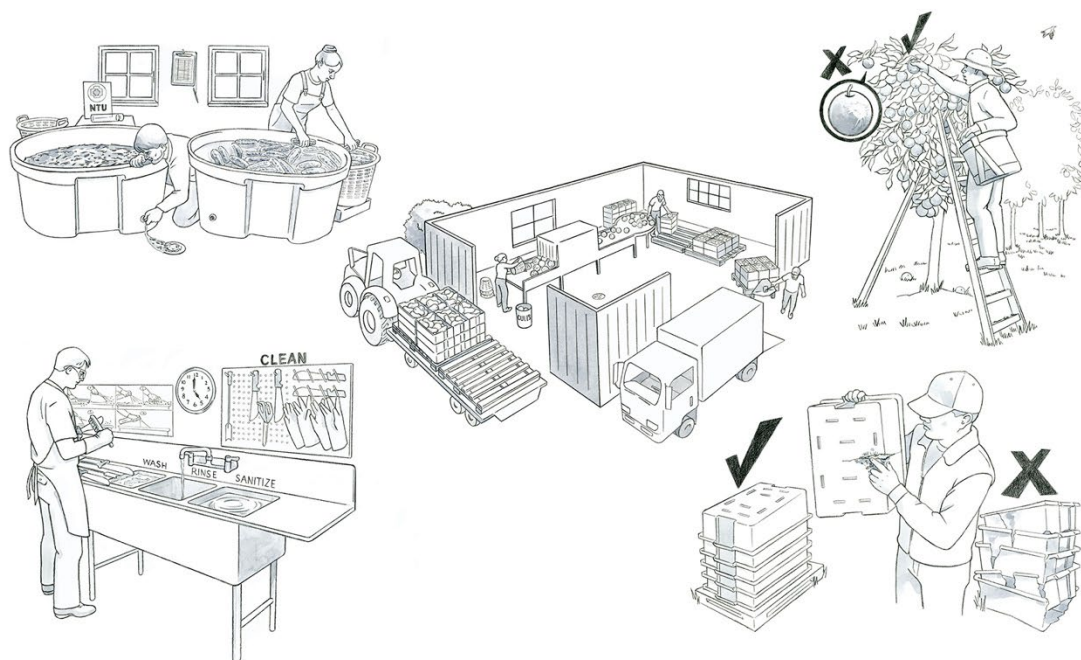


# More than Words Project

*A toolkit for illustrating produce safety practices*



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## **How to Use the Illustration Toolkit**

This brief guide outlines key considerations for using the illustrations during a PSA Grower Training, produce safety workshop, and other outreach activities.

### **Why illustrations?**

Illustrations provide a powerful and effective way to communicate concepts without the use of text. The PSA Grower Training Course teaches individuals about the Food Safety Modernization Act (FSMA) Produce Safety Rule (PSR), how to assess produce safety risks, and implement practices to reduce identified risks. This training contains complex regulatory language and scientific information, which can be difficult to understand. Incorporation of illustrations will provide an opportunity for learners to engage with the information in a different way to enhance their learning experience. These illustrations allow growers to consider risks they may have on their farms, practices that could reduce these risks, and regulatory provisions that may be relevant if they are subject to the FSMA PSR.

### **Illustration Use & Availability**

The illustrations are available for public educational use and are meant to be paired with the concepts presented in the Produce Safety Alliance (PSA) Grower Training Manual. Illustrations are available for download at our website: <https://cals.cornell.edu/produce-safety-alliance/resources/trainer-resources/more-words-illustrations>. Please respect the copyright.

### **How to Use the Illustrations & Teaching Notes**

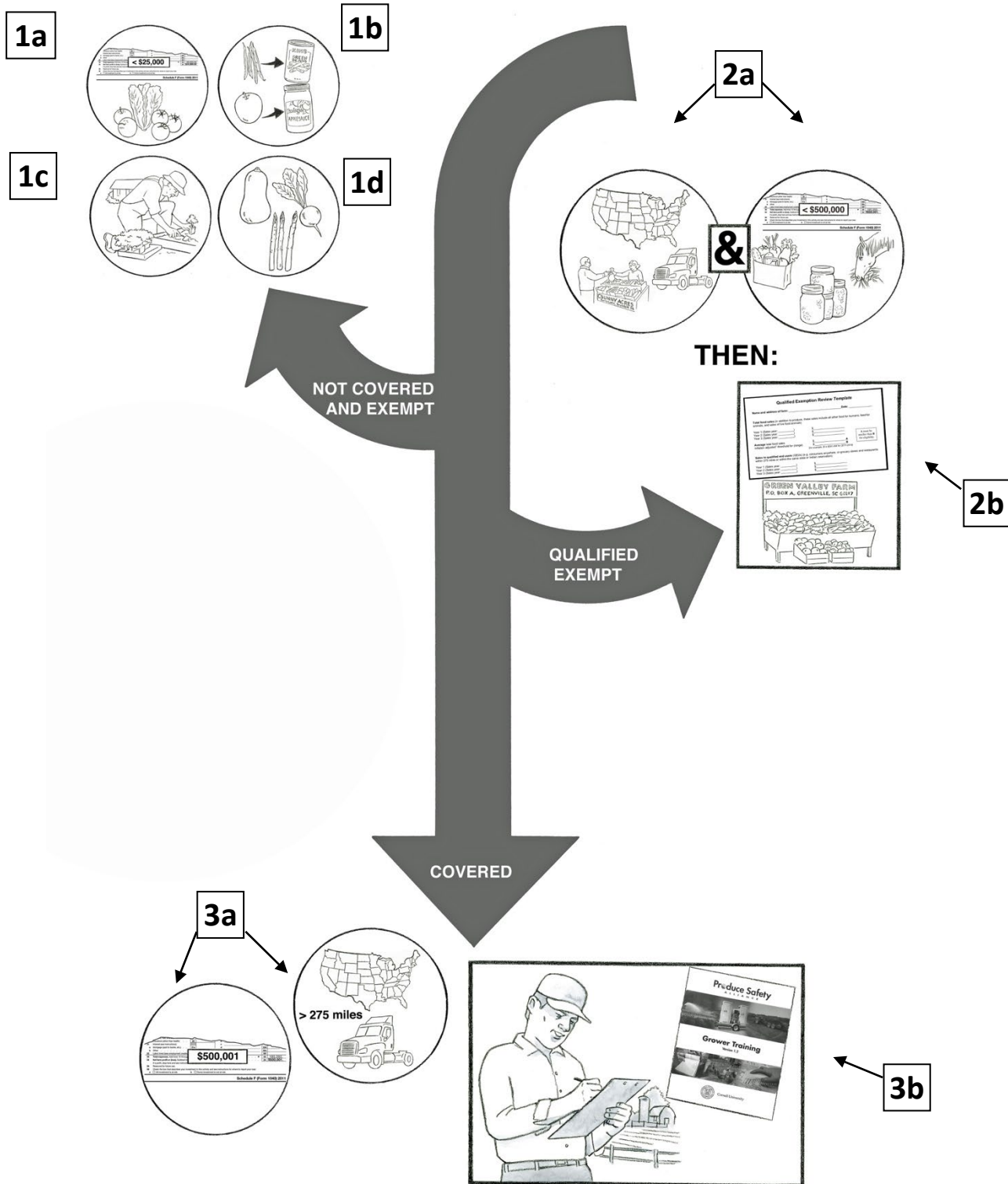
These illustrations were developed for use in the PSA Grower Training Courses by PSA Trainers and Lead Trainers to understand the requirements in the FSMA PSR and produce safety concepts covered in each illustration. Teaching notes for each illustration include a suggested location for use within the PSA Grower Training Curriculum, key teaching points, relevant FSMA PSR provisions, and supporting resources. Not all teaching points may need to be covered but are provided for discussion. Knowing the audience will help determine what level of detail and technical ability should be presented.

### **Questions, comments, or suggestions?**

We welcome your feedback in making this resource more useful or appropriate for your audience's needs. Please send comments to Donna Clements at [dmp274@cornell.edu](mailto:dmp274@cornell.edu), 909-552-4355.

For technical assistance with files, please contact Rob Way at [rhw2@cornell.edu](mailto:rhw2@cornell.edu), 315-787-2249.

## Exemptions and Exclusions – Determining a Farm's Status Illustration Guide and Teaching Notes



## Key Teaching Points

This illustration is intended to help clarify exemptions and exclusions within the FSMA Produce Safety Rule (PSR), including crops that are covered, crops that are Rarely Consumed Raw (RCR), farms that are qualified exempt, and farms covered by the FSMA PSR. Terms and vocabulary are very important in this illustration, so referring directly to the FSMA PSR will help. The FDA Factsheet *Standards for Produce Safety Coverage and Exemptions/Exclusions for 21 PART 112* (<https://www.fda.gov/media/95351/download>) is also a good reference to pair with this illustration. The numbers below align with key teaching points in the above illustration.

- 1a. Farms with an average annual value of produce sold during the previous three-year period of \$25,000 or less (adjusted for inflation) would not be covered by the FSMA PSR. The 2011 Schedule F form included in the illustration demonstrates that the <\$25,000 value is adjusted for inflation, based on 2011 values. Note that this value includes all produce sales not just 'covered produce' (FSMA PSR § 112.4).
- 1b. FSMA PSR § 112.2(b)(1) states that produce is eligible for an exemption if the produce receives commercial processing that adequately reduces the presence of microorganisms of public health significance. This image highlights produce that has undergone a heat treatment, or "kill-step" that incorporates a validated process to eliminate spore-forming microorganisms. There is another illustration with teaching notes in this collection entitled *Exemptions and Exclusions – Commercial Processing* which depicts this provision in more detail.
- 1c. FSMA PSR § 112.2(a)(2) states that produce used for personal or on-farm consumption is not covered. In the illustration, the man gardening in front of his house demonstrates this concept.
- 1d. FSMA PSR § 112.2(a)(1) establishes a list of rarely consumed raw commodities that are not covered by the regulation. The winter squash, garden beet, and asparagus depicted in this illustration are three commodities on the rarely consumed raw list. This exhaustive list contains 34 produce items in total. There is another illustration with teaching notes in this collection entitled *Exemptions and Exclusions – Rarely Consumed Raw* which depicts this provision in more detail.
- 2a. FSMA PSR § 112.5 allows farms to be eligible for a qualified exemption from most requirements of the regulation. To be eligible for a qualified exemption, the farm must meet **both** requirements:
  - The farm's direct food sales to qualified end-users must exceed sales to all buyers combined during the previous three years (FSMA PSR § 112.5(a)(1)). A qualified end-user is either the consumer of the food or a restaurant or retail food establishment that is located in the same state or the same Indian reservation as the farm. Restaurants, retail establishments, and consumers located in another state or country may be qualified end users if they are within 275 miles of the farm (depicted by the truck and United States map).
  - The farm must have food sales averaging less than \$500,000 per year adjusted for inflation during the previous three years (FSMA PSR § 112.5(a)(2)). The 2011 Schedule F form included in the illustration demonstrates that the <\$500,000 value is adjusted for inflation, based on 2011 values. Note that this value includes all food sales (not just produce items), as indicated in this illustration by the horse consuming animal feed, jarred goods, and groceries.

- 2b. Qualified exempt farms must meet certain modified requirements, as indicated within the box in this illustration. FSMA PSR § 112.6(b) states that qualified exempt farms must display the name and complete business address of the farm where the produce was grown (depicted in this illustration as a sign at the produce stand) and must establish and keep certain documentation (depicted in this illustration as the Qualified Exemption Review record template).
- 3a. Farms who do not meet one of the exemptions and exclusions listed above will be covered by the FSMA PSR. This may include farms selling over \$500,000 in total food sales, adjusted for inflation (depicted in this illustration as a 2011 Schedule F tax form with a value of \$500,001). This may also include farms selling a majority of foods to non-qualified end users (depicted in this illustration as a truck and United States map exceeding 275 miles). For more details on the exemptions and exclusions, please review FSMA PSR §§ 112.2, 112.4, 112.5, and 112.6, or the teaching notes above.
- 3b. Farms covered under the FSMA PSR must meet all applicable requirements established in the regulation. These covered farms may be subject to a regulatory inspection. In this illustration, the FSMA PSR requirements, including attendance at a PSA Grower Training Course and specific records, are depicted within a box to indicate that these are required practices.

#### **Relevant FSMA PSR Provisions**

- § 112.2(a)
- § 112.2(b)(1)
- § 112.4
- § 112.5
- § 112.6

#### **Suggested for Use in PSA Grower Training Version 1.2**

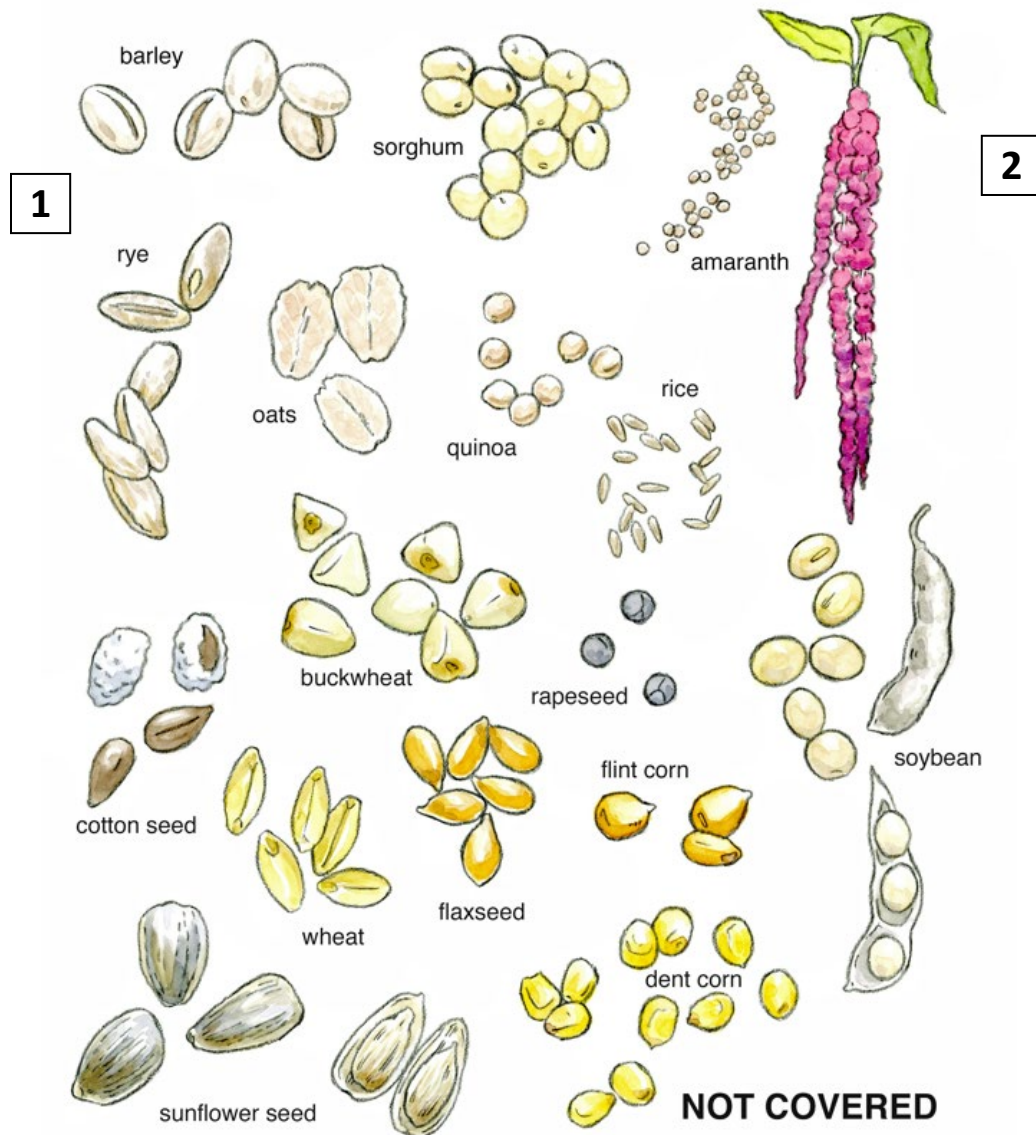
- Module 1: Introduction to Produce Safety after Slide 7

#### **Supporting Resources**

- FDA. FSMA PSR [Coverage and Exemptions/Exclusions Flow Chart](#).
- FDA. FSMA [Inflation Adjusted Cut Offs](#).
- [Produce Safety Alliance - Records Required by the FSMA PSR](#).
- Produce Safety Alliance - FSMA PSR [Exemptions & Exclusions](#) (PowerPoint).



## Exemptions and Exclusions – Non-Produce Food Grains Illustration Guide and Teaching Notes



### Key Teaching Point

This illustration includes crops that do not meet the definition of produce in the FSMA Produce Safety Rule (PSR) so they are not covered by the PSR. The numbers below align with key teaching points in the above illustration.

1. In § 112.3, the FSMA PSR defines produce as “any fruit or vegetable (including mixes of intact fruits and vegetables), and includes mushrooms, sprouts (irrespective of seed source), peanuts, tree nuts, and herbs.” Additionally, the definition in FSMA PSR § 112.3 states “Produce does not include food grains meaning the small, hard fruits or seeds of arable crops, or the crops bearing these fruits or seeds, that are primarily grown and processed for use as meal, flour, baked goods, cereals and oils rather than for direct consumption as small, hard fruits or seeds (including cereal grains, pseudo cereals, oilseeds and other plants used in the same fashion)”.
  2. “Examples of food grains include barley, dent- or flint-corn, sorghum, oats, rice, rye, wheat, amaranth, quinoa, buckwheat, and oilseeds (e.g., cotton seed, flaxseed, rapeseed, soybean, and sunflower seed)”. This list of grains is not exhaustive. For further insight, please refer to FSMA PSR § 112.3 under the definition of “Produce”, and Preamble comment 58.
- There is also a version of this illustration without name labels that can be used to let participants guess which crops are not considered produce items.

#### **Relevant FSMA PSR Provisions**

- § 112.3

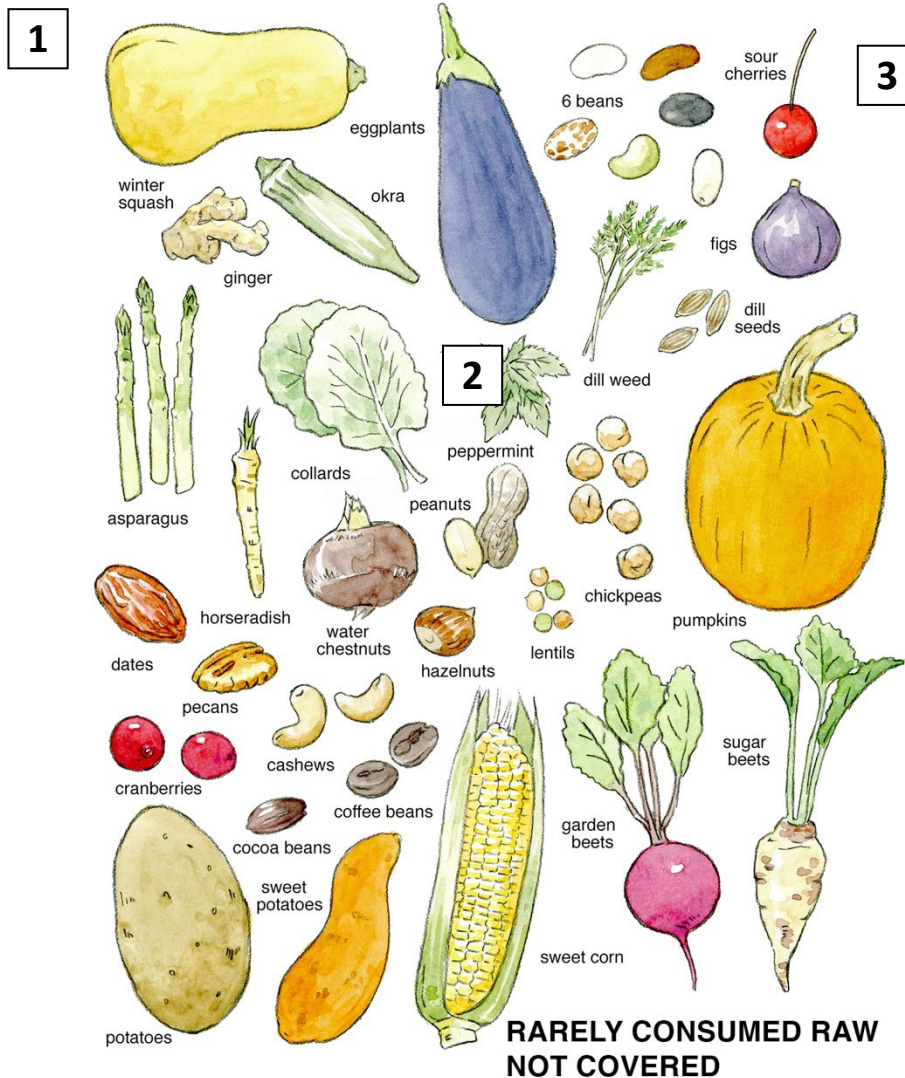
#### **Suggested for Use in PSA Grower Training Version 1.2**

- Module 1: Introduction to Produce Safety after Slide 7

#### **Supporting Resources:**

- FSMA PSR [Preamble Comment 58](#).

## Exemptions and Exclusions — Rarely Consumed Raw Illustration Guide and Teaching Notes



### Key Teaching Points

This illustration depicts produce items that are considered rarely consumed raw by the FSMA Produce Safety Rule (PSR) and therefore not covered by (or subject to) the regulation (§ 112.2(a)(1)). Since these items are often cooked by the consumer or go through another kill-step before being consumed, they are considered lower risk. The numbers below align with key teaching points in the above illustration.



1. There are 34 produce items on this exhaustive list. If a produce item is not listed as rarely consumed raw, it is considered to be covered under the FSMA PSR. The produce crops included in the exhaustive list that FDA has identified as rarely consumed raw are: asparagus; black beans, great Northern beans, kidney beans, lima beans, navy beans, and pinto beans; garden beets (roots and tops) and sugar beets; cashews; sour cherries; chickpeas; cocoa beans; coffee beans; collards; corn - sweet; cranberries; dates; dill (seeds and weed); eggplants; figs; ginger; hazelnuts; horseradish; lentils; okra; peanuts; pecans; peppermint; potatoes; pumpkins; winter squash; sweet potatoes; and water chestnuts.
  2. Growers may find this list to not be intuitive or aligned with cultural practices. Be sure to review the list thoroughly. For further insight on how this list was developed, please refer to the FDA “Rarely Consumed Raw” factsheet, and Preamble comments 62 – 68.
  3. There is a version of this illustration without name labels that can be used to let participants guess which crops are on the rarely consumed raw list.
- Be careful when identifying these products, as some may have different varieties that are not included on the rarely consumed raw list and are therefore covered by the FSMA PSR. Examples include:
    - Sour cherries are rarely consumed raw. Sweet cherries are covered.
    - Six bean varieties are rarely consumed raw (i.e., black, great Northern, kidney, lima, navy, pinto) as well as cocoa beans and coffee beans. Broad beans (fava), cowpea beans, and green beans are covered.
    - Cashews, hazelnuts, peanuts, pecans, and water chestnuts are rarely consumed raw. Brazil nuts, chestnuts, macadamia nuts, pine nuts, and walnuts are covered.

#### **Relevant FSMA PSR Provisions**

- § 112.2(a)(1)

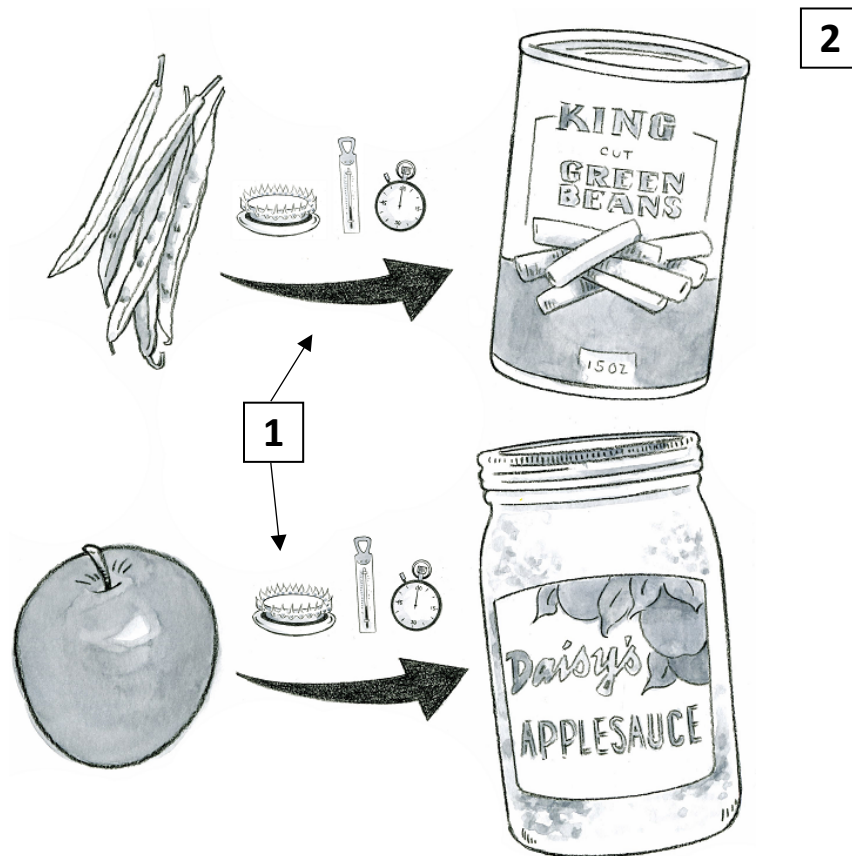
#### **Suggested for Use in PSA Grower Training Version 1.2**

- Module 1: Introduction to Produce Safety after Slide 7

#### **Supporting Resources**

- FDA Fact Sheet—[“Rarely Consumed Raw” Produce](#).
- FSMA PSR [Preamble Comments 62-68](#).

## Exemptions and Exclusions – Commercial Processing Illustration Guide and Teaching Notes



### Key Teaching Points

This illustration shows produce that has undergone a heat treatment, or “kill-step”. The numbers below align with key teaching points in the above illustration.

1. The FSMA Produce Safety Rule (PSR) § 112.2(b)(1) states that produce is eligible for exemption if the produce receives commercial processing that adequately reduces the presence of microorganisms of public health significance.
2. If a grower is selling the raw agricultural product to a processor, FSMA PSR § 112.2(b)(2) states the grower must disclose to the buyer that the food is “not processed to adequately reduce the presence of microorganisms of public health significance”. The grower must also either obtain written assurances from the customer that performs the commercial processing or a written assurance from the customer that an entity in the distribution chain will perform the commercial processing. For growers interested in understanding requirements for exemptions, reviewing all the sections of FSMA PSR provision § 112.2(b) is recommended as well as Preamble comments 58-61.

**Relevant FSMA PSR Provisions**

- § 112.2(b)(1)
- § 112.2(b)(2)

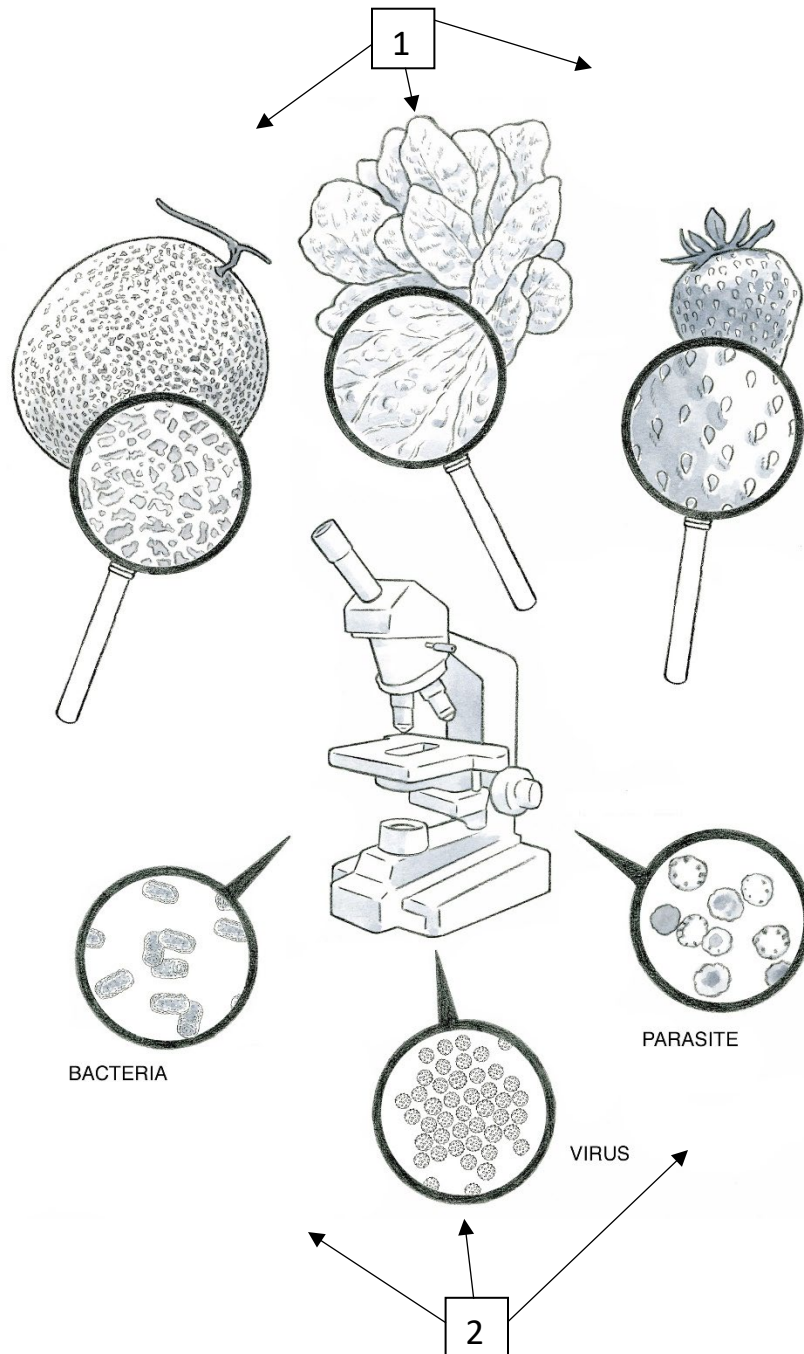
**Suggested for Use in PSA Grower Training Version 1.2**

- Module 1: Introduction to Produce Safety after Slide 7

**Supporting Resources:**

- FSMA PSR [Preamble Comments 58-61](#).

## Microorganisms Can Be Found on Produce Surfaces Illustration Guide and Teaching Notes



## Key Teaching Points

This illustration is intended to highlight how produce surfaces can provide niches for microorganisms to exist, attach, and grow. It is extremely difficult to remove microbial contamination on produce once it occurs; for this reason, growers should focus on preventing contamination through Good Agricultural Practices. The numbers below align with key teaching points in the above illustration.

1. The magnifying glasses illustrate a magnified view of the cantaloupe rind, lettuce leaves, and strawberry skin (left to right). These produce surfaces have different structures and areas where microorganisms, including pathogens, might have a higher chance of persistence, attachment, and growth. The magnified view of the cantaloupe shows a rough, netted surface that provides many areas where microorganisms can attach. During washing, these nooks can provide hydrophobic areas where microorganisms are protected from sanitizers that may be in wash water (Beuchat, 1997; Ukuki, 2002; Parnell, 2005; Park, 1999). In addition, when the stem is removed, the stem scar that remains is more susceptible to infiltration if the melons are submerged in wash water. The magnified area of the lettuce shows large folded areas that allow microorganisms to be concealed on the leaf. These leaves also have stomata (tiny openings in the leaf surface to allow for gas exchange) that can trap or provide microorganisms with access to attachment sites. The magnified view of the strawberry surface contains many achenes (seed-bearing structures) surrounded by receptacle tissue (red flesh). These areas as well as the calyx (cap) provide many crevices for microorganisms to adhere. Each of these examples illustrates why it is difficult to remove microbial pathogens from the produce surface. Additionally, these produce items are often consumed raw, so there is no cooking or “kill step” to destroy microbial pathogens.
2. The microscope indicates that a higher level of magnification is needed to visualize the microscopic pathogens in the lower half of this illustration. Microorganisms, such as bacteria, viruses, and parasites, are smaller than produce surfaces and difficult to detect visually without magnification. Three pathogen types are illustrated (left to right): bacteria (*Salmonella enterica*), viruses (Hepatitis A), and parasites (*Cyclospora cayetanensis*). Each of the pathogens listed here have caused produce-associated outbreaks.

## Suggested for Use in PSA Grower Training Version 1.2

- Module 1: Introduction to Produce Safety after Slide 10 or 17

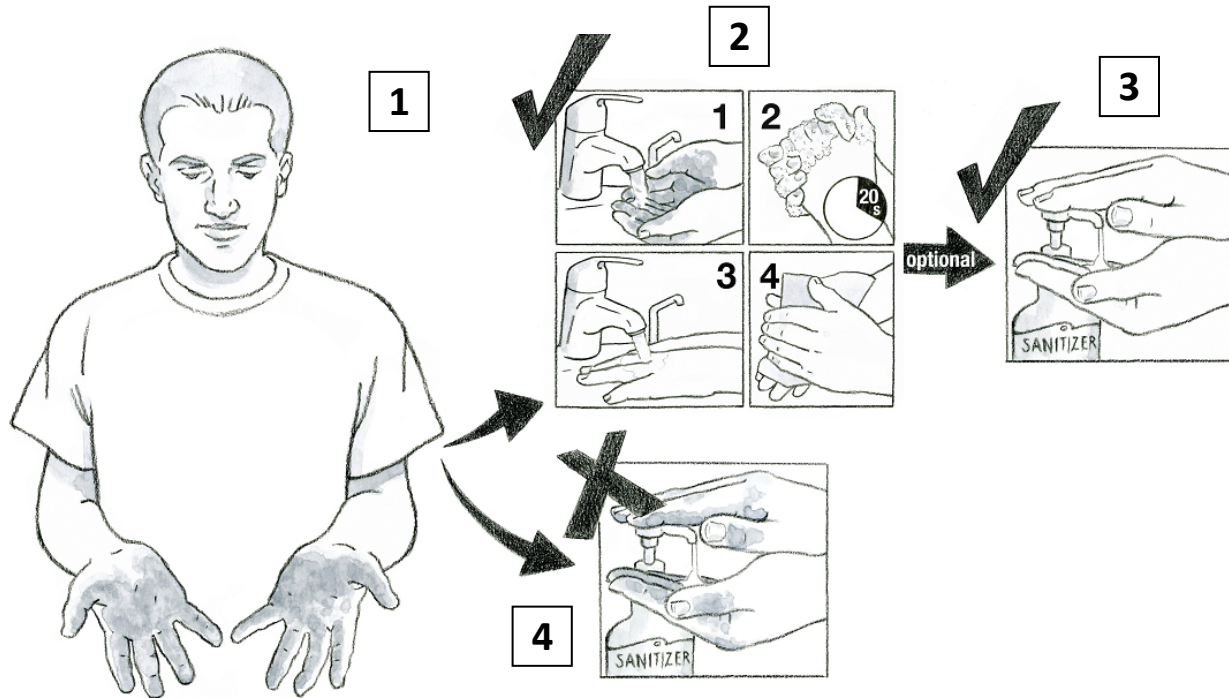


## Supporting Resources

- FDA—[Bad Bug Book](#).
- FDA—[Potential for Infiltration, Survival, and Growth of Human Pathogens within Fruits and Vegetables](#).
- USDA Food Safety Inspection Service—[Illnesses and Pathogens](#).
- Emerging Infectious Diseases—[Produce Handling and Processing Practices](#).
- Dairy, Food and Environmental Sanitation—[Evaluation of Sanitizers for Killing \*Escherichia coli\* O157:H7, \*Salmonella\*, and Naturally Occurring Microorganisms on Cantaloupes, Honeydew Melons, and Asparagus](#).
- International Journal of Food Microbiology—[Reducing \*Salmonella\* on cantaloupes and honeydew melons using wash practices applicable to postharvest handling, foodservice, and consumer preparation](#).
- Journal of Food Protection—[Relationship of Cell Surface Charge and Hydrophobicity to Strength of Attachment of Bacteria to Cantaloup Rind](#).

## Proper Use of Hand Sanitizer

### Illustration Guide and Teaching Notes



### Key Teaching Points

This illustration highlights that handwashing must always come before the use of hand sanitizers. The numbers below align with key teaching points in the above illustration.

1. The FSMA Produce Safety Rule (PSR) § 112.130(d) states that antiseptic hand rubs are not a substitute for handwashing with soap (or other effective surfactant) and water. This is the most important message within this illustration.
2. This is a reminder of the steps involved in properly washing hands: 1) wet the hands with water, 2) apply soap and rub vigorously for at least 20 seconds making sure to get between the fingers and the front and back of the hands, 3) rinse with clean water and 4) dry with a single-use paper towel or other sanitary method.
3. After the handwashing process is complete, a hand sanitizer can be used as an optional fifth step. Handwashing removes dirt from the hands, allowing the sanitizer to work properly.
4. Sanitizers alone do not effectively remove dirt from hand surfaces and cannot work effectively if hands have dirt on them. Handwashing must come first.

### Additional Discussion Topics Related to Handwashing

- The water used for handwashing activities must have no detectable generic *E. coli*. Untreated surface water must not be used for handwashing (FSMA PSR § 112.44(a)).
- The faucet should be turned off using the single-use towel after drying the hands. This will avoid contaminating the freshly clean hands.
- Hands must be washed after using the toilet, before starting or returning to work, before putting on gloves, after touching animals or animal waste, or any other time hands may become contaminated (FSMA PSR § 112.32(b)(3)).
- Handwashing facilities must have soap (or other effective surfactant), clean water, a sanitary way to dry hands, and appropriate containers for waste disposal (FSMA PSR § 112.130).

### Relevant FSMA PSR Provisions

- § 112.32(b)(3)
- § 112.44(a)
- § 112.130
- § 112.130(d)

### Suggested for Use in PSA Grower Training Version 1.2

- Module 2: Worker Health, Hygiene, and Training after Slides 5, 17, or 23

### Supporting Resources

- Washington State Department of Agriculture—[FSMA PSR Handwashing Poster](#)
- Produce Safety Alliance—[Everyone should wash their hands for at least 20 seconds](#) (English)
- Produce Safety Alliance—[Everyone should wash their hands for at least 20 seconds](#) (Spanish)

## FSMA PSR Visitor Requirements Illustration Guide and Teaching Notes



### Key Teaching Points

This illustration depicts FSMA Produce Safety Rule (PSR) visitor requirements. The definition of a “visitor” in the PSR is any person (other than farm personnel) who enters a covered farm with permission. Review Preamble comments 114, 157, 172, and 173 for further insights related to visitors. The numbers below align with key teaching points in the above illustration.

1. Visitors must be made aware of the farm’s policies and procedures to protect covered produce and food contact surfaces from contamination with microorganisms of public health significance (FSMA PSR § 112.33(a)). The farm owner is discussing the U-pick policies on his farm that each visitor must be aware of before entering the field. The images on the sign cover several topics that may be part of a farm’s food safety policies, such as requiring visitors to wash their hands before picking, using clean picking containers, leaving their pets at home, properly using provided toilet facilities, and depositing trash in provided cans.

In addition, a farm's food safety policies may also include instructing visitors to not enter the field if they are sick or have symptoms of an illness (FSMA PSR § 112.31). The FSMA PSR does not specify how policies should be shared with visitors, so farm personnel could share this information using posters, handouts, or verbally as visitors enter the farm.

2. Farms must also provide visitors with access to toilet and handwashing facilities (FSMA PSR § 112.33(b)). The toilet and handwashing station in this illustration is convenient for customers to use and is located outside of the produce growing area, so that potential contamination of the fields from the restrooms is minimized.

#### **Relevant FSMA PSR Provisions**

- § 112.31
- § 112.33(a)
- § 112.33(b)

#### **Suggested for Use in PSA Grower Training Version 1.2**

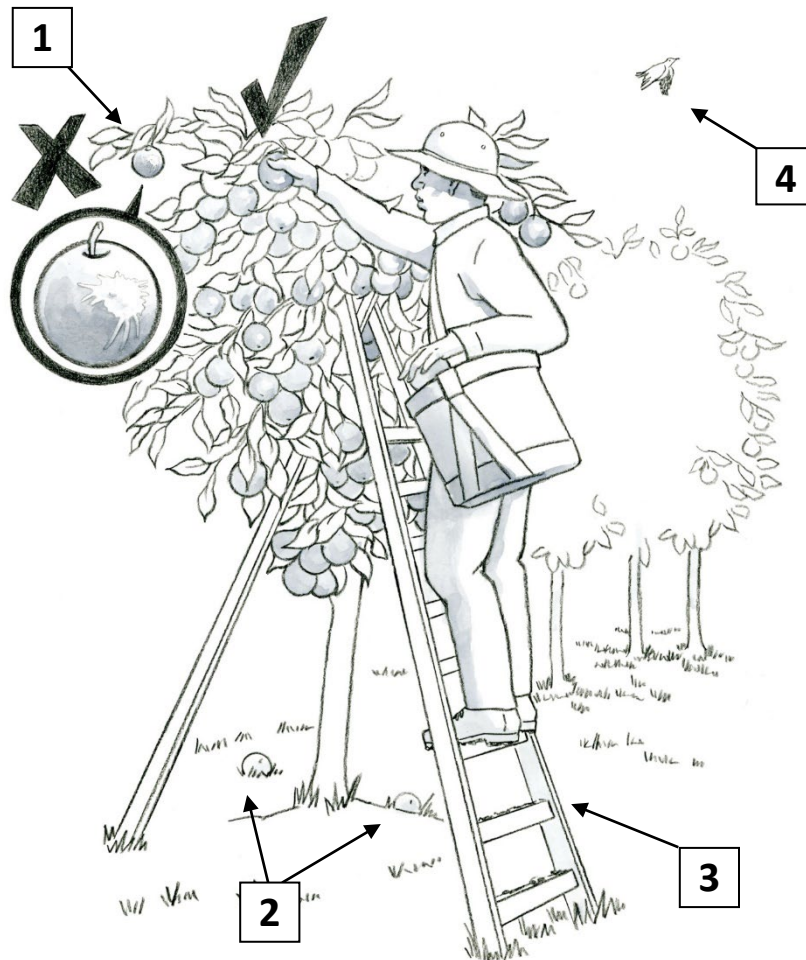
- Module 2: Worker Health, Hygiene, and Training after Slides 11 or 23

#### **Supporting Resources**

- National Young Farmers Coalition—[Volunteers, Visitors, and Food Safety](#).
- FSMA PSR [Preamble comments 114, 157, 172 and 173](#)



## Avoiding the Harvest of Contaminated Fruit Illustration Guide and Teaching Notes



### Key Teaching Points

Workers must be trained to identify and not harvest produce that may be contaminated with a known or reasonably foreseeable food safety hazard. Effective training results in workers who are empowered to make decisions and implement food safety practices everyday while they work. Review the requirements outlined in FSMA Produce Safety Rule (PSR) §§ 112.22(b)(1) and 112.112. The numbers below align with key teaching points in the above illustration.

1. In this illustration, the call out bubble shows an apple with visible contamination (feces) from a bird. The “X” indicates apples with contamination must not be harvested. The “✓” indicates this apple is not contaminated.
2. Produce covered by the FSMA PSR which has dropped to the ground before (or during) harvest must not be distributed. Review FSMA PSR § 112.114 and preamble comments 336-339 for further insight.

3. The rungs of the ladder have visible soil from the worker's boots which could contribute to contamination of the worker's hands if they contact the rungs as they are climbing the ladder. Hand washing and awareness of hand placement on the side rails rather than the rungs can help minimize cross-contamination risks.
4. Wildlife, such as the bird in this illustration, may serve as a source of contamination to fresh produce. Review the requirements of FSMA PSR § 112.83 and discuss how to evaluate whether wildlife are resident or transient, and whether contamination is present and likely to impact the safety of the crop. What actions might a grower take if extensive bird droppings are found on a particular tree or block of an orchard?

#### **Relevant FSMA PSR Provisions**

- § 112.22(b)(1)
- § 112.83
- § 112.112
- § 112.114

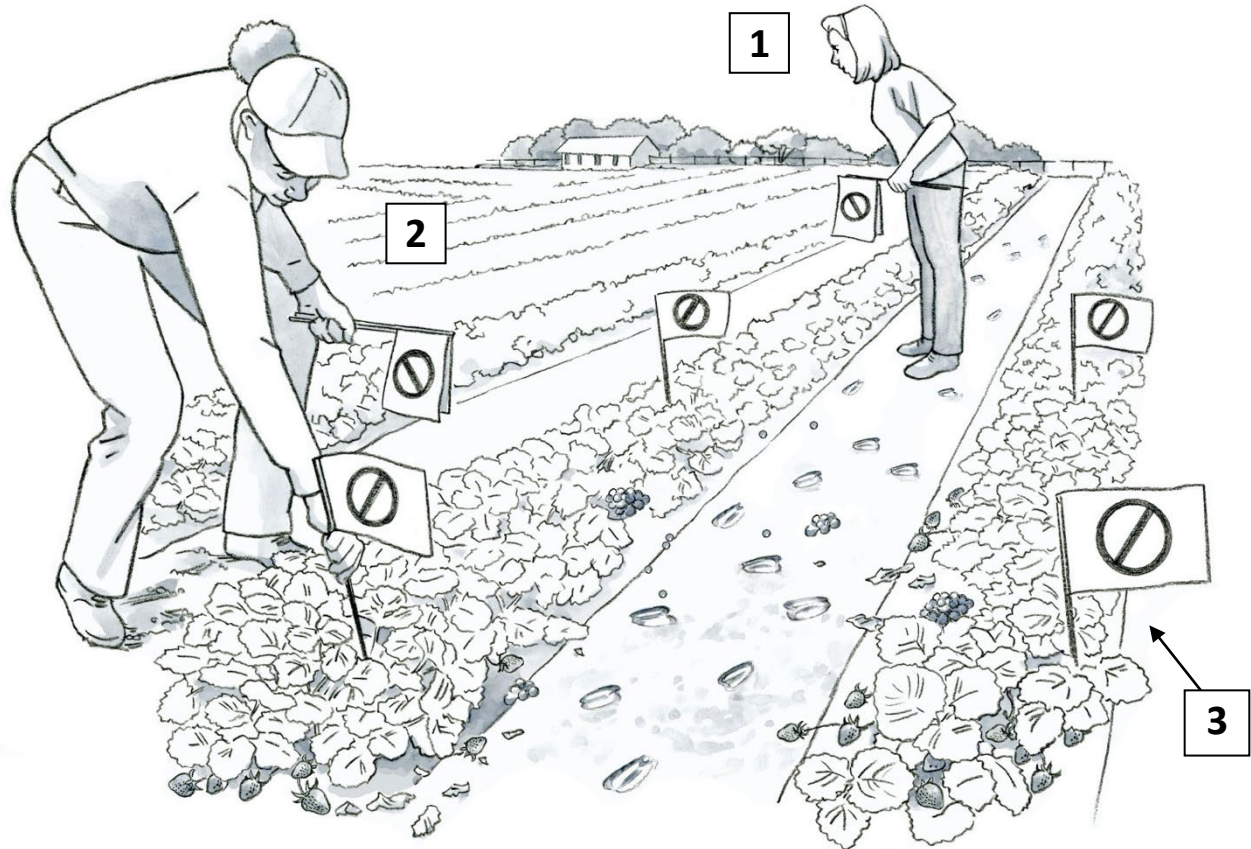
#### **Suggested for Use in PSA Grower Training Version 1.2**

- Module 2: Worker Health, Hygiene, and Training after Slide 15
- Module 4: Wildlife, Domesticated Animals, and Land Use before Slide 23
- Module 6: Postharvest Handling and Sanitation after Slide 26 or 27

#### **Supporting Resources**

- California Leafy Green Products Handler Marketing Agreement (LGMA)—[Assessing Animal Activity in the Field](#).
- National Good Agricultural Practices Program—[Worker Health, Hygiene, and Training Decision Tree](#).
- National Good Agricultural Practices Program—[Wildlife and Animal Management Decision Tree](#).
- FSMA PSR [Preamble Comments 336-339](#).

## Establishing No Harvest Buffer Zones Illustration Guide and Teaching Notes



### Key Teaching Points

Workers must be able to recognize when produce must not be harvested. This requires training and understanding food safety risks in the field, such as those from wildlife or domestic animals. Review FSMA Produce Safety Rule (PSR) §§ 112.22(b)(1), 112.83, and 112.112. The numbers below align with key teaching points in the above illustration.

1. In this illustration, two workers scout for evidence of animal intrusion and fecal contamination in a strawberry field prior to harvest. Visible hoof prints and deer feces are shown in the rows as well as in the path between the rows of strawberries.
2. While buffer zones are not required to be established by the FSMA PSR, they are one way to manage risk. Buffer zones may vary from a 1-25 foot radius, depending on the type of feces, extent of the contamination, and environmental conditions such as prior rain or wind events. Growers should also consult with current industry guidance and marketing agreements for specifics of buffer zone distances required for certain commodities such as leafy greens.

3. Workers who harvest produce must receive training on how to recognize covered produce that must not be harvested, including produce that may be contaminated (FSMA PSR § 112.22(b)(1)). In this illustration, flags are being placed to denote areas which must not be harvested due to fecal contamination and animal intrusion.

Additional discussion topic related to no-harvest buffer zones:

- Does the standard operating procedure (SOP) require them to flag and remove the contamination in addition to not harvesting the affected produce? If so, worker hygiene will be critical after handling fecal material to ensure it does not cross-contaminate produce from hands, tools, or equipment (FSMA PSR § 112.32(b)).

#### **Relevant FSMA PSR Provisions**

- § 112.22(b)(1)
- § 112.32(b)
- § 112.83
- § 112.112

#### **Suggested for Use in PSA Grower Training Version 1.2**

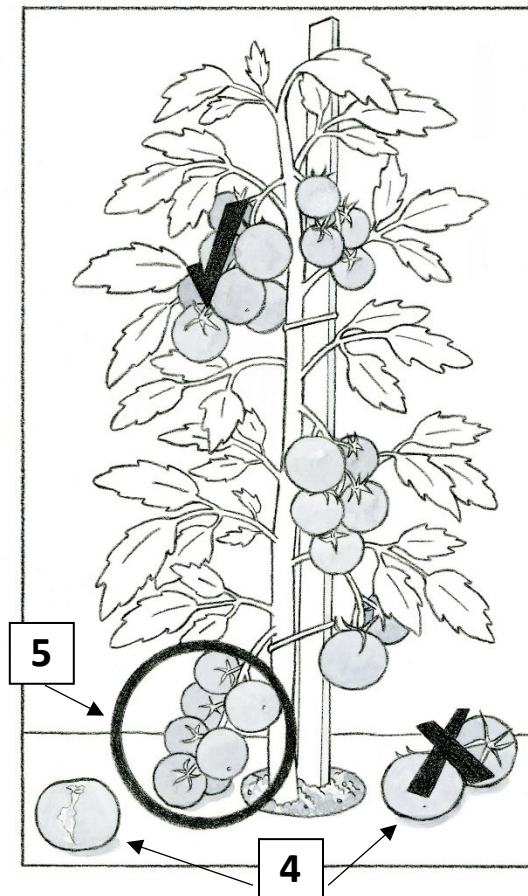
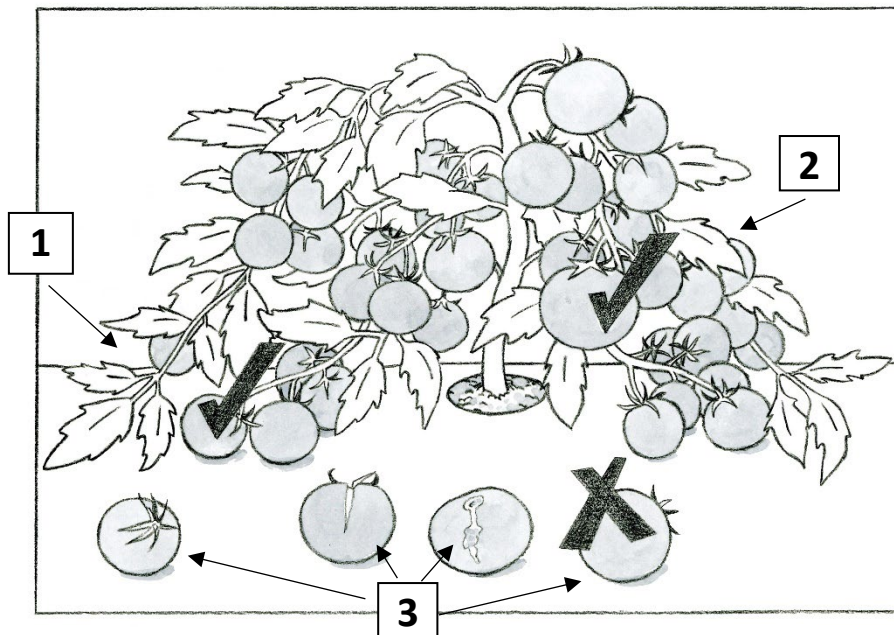
- Module 2: Worker Health, Hygiene, and Training after Slide 15
- Module 4: Wildlife, Domesticated Animals, and Land Use after Slide 22

#### **Supporting Resources**

- California Leafy Green Products Handler Marketing Agreement (LGMA) — [Assessing Animal Activity in the Field](#).
- Farm Food Safety Decision Trees— [Wildlife and Animal Activity Decision Tree](#).



## Exemptions and Exclusions – Dropped Covered Produce Illustration Guide and Teaching Notes





## Key Teaching Points

This illustration depicts ‘dropped covered produce’, as defined in the FSMA Produce Safety Rule (PSR), and uses two types of tomato plants to address key factors that influence whether a produce item is considered ‘dropped’. The FSMA PSR defines dropped covered produce as produce that drops to the ground before harvest (§ 112.114). According to FSMA PSR § 112.114, dropped covered produce does not include root crops that grow underground (such as carrots), crops that grow on the ground (such as cantaloupe), or produce that is intentionally dropped to the ground as part of harvesting (such as almonds). The numbers below align with key teaching points in the above illustrations.

1. The top illustration shows a bush-variety (determinate) tomato plant exhibiting a sprawling growth pattern. These tomatoes have grown to the ground and are still attached to the plant, and therefore are not dropped covered produce. The “✓” indicates that these tomatoes can be harvested. Refer to FDA Fact Sheet “Dropped Covered Produce” and Preamble comment 338, for additional details.
2. These tomatoes are not contacting the ground and are therefore not dropped covered produce. The “✓” indicates that these tomatoes can be harvested.
3. Produce that grows off the ground and has dropped to the ground before or during harvest is considered dropped covered produce. In this illustration the “X” indicates that these tomatoes cannot be harvested for the fresh market. All four of these tomatoes are considered dropped covered produce, regardless of whether the tomatoes look physically damaged. Bruising and microscopic injuries due to impact may provide an entry point for pathogens to enter and grow.
4. The bottom illustration shows a staked (indeterminate) tomato plant where three tomatoes have dropped to the ground before or during harvest. In this illustration, the “X” indicates that these tomatoes cannot be harvested for the fresh market. All three of these tomatoes are considered dropped covered produce, regardless of whether the tomatoes look physically damaged. Bruising and microscopic injuries due to impact may provide an entry point for pathogens to enter and grow.
5. These tomatoes have grown to the ground and are still attached to the plant, despite the plant’s upright growth pattern. The difference between the tomatoes in this example and in #1 above is the growth pattern of the tomatoes (bush-type vs. upright). This branch is circled (“O”) to indicate the unknown harvestable status of these tomatoes. According to the FSMA PSR these tomatoes would be considered dropped covered produce, and not harvestable, due to the plant’s upright growth pattern. “Produce that grows off the ground, such as staked tomatoes, and that drops to the ground before it is harvested, is considered dropped covered produce, even if the produce is still attached to the plant when it contacts the ground” (FDA Fact Sheet Dropped Covered Produce, FSMA PSR Preamble comment 338). Sometimes these fruits are referred to as “droops” as they have grown to the ground or drooped to the ground but have not physically dropped to the ground. Due to inconsistent feedback from regulatory personnel about whether this fruit is considered dropped covered produce or drooped produce, it is unclear if growers should harvest these tomatoes. Significant effort has been made to clarify this point, but nothing concrete has been decided.

Additional discussion topics related to dropped covered produce:

- Dropped produce can be used for food for human consumption that receives commercial processing, as stated in FSMA PSR § 112.2(b). Additional details on the commercial processing exemption, including the required disclosure documentation, can be found within FDA’s “Dropped Covered Produce” fact sheet.
- The following produce is not subject to the requirements in the FSMA PSR, and therefore not subject to the dropped covered produce prohibition. Refer to FSMA PSR Preamble comment 339 for additional details.
  - Produce that is on the rarely consumed raw list (FSMA PSR §112.2(a)(1))
  - Produce that is produced by an individual for personal consumption or produce for consumption on the farm or another farm under the same management
  - Produce that is not a raw agricultural commodity (RAC)

#### **Relevant FSMA PSR Provisions**

- § 112.2(a)(1)
- § 112.2(b)
- § 112.114

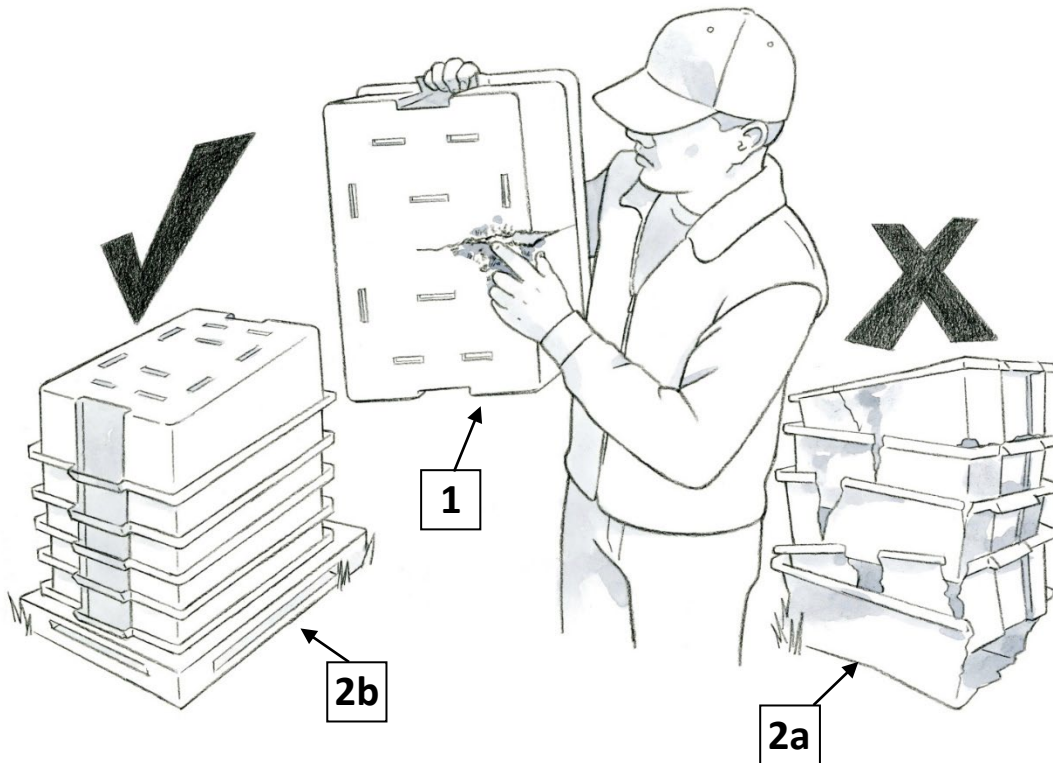
#### **Suggested for Use in PSA Grower Training Version 1.2**

- Module 2: Worker Health, Hygiene, and Training after Slide 15
- Module 6: Postharvest Handling and Sanitation after Slide 6

#### **Supporting Resources**

- FDA Fact Sheet—[Dropped Covered Produce](#).
- FSMA PSR [Preamble Comment 338-339](#).

## Harvest Bin Inspection Illustration Guide and Teaching Notes



### Key Teaching Points

Food contact surfaces, including harvest totes and containers, must be in good condition so they do not serve as a source of contamination from pathogen niches (such as in cracks, deep grooves, or damaged areas) and can be easily cleaned, and when appropriate, sanitized. The numbers below align with key teaching points in the above illustration.

1. In this illustration, a worker is inspecting reusable plastic containers (RPCs) prior to harvest. Review FSMA Produce Safety Rule (PSR) § 112.22(b)(3) regarding worker responsibilities for harvest containers and equipment and § 112.123 on the condition of equipment and tools.
2. Farms and packinghouses may have varying protocols for inspecting, cleaning, and when appropriate, sanitizing their harvest containers (FSMA PSR § 112.111(b)). A standard operating procedure (SOP) can be valuable to direct workers on these steps, including (a) what to do with containers that require repairs or replacement and (b) how and where clean harvest containers need to be stored. The clean harvest containers in this illustration are neatly stacked upside down on a pallet, so that containers are not touching the ground and dirt and debris will not fall into the clean surface inside. Organizing the clean containers in a standardized manner indicates to workers that they are ready for use (FSMA PSR § 112.123).

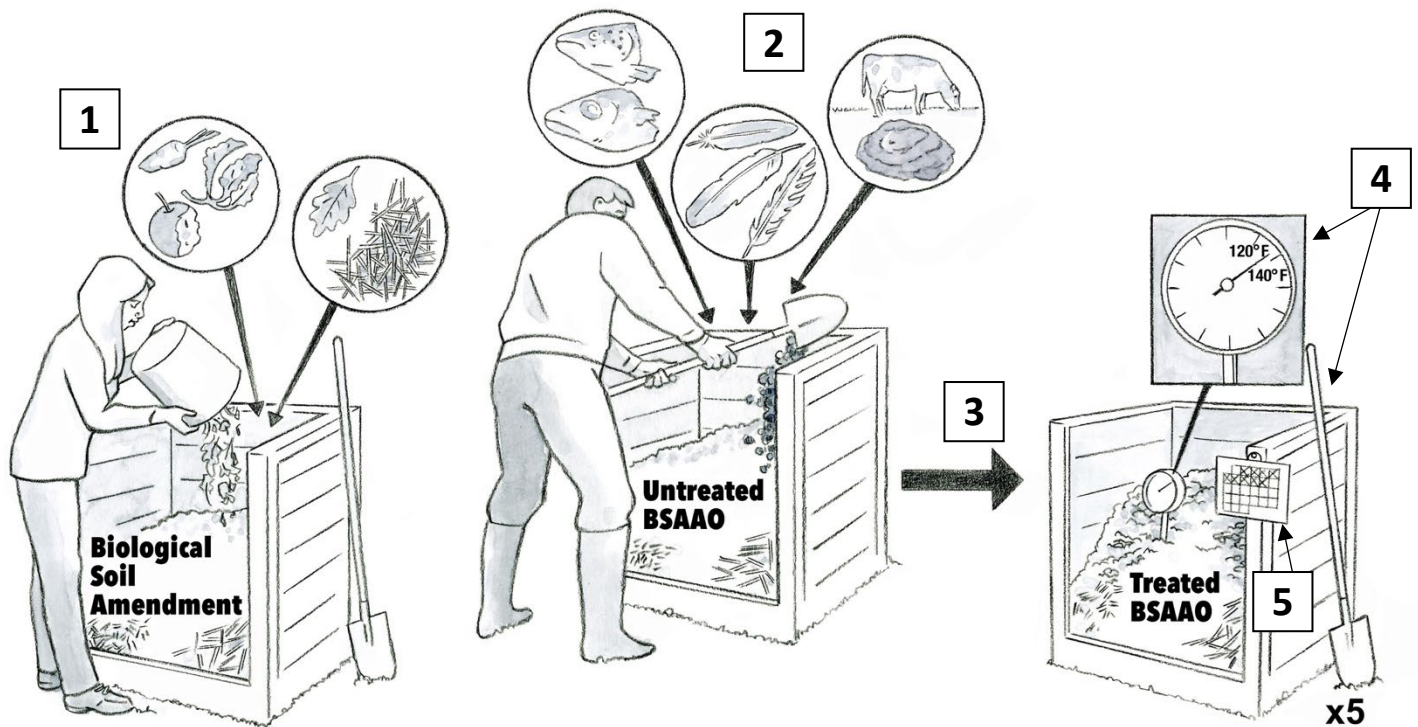
**Relevant FSMA PSR Provisions**

- § 112.22(b)(3)
- § 112.111(b)
- § 112.123

**Suggested for Use in PSA Grower Training Version 1.2**

- Module 2: Worker Health, Hygiene, and Training after Slide 15
- Module 6: Postharvest Handling and Sanitation after Slide 26 or 27

## Categorizing Biological Soil Amendments of Animal Origin Illustration Guide and Teaching Notes



### Key Teaching Points

This illustration is intended to distinguish the differences between key definitions in the FSMA Produce Safety Rule (PSR), including biological soil amendments, biological soil amendments of animal origin (BSAAO), and untreated vs. treated BSAAO. The FSMA PSR establishes soil amendment definitions in § 112.3(c). Being familiar with these definitions will help growers understand the risks and regulatory requirements associated with each soil amendment type. The numbers below align with key teaching points in the above illustration.

1. Food preparation scraps, a type of pre-consumer vegetative waste, yard trimmings, and straw are being added to a new soil amendment pile labeled "Biological Soil Amendment". These inputs are all examples of biological soil amendments (i.e., any soil amendment containing non-animal based biological materials, alone or in combination that do not contain any form of human waste).



2. Dead fish, cow manure, and feathers are being added to the developing soil amendment pile labeled “Untreated BSAAO”. Since animal products were added to this bin, it is now considered a BSAAO: a biological soil amendment which consists of materials of animal origin. This definition is important because BSAAO are regulated under the FSMA PSR. Untreated soil amendments, such as the fish, manure, and feathers added to this bin, are considered higher risk since they have not been treated to reduce pathogens. Untreated soil amendments are defined in FSMA PSR § 112.51(b) and practices for using untreated soil amendments are outlined in § 112.56.
3. BSAAO can undergo a validated treatment step, such as composting, to reduce risks. This treatment step shifts the BSAAO from ‘untreated’ to ‘treated’. Due to the reduced risks of a treated BSAAO, practices for using a treated BSAAO are different than those for an untreated BSAAO (FSMA PSR § 112.56).
4. The FSMA PSR establishes microbial standards in § 112.55 and outlines two treatment processes (i.e., turned composting, aerated static composting) that meet the standards in § 112.54. This illustration demonstrates the process requirements of turned composting to ensure a BSAAO is effectively treated. These steps include monitoring the temperature to ensure a minimum of 131°F for 15 days and turning the pile at least 5 times, followed by curing.
5. Growers treating soil amendments, such as compost, on their farm are required to keep records of the treatment process (FSMA PSR § 112.60). The calendar record hanging on the bin would allow the grower to document the time, temperature, and turnings.

#### **Relevant FSMA PSR Provisions**

- |               |            |
|---------------|------------|
| • § 112.3(c)  | • § 112.55 |
| • § 112.51(b) | • § 112.56 |
| • § 112.54    | • § 112.60 |

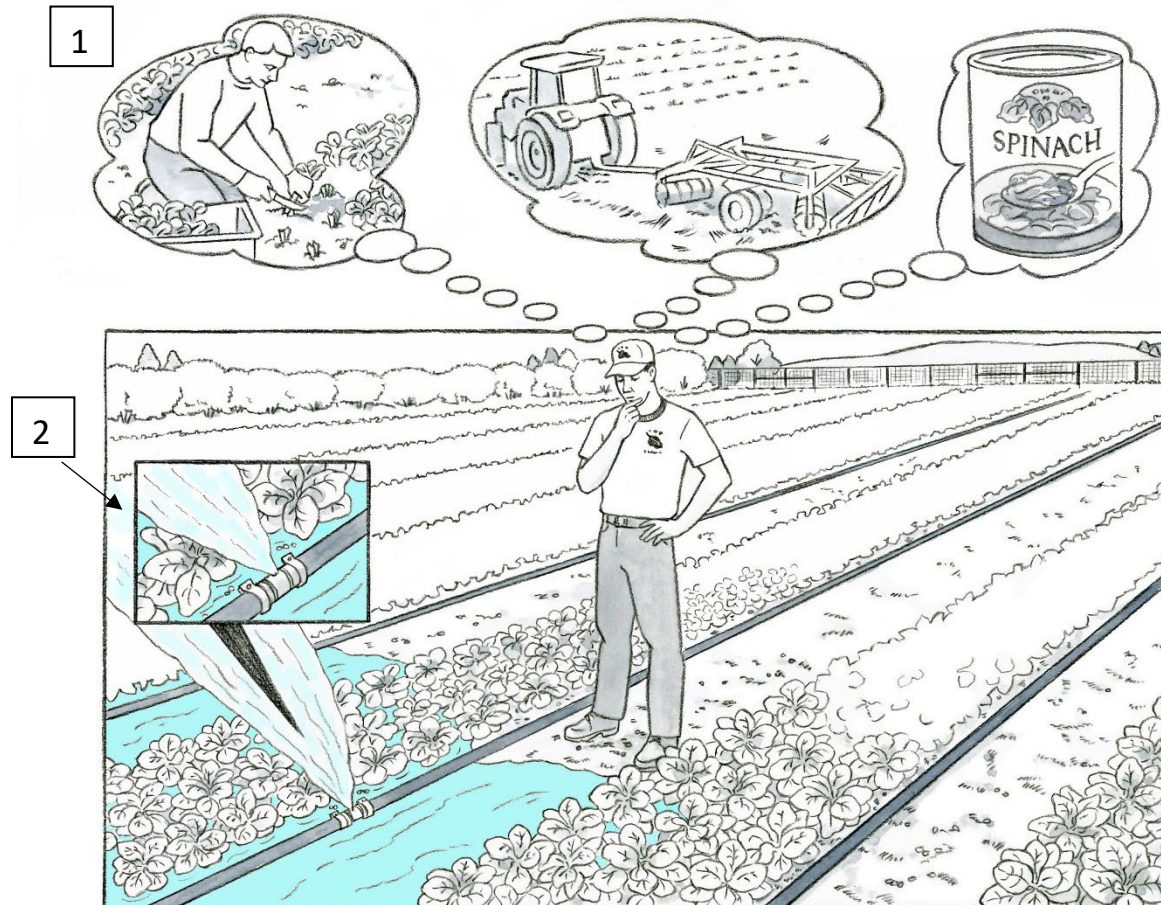
#### **Suggested for Use in PSA Grower Training Version 1.2**

- Module 3: Soil Amendments after Slide 10 or 16

#### **Supporting Resources**

- Produce Safety Alliance—[Records Required by the FSMA PSR](#).

## In-field Pooling and Implications for Harvest Illustration Guide and Teaching Notes



### Key Teaching Points

This illustration is intended to define in-field pooling, highlight how pooling differs from flooding, and the implications pooling has on harvest. In-field pooling can occur during heavy rain events or when in-field irrigation equipment fails or is mismanaged. In this illustration, a break in the water distribution pipe allowed irrigation water to spray onto the harvestable portions of the spinach and pool in the surrounding rows. In-field pooling is different from unintentional flooding, since the water generally does not run off into other fields or contain other contaminating agents such as unknown chemical, physical, and biological hazards. There is an accompanying illustration entitled “Flooding and Implications for Harvest”, which provides more detail on flooding and produce adulteration. The numbers below align with key teaching points in the above illustration.

1. In this illustration, the pooled water originates from a broken irrigation line, not an overflowing stream, river, or lake, therefore the produce contacted by this water is not automatically considered adulterated. As indicated in the thought bubbles, the grower

has several different things to consider before they decide how the crop can be used under this scenario. If the grower knows something about the quality of the water, is confident it is safe and of adequate sanitary quality, and the water is not likely to have resulted in crop contamination, the crop could be harvested and sold as fresh produce. If the grower is concerned with the quality of the water or is unsure, the field could be tilled under or the produce can be sold to a processor where a “kill-step” will be implemented. The grower will need to assess risks to make this determination.

2. The FSMA Produce Safety Rule (PSR) requires growers to inspect the agricultural water systems that are under their control, including water sources, water distribution systems, facilities, and equipment. This should be completed at the beginning of a growing season or at least once annually. Regular inspections will reduce the potential of equipment failure throughout the growing season. Refer to FSMA PSR § 112.42 and comments 183 and 184 of the Preamble for further insights. In addition, as described in FSMA PSR § 112.42(d) and Preamble comment 190, the grower must implement measures to reduce the potential of the pooling waters to reach the harvestable portions of the crop, such as staking the crop or using an alternative irrigation method.

#### **Relevant FSMA PSR Provisions**

- § 112.42

#### **Relevant Federal Food, Drug, and Cosmetic Act (FD&C) Provisions**

- 21 U.S. Code, [FD&C Chapter 9, § 321\(f\)](#) (establishes the definition of food)
- 21 U.S. Code, [FD&C Chapter 9, § 331](#) (establishes prohibited acts, including the adulteration of any food in interstate commerce). Note: 21 USC § 331 is the same as Section 402 in the Code of Federal Regulations.
- 21 U.S. Code, [FD&C \(Chapter 9\), § 342](#) (establishes the definition of adulteration)

#### **Suggested for Use in PSA Grower Training Version 1.2**

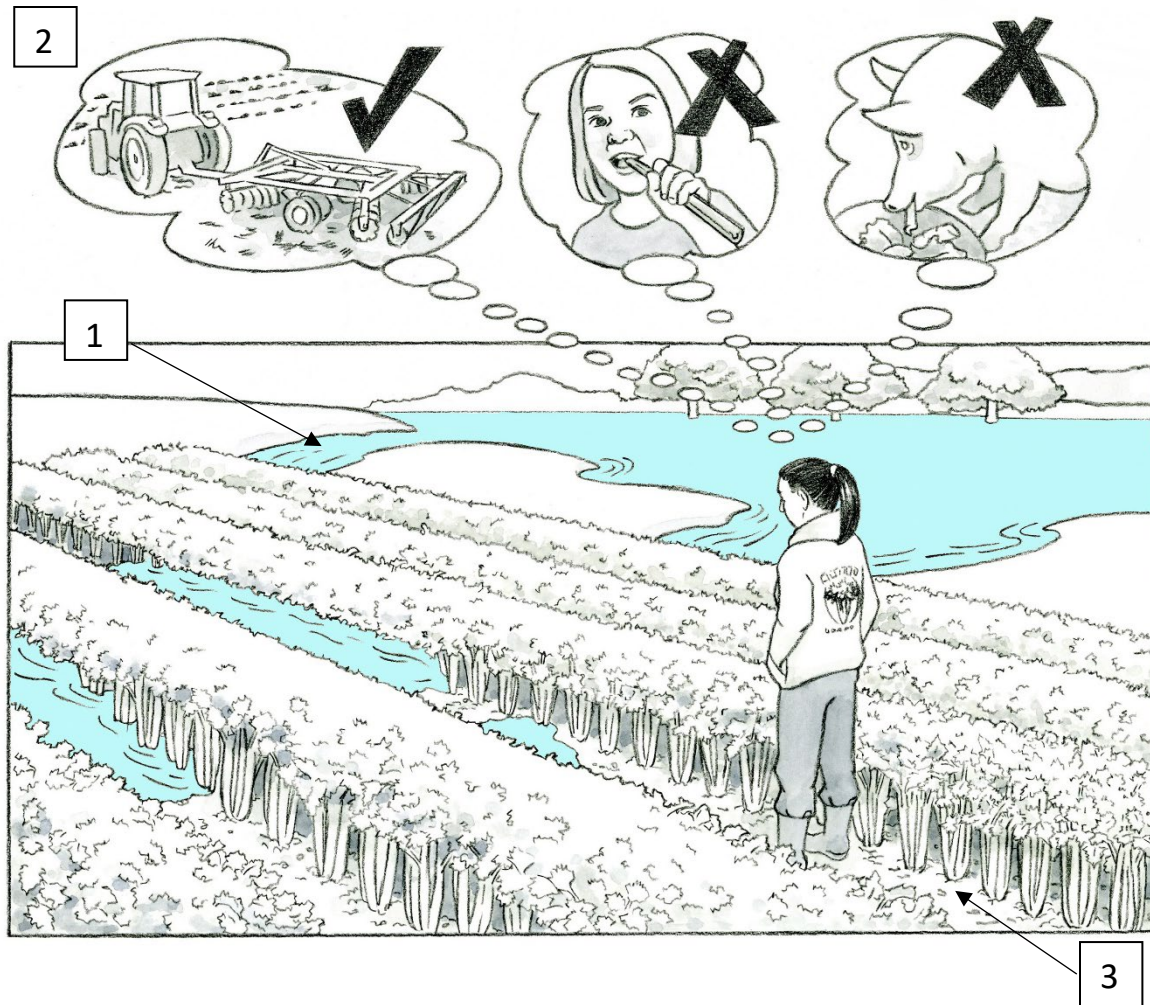
- Module 5-1 Agricultural Water Part 1: Production Water after Slide 19 or 38

#### **Supporting Resources**

- FDA [Guidance for Industry: Evaluating the Safety of Flood-affected Food Crops for Human Consumption](#).
- FDA [Safety of Food and Animal Food Crops Affected by Hurricanes, Flooding, and Power Outages](#).
- FDA [Resources for Human and Animal Food Producers Affected by Flooding](#).
- FSMA PSR [Preamble Comments 183-184 and 190](#).



## Flooding and Implications for Harvest Illustration Guide and Teaching Notes



### Key Teaching Points

This illustration is intended to define flooding and identify its implications on harvesting produce. Flooding is the overflowing of a field with surface waters such as rivers, lakes, or streams. Flood waters are likely to contain physical, chemical, and biological contaminants, such as garbage, sewage, chemicals, heavy metals, and pathogenic microorganisms that may be harmful to the health of humans and animals. Flooding is different than in-field pooling; there is an accompanying illustration entitled “In-Field Pooling and Implications for Harvest” which provides more details. The numbers below align with key teaching points in the above illustration.

1. In this illustration, a river has overflowed and comes into direct contact with the celery field. The grower is evaluating the safety of this crop. Any harvestable portion of the crop that has been contacted by the flood waters is considered adulterated and cannot be harvested (Federal Food, Drug, and Cosmetic Act, § 342). There is no practical method to recondition the produce so that it is safe for consumption.

Thinking beyond this illustration, food crops most likely to be impacted by flooding are surface crops such as leafy greens, tomatoes, green beans, berries, and corn; underground crops, such as peanuts, potatoes, carrots, and garlic; and even food crops with a hard, outer skin or shell, such as watermelons and winter squash. According to the FSMA Produce Safety Rule (PSR) § 112.11, the grower must take measures to minimize health consequences or death from covered produce including providing “reasonable assurances that the produce is not adulterated under section 402 of the Federal Food, Drug, and Cosmetic Act[...].”

2. The two “X” thought bubbles indicate that the celery crop must not be harvested for human or animal consumption. FDA does provide a path for using flooded crops for animal feed but only if a thorough evaluation and explicit standards are achieved. Guidance documents in the Supporting Resources include more detail about evaluating flood-affected produce crops. The “✓” thought bubble indicates that the celery crops should be disposed in a way that does not adulterate adjacent crops. Tilling the crop under is one method of destruction. For further insight, refer to the “FDA Guidance for Industry: Evaluating the Safety of Flood-affected Food Crops for Human Consumption”.
3. Crops near flooded areas or those where the harvestable part of the plant did not come in contact with the flood water need to be evaluated on a case-by-case basis. These crops, as well as those in which the harvestable portion develops after flood waters recede, are not automatically deemed adulterated. The FDA Guidance for Industry describes additional considerations for assessing flood water and replanting flood-affected fields.

#### **Relevant FSMA PSR Provisions**

- § 112.11

#### **Relevant Federal Food, Drug, and Cosmetic Act (FD&C) Provisions**

- 21 U.S. Code, [FD&C Chapter 9, § 321\(f\)](#) (establishes the definition of food)
- 21 U.S. Code, [FD&C Chapter 9, § 331](#) (establishes prohibited acts, including the adulteration of any food in interstate commerce). Note: 21 USC § 331 is the same as Section 402 in the Code of Federal Regulations.
- 21 U.S. Code, [FD&C \(Chapter 9\), § 342](#) (establishes the definition of adulteration)

#### **Suggested for Use in PSA Grower Training Version 1.2**

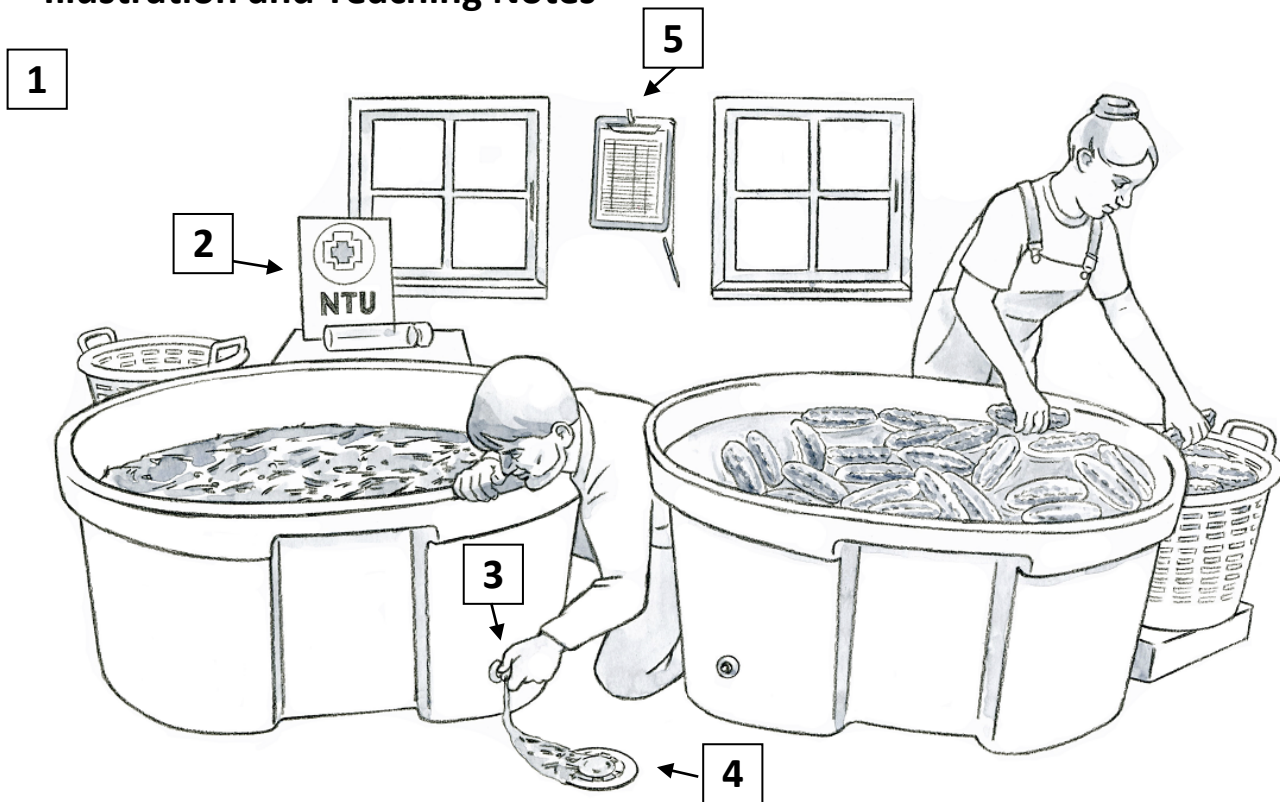
- Module 5-1 Agricultural Water Part 1: Production Water after Slide 38



## Supporting Resources

- FDA [Guidance for Industry: Evaluating the Safety of Flood-affected Food Crops for Human Consumption](#).
- FDA [Safety of Food and Animal Food Crops Affected by Hurricanes, Flooding, and Power Outages](#).
- FDA [Resources for Human and Animal Food Producers Affected by Flooding](#).
- Produce Safety Alliance—[Food Safety for Flooded Farms](#).
- Kansas State University/University of Missouri Extension—[Frequently Asked Questions About Handling Flooded Produce](#).

## Managing Post-Harvest Water and Change Schedules Illustration and Teaching Notes



### Key Teaching Points

In this illustration, cucumbers are being washed in large tubs in an indoor packing area. The numbers below align with key teaching points in the above illustration.

1. Washing produce is not required in the FSMA Produce Safety Rule (PSR), however if produce is washed, there are required practices to minimize risks.
2. Water used for harvest and postharvest activities must be visually monitored for the build-up of organic material according to FSMA PSR § 112.48(b). Here, a tool for monitoring turbidity (water cloudiness) is displayed behind the tub. Turbidity measurements are not required; however, they can be used as an indicator for when the water should be changed. The organic matter suspended in turbid water can make some sanitizer treatments less effective.
3. The FSMA PSR § 112.48(a) requires that postharvest water must be managed by establishing water-change schedules for batch, or recirculated, systems. The worker on the left is draining the dirty water so that the tub may be refilled with clean water. The frequency of how often this change may occur will depend on several factors, including the type of sanitizer used, turbidity measurements, and organic load.

4. Grey water from washing and cooling produce must be properly disposed of so that it does not contaminate food contact surfaces and other areas used for covered activities according to FSMA PSR §§ 112.132 and 112.133. The water from the tub is being discharged into a drain in the packing area to minimize risks of contamination from the grey water.
5. A postharvest water monitoring record and pen are hanging on the wall for ease of recordkeeping. FSMA PSR §112.43(b) requires the results of water treatment monitoring to be documented.

#### **Relevant FSMA PSR Provisions**

- § 112.43(b)
- § 112.48(a)
- § 112.48(b)
- § 112.132
- § 112.133

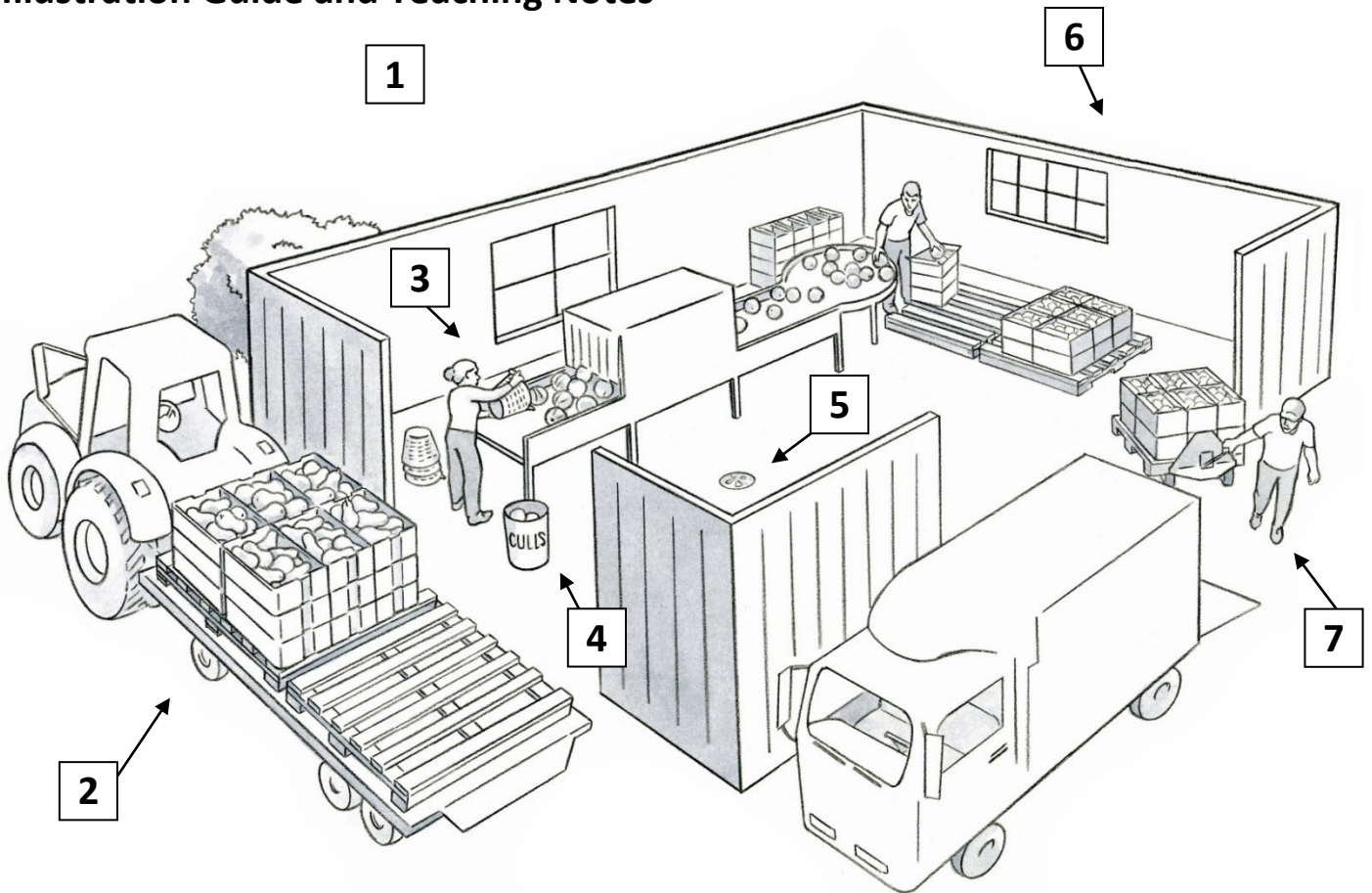
#### **Suggested for Use in PSA Grower Training Version 1.2**

- Module 5.2 Agricultural Water Part 2: Postharvest Water after Slide 62

#### **Supporting Resources**

- Michigan State University Extension—[Handling Turbidity in Postharvest Wash Water](#).
- Produce Safety Alliance—[Records Required by the FSMA PSR](#).
- National Good Agricultural Practices Program—[Postharvest Water Decision Tree](#).

## Packinghouse Flow - Considerations for Food Safety Illustration Guide and Teaching Notes



## Key Teaching Points

This illustration highlights product flow through a packinghouse. Notice that produce from the field is entering on one side of the packinghouse and packed produce is exiting out another door to the truck. The numbers below align with key teaching points in the above illustration.

1. FSMA Produce Safety Rule (PSR) §§ 112.126, 112.127 and 112.128 describe requirements for buildings and pest control in buildings. There are many activities involved as produce moves through the packinghouse with each activity described in the steps below.
2. A tractor pulls a load of butternut squash (a type of winter squash) up to the door of the packinghouse, while a worker inside is emptying bins of cantaloupes onto a conveyor to be washed and packed into clean boxes. Cantaloupes (covered by the FSMA PSR) are being washed first, followed by butternut squash. Winter squash is included on the rarely consumed raw list. FSMA PSR § 112.111(a) and (b) outlines requirements for separating and handling covered produce from excluded produce if the excluded produce is not grown, harvested, packed, or held in accordance with FSMA PSR requirements. It may be relevant to mention that some audits require covering produce during transportation. The butternut squash on the back of the tractor are not physically covered and may be susceptible to contamination from dirt and debris during transportation, birds, or other pests if not covered.

3. The worker emptying cantaloupes onto the conveyor belt is placing the empty bins stacked upside-down so that they know that these will need to be cleaned and sanitized prior to their next use. Having a system in place for identifying dirty containers from clean containers will help ensure produce is harvested into clean containers.
4. A cull bin is shown to collect any damaged melons. Culls should be removed from the packinghouse on a regular basis so as not to serve as an attractant to rodents or insects. FSMA PSR § 112.132 outlines requirements for control and disposal of trash, litter, and waste.
5. Proper drainage is important in post-harvest handling areas. The presence of standing water can allow for the growth of pathogens that can spread to other areas from splash or foot and vehicle traffic. Water should only be used if it can be properly managed.
6. The worker at the end of the washing line is packing the washed cantaloupes into clean boxes which are stacked off the ground on a pallet. FSMA PSR § 112.116 describes measures that must be taken when using food packing materials. It is also important to note that workers packing the boxes need to have clean hands to reduce microbial risks to the produce they are handling.
7. The pallet of boxed cantaloupes is being pulled on a pallet jack to a truck waiting outside. Transportation types may vary depending on the business. Growers may be using everything from horse drawn wagons to refrigerated truck for produce transportation. FSMA PSR § 112.125 requires equipment used to transport covered produce be adequately clean before use and adequate for use.

#### **Relevant FSMA PSR Provisions**

- |                |             |
|----------------|-------------|
| • § 112.111(a) | • § 112.126 |
| • § 112.111(b) | • § 112.127 |
| • § 112.116    | • § 112.128 |
| • § 112.125    | • § 112.132 |

#### **Suggested for Use in PSA Grower Training Version 1.2**

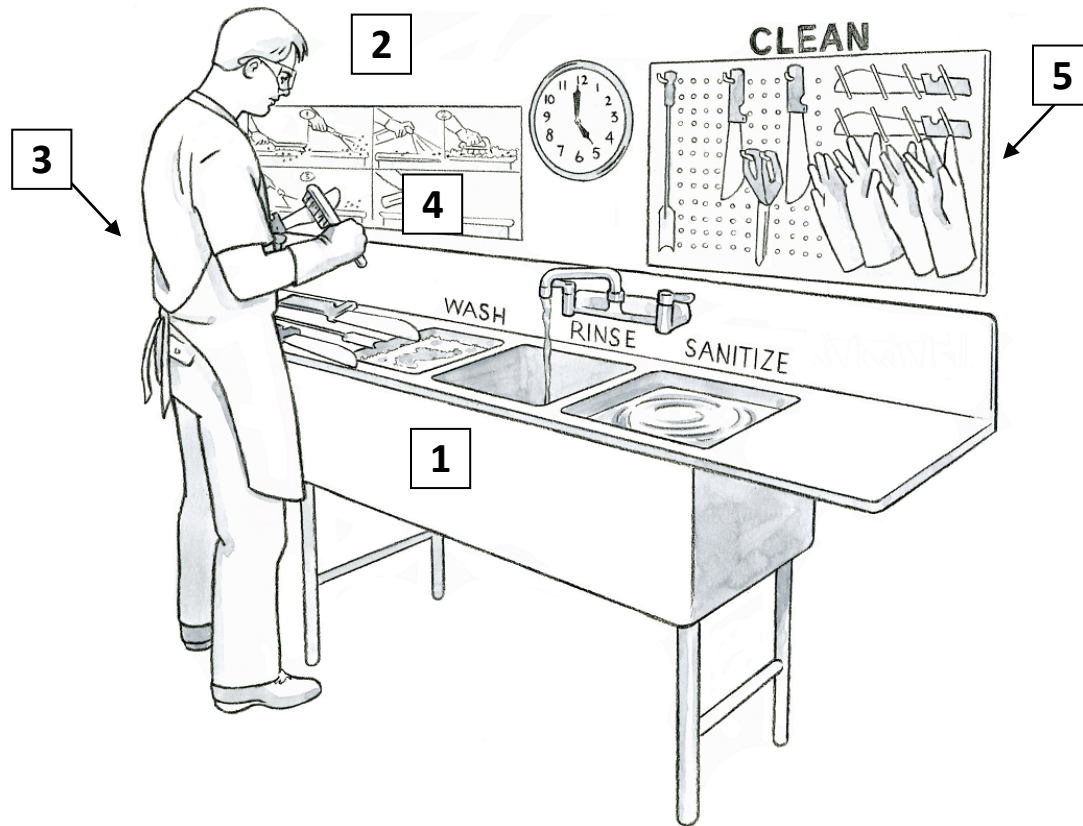
- Module 6: Postharvest Handling and Sanitation after Slide 9 or in several other areas in Module 6

#### **Supporting Resources**

- University of Vermont Extension Ag Engineering—[Planning an Efficient and Safe Wash/Pack Area](#).



## Cleaning and Sanitizing Tools Illustration Guide and Teaching Notes



### Key Teaching Points

In this illustration, small harvest tools are being cleaned and sanitized at the end of the workday. The numbers below align with key teaching points in the above illustration.

1. A worker is scrubbing a harvest knife with a brush in front of a three-section sink labeled "Wash", "Rinse" and "Sanitize". The "Wash" basin has soapy water to help clean the tools. The "Rinse" basin uses running water to rinse off soap and dirt, resulting in clean tools. Lastly, the tools are immersed in a sanitizer solution in the "Sanitize" basin before hanging to dry. The FSMA Produce Safety Rule (PSR) § 112.123(d)(1) requires that all food contact surfaces, including harvest tools, be inspected, maintained, cleaned, and when necessary, sanitized.
2. A poster demonstrating the four-step cleaning and sanitizing process is hanging above the sink as a visual reference for the worker so they know how to properly complete the task. The FSMA PSR §§ 112.21 and 112.22 requires training for those that handle food contact surfaces including requirements for inspecting harvest equipment.
3. The worker is wearing Personal Protective Equipment (PPE), including protective glasses, gloves, and an apron, to protect him from the sanitizer.

4. Specialized cleaning tools are being used to scrub the harvest tools. This worker is specifically using a small brush to ensure the crevices between the knife blade and handle are cleaned. According to the FSMA Produce Safety Rule Draft Guidance, “food contact sources should be visually assessed for remaining residues, such as visible soil, food residue, grease, or other material” (page 98).
5. Dirty harvest tools, not yet cleaned, are on the left of the sinks to ensure clean tools are separated from dirty tools. Clean tools and gloves are hanging to dry on the pegboard above the sink. Note that everything has a designated place, including a labeled pegboard to hang clean tools to dry.

**Relevant FSMA PSR Provisions**

- § 112.21
- § 112.22
- § 112.123(d)(1)

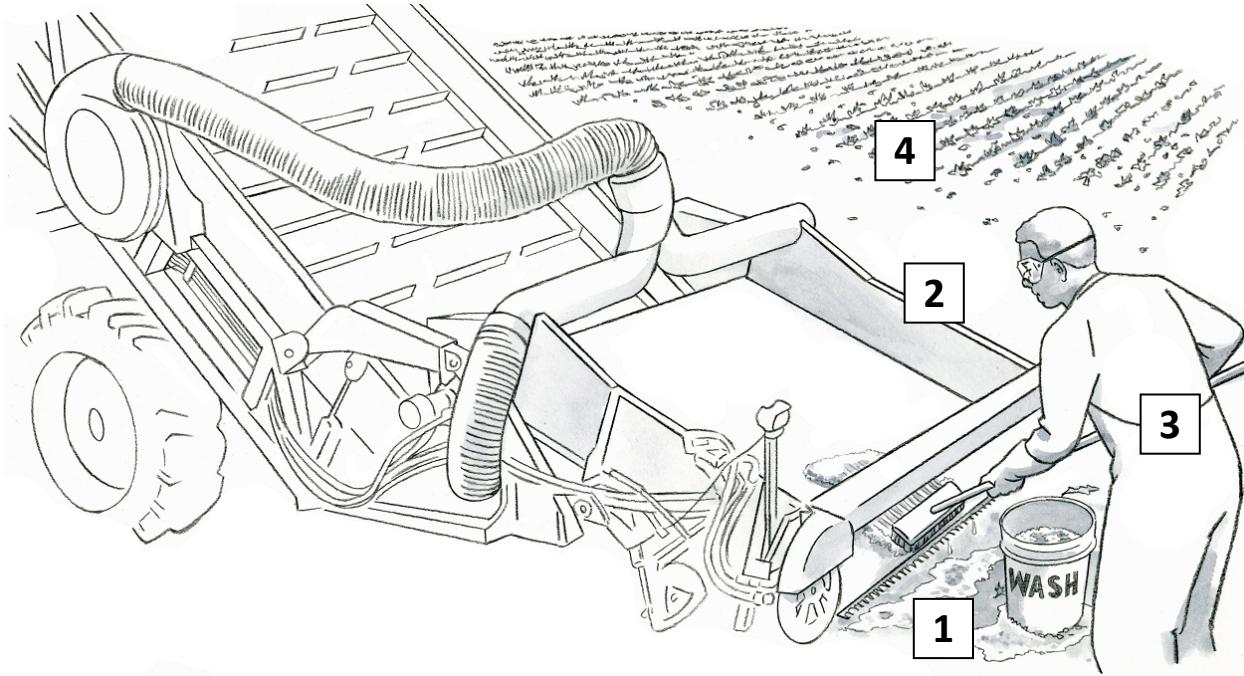
**Suggested for Use in PSA Grower Training Version 1.2**

- Module 6: Postharvest Handling and Sanitation after Slide 21

**Supporting Resources**

- Produce Safety Alliance—[Cleaning vs. Sanitizing](#).
- FSMA PSR—[Draft Guidance](#).
- Produce Safety Alliance—[Records Required by the FSMA PSR](#).

## Harvest Equipment Sanitation Illustration Guide and Teaching Notes



### Key Teaching Points

In this illustration, a worker cleans a leafy greens harvester using a long-handled scrub brush and foaming detergent. The numbers below align with key teaching points in the above illustration.

1. The long handle of the scrub brush allows the worker to reach and clean all areas of the harvester. The foaming detergent ensures that the cleaner comes into contact with crevices in the harvester, including corners and conveyor belt. The FSMA Produce Safety Rule (PSR) requires that all food contact surfaces, including harvest tools, be inspected, maintained, cleaned, and when necessary and appropriate, sanitized (§ 112.123(d)(1)).
2. After cleaning, the worker or a supervisor will visually assess the harvesting equipment “for remaining residues, such as visible soil, food residue, grease, or other material” (FSMA Produce Safety Rule Draft Guidance, page 98). In this case, additional soil and leaf matter.
3. The worker is wearing Personal Protective Equipment (PPE), including protective glasses, gloves, and an apron, to protect him from the foaming detergent.
4. Grey water, such as the water used to wash the harvester, must be properly disposed of so that it does not contaminate food contact surfaces and other areas used for covered activities (FSMA PSR § 112.132). In this scene, the risk of contamination is low because this lettuce field has already been harvested. If the lettuce field were not yet harvested, the worker would need to ensure that the grey water does not come into contact with covered produce or areas used for covered activities.

**Relevant FSMA PSR Provisions**

- § 112.123(d)(1)
- § 112.132

**Suggested for Use in PSA Grower Training Version 1.2**

- Module 6: Postharvest Handling and Sanitation after Slide 21

**Supporting Resources**

- Produce Safety Alliance—[Cleaning and Sanitizing](#).
- FSMA PSR—[Draft Guidance](#).
- Produce Safety Alliance—[Records Required by the FSMA PSR](#).

## Packinghouse Sanitation - Dry Cleaning Illustration Guide and Teaching Notes



### Key Teaching Points

In this illustration, workers in a garlic factory demonstrate the three steps to cleaning and sanitizing a packing line using dry cleaning techniques. Dry cleaning is often performed in operations that handle foods that are already dry and have low water activity. It can also be used in facilities that have difficulty properly managing water. Food contact surfaces (zone 1 surfaces) must be inspected, maintained, cleaned, and, when necessary and appropriate, sanitized. Review the requirements in the FSMA Produce Safety Rule (PSR) §§ 112.123(d)(1) and (d)(2). Please note, this illustration includes all these steps happening simultaneously but in normal circumstances, they would be separated by time. The numbers below align with key teaching points in the above illustration.

1. Pre-cleaning is the first step of the dry-cleaning process. The purpose is to remove any obvious dirt and debris from the food contact surface. In the illustration, the worker is using a vacuum to remove the garlic wrappers and debris. Brushes, scrapers, and air blowers can also be used.



2. The second step of dry-cleaning is cleaning, as shown by the worker wiping down the conveyor belt. This can be done by scrubbing the surface to remove all soil from the surfaces. A food-grade alcohol-based detergent, dry or low-moisture steam, or pelletized CO<sub>2</sub> can be used instead of water-based detergents for this step.
3. Lastly, the third step is sanitizing with a sanitizer approved for food contact surfaces. One option, shown in this illustration, would be spraying the surface with a high-percentage isopropyl alcohol and letting the surface dry.

**Relevant FSMA PSR Provisions**

- § 112.123 (d)(1)
- § 112.123 (d)(2)

**Suggested for Use in PSA Grower Training Version 1.2**

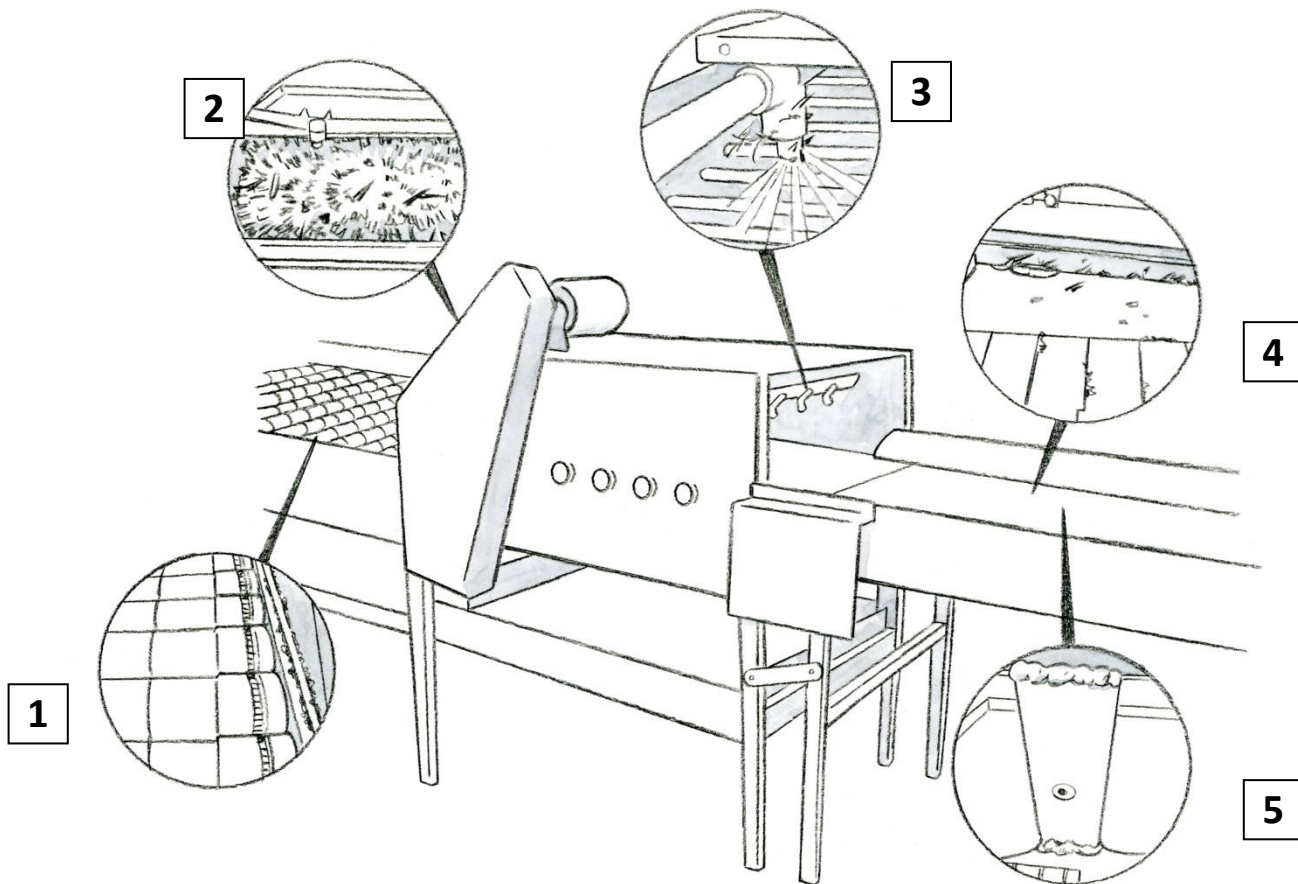
- Module 6: Postharvest Handling and Sanitation after Slide 21

**Supporting Resources**

- Cornell University Institute for Food Safety—[Cleaning – Wet and Dry Cleaning \(Part 2\)](#).

## Sanitation Challenges - Hard to Clean Equipment

### Illustration Guide and Teaching Notes



#### Key Teaching Points

The sanitation of postharvest washing and packinghouse equipment is critical to minimizing cross-contamination of fresh produce. Not all equipment that produce contacts, directly or indirectly, has been built with principles of sanitary design in mind. Ideally, materials used in the construction of equipment should be non-porous and easy to clean. According to FSMA Produce Safety Rule (PSR) § 112.123 equipment must be adequate in design and construction to enable them to be adequately cleaned and maintained. The illustration shows a piece of small-scale produce washing equipment. Five call-outs show areas that are challenging to clean and where potential harborage sites may exist for microbial pathogens. Each area is described below. The numbers below align with key teaching points in the above illustration.

1. Rollers. Diverse materials are used to construct rollers. Occasionally foam-based rollers and bumpers are used to prevent produce from getting damaged during movement along the line. If the foam is not closed cell, it could absorb water, providing moisture to support bacterial survival and serve as a source of contamination.
2. Brushes. Often used to remove debris and soil from produce, brushes have the potential to trap debris that could harbor microbial pathogens and are notoriously difficult to clean. In

many cases, brushes are not easily removed from the equipment for cleaning and sanitation but effort needs to be expended to ensure brushes are properly cleaned to reduce food safety risks.

3. Spray nozzles. Water from spray nozzles will directly contact the produce so it is important that they be cleaned and well maintained. It is not uncommon for dirt and debris to build up on nozzles, so equipment cleaning Standard Operating Procedures (SOPs) should include cleaning the spray nozzles.
4. Equipment walls and conveyors. Produce will directly contact the side walls and conveyor belts of equipment, therefore sanitation of these surfaces is a high priority. Pay particular attention to areas where a conveyor may have bends or corners where debris could build up. Some conveyors are solid belts, while others are made of metal linked together. Depending on the type of conveyor belt, sanitation practices may be different which is why it is important to develop an SOP and train all workers on cleaning practices and expectations.
5. Equipment joints and welds. Joints and improper welds are a great place for microbial pathogens, both human and plant, to hide. Welds should be smoothly bonded and joints rounded wherever possible. Sanitation programs should focus on ensuring debris build-up is removed from these areas.

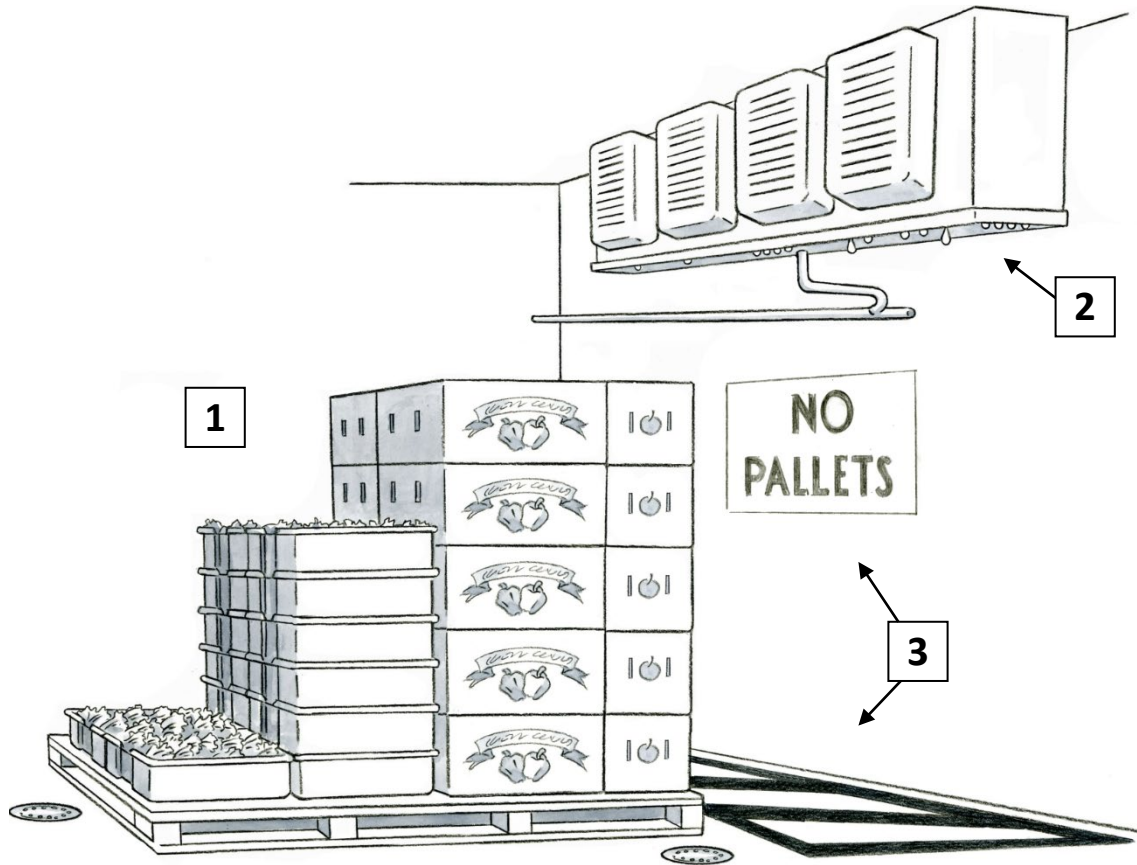
#### **Relevant FSMA PSR Provisions**

- § 112.123

#### **Suggested for Use in PSA Grower Training Version 1.2**

- Module 6: Postharvest Handling and Sanitation after Slide 24

## Food Safety in Packinghouse Coolers Illustration Guide and Teaching Notes



### Key Teaching Points

In this illustration, a pallet of assorted produce crops (leafy greens, peppers, and apples) is stored in a cooler. The numbers below align with key teaching points in the above illustration.

1. The pallet holds the boxes and trays off the ground, away from any moisture accumulating on the floor. The floor drains will also help minimize water pooling on the ground. FSMA Produce Safety Rule (PSR) § 112.123 establishes requirements for equipment and tools, including coolers. Recommendations for cold storage areas are provided in Module 6 Slide 30.
2. Small droplets of water are shown on the bottom of the condenser unit in the cooler. This condensate could carry pathogens, such as *Listeria monocytogenes*. The FSMA PSR § 112.126(b) requires measures be taken to prevent contamination of produce and food contact surfaces from drip or condensate.
3. Black diagonal lines painted on the floor and a "No Pallets" sign on the wall indicate that the produce should not be stored under the condenser unit. These measures will minimize contamination.

Additional discussion topics related to food safety in packinghouse coolers:

- Thermostats, thermometers, and other cooler controls are not shown in the illustration, however FSMA PSR § 112.124 requires that instruments used to measure, record, and regulate temperature be kept accurate and precise, be maintained, and be adequate in number.

#### **Relevant FSMA PSR Provisions**

- § 112.123
- § 112.124
- § 112.126(b)

#### **Suggested for Use in PSA Grower Training Version 1.2**

- Module 6: Postharvest Handling and Sanitation after Slide 30