden and practices better than anyone, but do you know the consequences?
- Your actions directly impact food safety

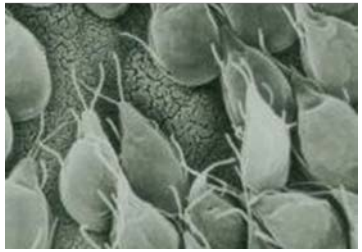
FDA Outbreaks Linked to Produce Contamination Likely Prior to Retail: 1996–2014



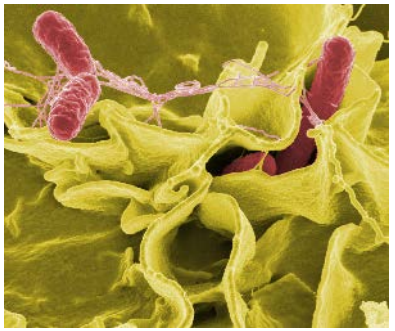
Microorganisms of Concern

- Bacteria
  - *Salmonella,* toxigenic *E. coli, Shigella, Listeria monocytogenes*
- Viruses
  - Norovirus, Hepatitis A
- Parasites
  - *Giardia lamblia*, *Cryptosporidium parvum, Cyclospora cayetanensis*



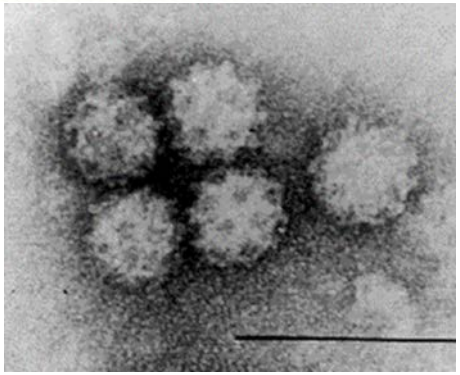


Bacteria in the Garden



- Bacteria are microorganisms that can multiply both inside and outside of a host
- Bacteria include pathogens such as *E. coli* O157:H7, *Salmonella*, and *Listeria monocytogenes*
- Bacteria can multiply rapidly given the right conditions: water, food, and the proper temperature
- Good Agricultural Practices can reduce risks by minimizing situations that support bacterial survival and growth

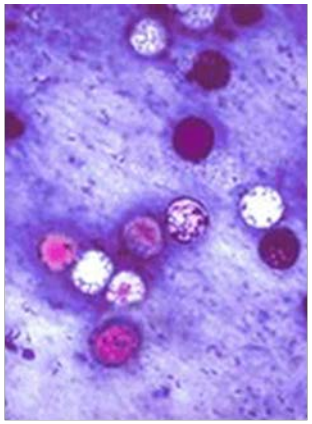
Viruses in the Garden

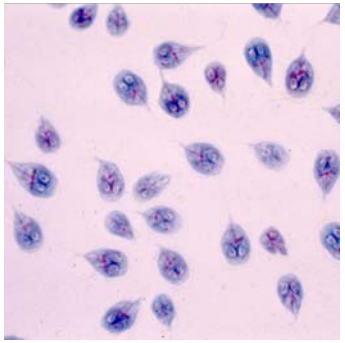


- **Viruses** are small particles that multiply only in a host, not in the environment or on produce
- Contamination most often linked to an ill volunteer handling produce (fecal-oral route) or contaminated water
- It only takes a few virus particles to make someone ill
- Can be very stable in the environment
- Prevention is the key to reducing viral contamination
- Limited options for effective sanitizers

Parasites in the Garden

- **Parasites** are protozoa or intestinal worms that can only multiply in a host animal or human
- Commonly transmitted by water
- Can be very stable in the environment; often not killed by chemical sanitizers
- Can survive in the body for long periods of time before ever causing signs of illness





Health Impacts by Pathogen Type

FDA Outbreaks Linked to Produce by Pathogen Types: 1996–2014

Pathogen Type	Outbreaks (% of total)	Illnesses (% of total)	Hospitalizations (% of total)	Deaths
Bacterial	148 (85.55)	11,377 (66.28)	1,844 (89.21)	65
Parasitic	21 (12.14)	4,786 (27.88)	67 (3.24)	0
Viral	3 (1.73)	993 (5.79)	156 (7.55)	3
Total	173*	17,164	2,067	68

*The total also includes chemical hazards not identified in this table (e.g., a Curcurbitacin toxin outbreak associated with squash).

Produce Safety Challenges

- Fresh produce is often consumed raw (i.e., not cooked)
- Microbial contamination on produce is extremely difficult to remove once present
  - Natural openings, stem scars, bruises, cuts
  - Rough surfaces, folds, netting
- Contamination is often sporadic
- Bacteria can multiply on produce surfaces and in fruit wounds, provided the right conditions are present

Contamination Sources

Humans

Soil

Produce

Animals

Buildings
Equipment
Tools

Water

How Contamination is Spread

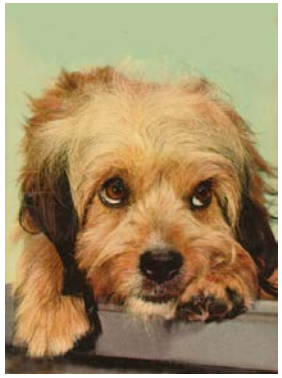
- **Humans**

  Volunteers can spread pathogens to produce because they directly handle fruits and vegetables.

  – Improper health and hygiene practices
    - Lack of adequate training and handwashing practices
    - Lack of or inadequate toilet facilities

  – Illness or injury
    - Working while sick
    - Injuries that result in blood contacting fresh produce

How Contamination is Spread



- **Animals**

  Domesticated and wild animals can carry and transmit human pathogens to produce.

  – Garden intrusion may result in direct fecal contamination of gardens

  – Animal feeding, rooting, and movement through gardens may spread contamination

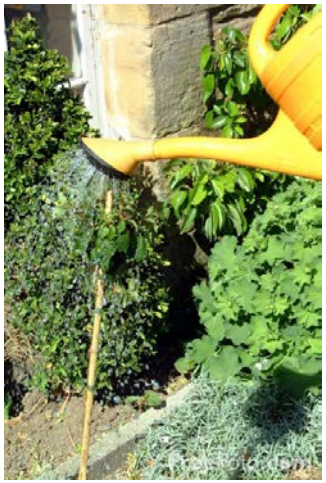
  – Animals can contaminate water sources used for produce production

How Contamination is Spread

- **Water**

  Water can carry and spread human pathogens, contaminating garden.

  – Production water
    - Irrigation, crop sprays, frost protection
  – Postharvest water
    - Cooling, washing, cleaning
  – Unexpected events
    - Flooding, runoff



How Contamination is Spread

- **Soil Amendments**

  Raw manure and other soil amendments can be a source of contamination if not properly handled and applied.

  – Application too close to harvest
  – Improper/incomplete treatment
  – Improper storage
  – Runoff
  – Wind spread
  – Cross-contamination due to improper sanitation procedures

How Contamination is Spread

- **Surfaces, equipment, tools, and buildings**

  Any unclean surface that contacts produce can harbor pathogens and serve as a source of contamination.

  – For example, not having an established schedule for cleaning or sanitizing food contact surfaces, including tools

  Facility management can also impact risks

  – Areas outside buildings that are not kept mowed or clean can harbor pests

  – Standing water or debris present in the packinghouse can become a source of cross-contamination

Cleaning vs. Sanitizing

What is the difference and why does it matter?

- **Cleaning:** Physical removal of dirt (soil) from surfaces which can include the use of clean water and detergent
- **Sanitizing:** Treatment of a cleaned surface to reduce or eliminate microorganisms

Important point: You cannot sanitize a dirty surface.

Cleaning always comes first!

Produce Safety Begins with Your Commitment

- Identifying produce safety risks in your garden
- Supporting the implementation of food safety policies and practices to reduce risks
- Providing equipment and facilities necessary to implement practices that reduce risks
- Supporting effective food safety training so everyone can actively be involved in reducing risks
- Setting a good and consistent example in your garden

Steps Towards Produce Safety

1. Assess Produce Safety Risks
2. Implement Practices
3. Monitor Practices
4. Use Corrective Actions
5. Keep Records

Assessing Risks

- **Assess your garden and practices**
  - Location of garden and adjacent land activities that may represent risks to the crops you grow
  - Fecal contamination risk from domesticated or wild animals
  - Use of water and manure in crop production
  - Volunteer training programs and hygiene facilities
  - Practices used to grow, harvest, pack, or hold produce and the tools and equipment
  - Typical and atypical (e.g., flooding) situations

Implementing Practices to Reduce Risks

- Focus on preventing contamination
  - Cannot reliably remove contamination
- Address risks most likely to have the biggest impact on produce safety first
- May require modification of current practices and additional training for volunteers
- May require capital investment
- You may already be doing the right thing!
- Ask for help and seek training if you are unsure

Standard Operating Procedures (SOPs)

- **A written document defining how to complete a specific food safety practice.**
- **SOPs include:**
  1. Step-by-step instructions to ensure that even a person who has never done a practice before can complete the practice correctly by following the instructions
  2. Location and name of any supplies needed to complete the practice
  3. When and how often the practice should be completed
  4. What records are needed/necessary

Monitoring

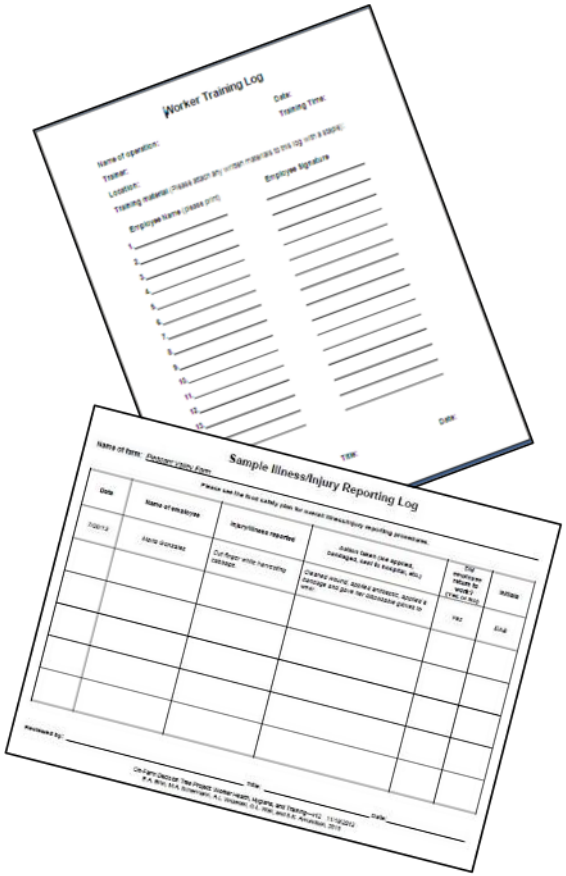
- Performed on a schedule or during a specific activity
- Allows you to verify practices are being completed properly
- Helps identify problems before they impact safety
  - Frequent high generic *E.coli* counts in water test results
  - Evidence of animal intrusion and fecal contamination
  - Improper cleaning and sanitation practices resulting in dirty equipment and tools

Corrective Actions

- Can be established in advance
  - Plan for sick children or volunteers
  - Plans for a spilled portable toilet??
- Fix problems that are identified during monitoring
  - Restocking toilet and handwashing facilities
  - Training garden managers and volunteers
- May require short and long term planning
  - Establishing sanitation programs (short term)
  - Replacing equipment (long term)

Recordkeeping

- Recordkeeping includes documenting practices, monitoring, and corrective actions
- There are many templates available
- Recordkeeping should be convenient, or else it will not get done
- Records must be signed and dated after they are reviewed
- Keep all records for at least 2 years



Recordkeeping Basics

- Establish record keeping schedules that make sense for the record keeper and the action
  - When does it need to be recorded?
  - Who is in charge of documenting it?
  - How often does it need to be documented?
- Build recordkeeping into normal routines
  - Place recordkeeping logs in accessible areas with necessary supplies (e.g., pens, paper)

A Garden Food Safety Plan

- Gets you thinking about YOUR garden and practices
- Keeps you organized so you can focus your time and resources more effectively
- Gives you a plan to follow and assure everyone is involved
- Documents your progress
- Is not required by the FSMA Produce Safety Rule, but is a good idea!

Summary

- Produce safety impacts your farm
- Microorganisms are the primary produce safety concern
- Your commitment is critical to success
- Produce safety includes:
  - Assessing risks, implementing practices, monitoring practices, using corrective actions, and keeping records
  - Providing the necessary resources to get it done
- A written Farm Food Safety Plan guides your produce safety efforts

Thank you!

Karen Mitchell
mitchell6060@purdue.edu