Guidelines for Food Safety in Hydroponic Production

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Produce Food Safety

What have you heard???
Produce Food Safety

CDC estimates that each year:

- 48 million Americans sick from foodborne illness
- 1 in 6 people
- 128,000 hospitalizations
- 3,000 deaths

Source: [http://www.cdc.gov/foodborneburden/](http://www.cdc.gov/foodborneburden/)
Produce Related Illnesses

• Americans buying more fresh produce
• Range of consumer health (immunocompromised)
• Better detection and reporting systems
Causes of Illness

**Bacteria** – Single-celled organisms that live independently.

**Parasites** – Intestinal worms or microscopic protozoa that live in a host animal or human

**Viruses** – Small particles that live and can only replicate in a host
Causes of Illness

Three most common bacteria:

Salmonella

E. coli O157:H7

Listeria monocytogenes

24 Hours

1 Cell 17 Million Cells

Under ideal growing conditions
On-Farm Microbial Sources – Indoor Eliminates Some!

Soil
People
Water
Manure
Livestock
Pets
Wildlife
Washing Alone Does Not Mean Safe

*E. coli* on lettuce

*Salmonella* on muskmelon

Photo credits: E. Maynard, Peter Cooke, Stephen Ausmus, Scimat Science Photo Library, Institute of Food Technologists
Consider Farm to Fork Risks
Reduce On-Farm Risks

Using Good Agricultural Practices

GAPs are the conditions, growing practices, and harvesting practices recommended for minimizing risk of microbial contamination to produce safe and wholesome fruits and vegetables.
Regulation of On-Farm Food Safety

Federal Government (FDA) (FSMA)

Indiana State Department of Health (ISDH)

Industry

County Health Departments

Farmers’ Market Rules
Food Safety Modernization Act

FSMA = Food Safety Modernization Act

January 2011 - Signed into Law
November 2015 - Final Produce Rule Published
January 2016 – New Produce Rule Became Law

https://en.wikipedia.org/wiki/FDA_Food_Safety_Modernization_Act
Seven Rules of FSMA

• Preventive Controls for Human Foods
• Preventive Controls for Food for Animals
• Produce Safety
• Foreign Supplier Verification Programs (FSVP) for Importers of Food for Humans and Animals
• Accreditation of Third-party Auditors/Certification Bodies to Conduct Food Safety Audits and to Issue Certifications
• Sanitary Transportation of Human and Animal Food
• Focused Mitigation Strategies to Protect Food Against Intentional Adulteration
FSMA Terminology

**Covered** – One is held to and obligated to comply with the produce rule.

**Exempt** – One is not obligated to comply with the produce rule.

**Qualified Exemption** – One is exempt from the produce rule provided that certain conditions (qualifiers) are met.
FSMA Produce Rule – Am I Covered???
Am I a FARM or a FACILITY???
Farm

**FSMA Produce Rule**
Good Agricultural Practices (GAPs)

Facility

**FSMA Preventive Controls Rule**
Applies if required to register with FDA
Chopping, grinding, and pelletizing may constitute “manufacturing”

Mixed-type Facility
An entity that engages in both farming and processing
Farm

Minimal processing
- Drying
- Baling
- Vacuum packing
***No significant alterations

Facility

Beyond minimal processing
- Pelletizing
***Significant alterations
FSMA Produce Rule – Am I Covered???

Farms or farm mixed-type facilities with an average annual monetary value of produce sales of $25,000 or less are not covered.
Commodities Rarely Consumed Raw are Exempt

Asparagus
Beans
  Black
  Great Northern
  Kidney
  Lima
  Navy
  Pinto
Beets
  Garden (roots and tops)
  Sugar
Cashews
Sour Cherries
Chickpeas
Cocoa Beans

Coffee Beans
Collards
Sweet Corn
Cranberries
Dates
Dill
  Seeds
  Weed
Eggplants
Figs
Horseradish
Hazelnuts
Lentils
Okra
Peanuts
Pecans
Peppermint
Potatoes
Pumpkins
Winter Squash
Sweet Potatoes
Water Chestnuts
And Food Grains

Barley
Corn
Dent
Flint
Sorghum
Oats
Rice
Rye
Wheat

Amaranth
Quinoa
Buckwheat
Oilseeds
Cotton
Flax
Rape
Soy
Sunflower
Processing crops receive a qualified exemption if:

A. They receive commercial processing that adequately reduces the presence of microorganisms of public health significance.

B. Accompanying documents disclose that the food is “not processed adequately to reduce the presence of microorganisms of public health significance”.

C. Written assurances from the buyer are obtained annually.
FSMA Produce Safety Rule

If I’m exempt, does this really matter???
Remember!!!

While individuals may be exempt from regulations,

One is NEVER exempt from liability!
Agricultural Water

“Water used in covered activities on covered produce where water is intended to, or is likely to, contact covered produce or food contact surfaces, including water used in growing activities (including irrigation water applied using direct water application methods, water used for preparing crop sprays, and water used for growing sprouts) and in harvesting, packing, and holding activities (including water used for washing or cooling harvested produce and water used for preventing dehydration of covered produce).”

FSMA Produce Rule – Section 112.3(c)
Hydroponics

- The routes of contamination FDA considered for covered produce under the Produce Safety Rule are applicable to hydroponic farming.
- Covered produce grown in hydroponic systems is subject to the same potential for contamination from agricultural water.
Direct Water Application Method

“Using agricultural water in a manner whereby the water is intended to, or is likely to, contact covered produce or food contact surfaces during use of the water.”

Produce

Defined, in part, as the harvestable part of a crop.

FSMA Produce Rule – Section 112.3(c)
Water Questions to Ask

1. Is my farm covered by the produce rule?

2. Is this particular crop covered by the produce rule?

3. Will I be applying water, as irrigation or crop sprays, to the harvestable part of the crop?
Produce Rule
Agricultural Water Standards

Surface water applied directly to harvestable part during growing
  20 samples within two years to establish a baseline
  5 samples per year thereafter

Underground water applied directly to harvestable part during growing
  4 samples in the first year
  1 sample thereafter

Sources: [http://www.fda.gov/Food/GuidanceRegulation/FSMA/ucm415226.htm#water](http://www.fda.gov/Food/GuidanceRegulation/FSMA/ucm415226.htm#water) and PSA Curriculum Resources
Produce Rule
Agricultural Water Standards (con’t)

For all water sources:
   Geometric Mean <126 CFU generic *E. coli* /100 ml
   Statistical Threshold Value <410 CFU generic *E. coli* / 100 ml

Sources: [http://www.fda.gov/Food/GuidanceRegulation/FSMA/ucm415226.htm#water](http://www.fda.gov/Food/GuidanceRegulation/FSMA/ucm415226.htm#water) and PSA Curriculum Resources
Postharvest Water

• No detectable generic *E. coli* are allowed for certain uses of agricultural water in which it is reasonably likely that potentially dangerous bacteria, if present, would be transferred to produce through direct or indirect contact.

• Examples include water used for washing hands during and after harvest, water used on food-contact surfaces, water used to directly contact produce (including to make ice) during or after harvest.
Produce Rule Training Requirement

One person from each covered farm must complete training in the APPROVED GAPs curriculum.

The approved curriculum is the Produce Safety Alliance Curriculum

The training and registrations will be managed by the Association of Food and Drug Officials (AFDO)

Check out www.safeproducein.com for training information!
Where can I sell my produce?

- **Directly to consumers at your farm** – Always acceptable! Recommended to take a GAPs course and follow GAPs.

- **At roadside stands** – Yes, but make sure produce is intact and avoid excess trimming. Recommended to take a GAPs course and follow GAPs.

- **At farmers markets** – Yes, but make sure produce is intact and avoid excess trimming. Strongly encouraged to take a GAPs course and follow GAPs.

   *All of these sales are directly to the end user.*
Where can I sell my produce?

- To restaurants and other produce distributors – Must register with the ISDH as a Wholesale Fruit and Vegetable Grower and Distributor. Registration forms can be found at: [http://www.in.gov/isdh/25773.htm](http://www.in.gov/isdh/25773.htm)

It is strongly encouraged that growers take a GAPs course. In addition, a buyer may require a 3rd party audit.

Registering with ISDH does not mean they will come to inspect your farm. It provides a list of growers they can easily contact should food safety issues arise.
What should I sell?

• Unless your buyers demand it, avoid washing produce
  • Drying product can be difficult and the addition of water allows bacteria to grow

• Avoid excess trimming and selling bruised fruits and vegetables
  • Cuts and bruises allow for the release of plant nutrients that are food for bacteria
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Questions???