



## Produce Safety and On-Farm Flooding

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Severe weather conditions in March 2021 brought torrential and sustained rains across the state, totaling more than 20 inches over a 72-hour period in some locations, according to the NOAA National Weather Service. These rains caused destructive flooding, substantial property damage, and crop loss. In addition to the immediate danger to human health and safety, flooding can also negatively impact farm food safety. After a flood, it is critical to be aware of the food safety risks that can impact crops during clean-up and recovery.

### Why is flooding a concern for produce safety?

While flooding in actively growing fields may occur from an irrigation issue or heavy rain, the type of flooding growers should be concerned with are those from water runoff via streams, irrigation ditches, gulches, and other bodies of water. Flooding from runoff is of particular concern because this floodwater serves as a vehicle that transports off-site and unknown contaminants onto the farm as the water moves. During a flood, crops may become partially or completely submerged by floodwater that can carry microbial pathogens, chemicals, and other contaminants, which pose serious risks to human health. Although not submerged, edible portions of crops that are above floodwater (e.g. hanging fruit) may still be directly contaminated by splashing or other means. **If any edible portion of a crop has been exposed to floodwaters, they are then considered to be adulterated under the Federal Food, Drug, and Cosmetic Act and should not enter human food channels, meaning that they cannot be used or sold as food.**



Photo: A flooded crop field

## **Types of Contaminants in Floodwater**

Contaminants in floodwater depend on the surrounding land use and activities upstream and can pose serious risks to human health. Both chemical and microbial contamination may exist in floodwaters. Microbial contamination includes bacteria, parasites, and viruses, and may originate from feces and areas with wild animals (e.g. feral pigs, deer, and chickens), livestock farms, stables, kennels, and residential pets. Septic systems and cesspools may also be sources of microbial contamination. Chemical contaminants may come from one's own farm, neighboring farms, residential areas, and commercial areas and can include fuels, oils, lubricants, heavy metals, pesticides, fertilizers, detergents, and other chemicals.

### **When cleaning up fields and disposing of affected crops, here are some useful practices to promote food safety:**

- Protective clothing should be used when working in adulterated fields (e.g. gloves and rubber boots) and should be discarded or cleaned and sanitized after use
- Ensure that adulterated crops are kept separate from clean, unadulterated crops by clearly identifying and segregating each type to prevent cross-contamination and co-mingling
- Clean and sanitize tools, bins or baskets, and equipment before use with unadulterated crops
- Properly wash hands and change gloves (if using gloves) after handling adulterated crops and before handling any unadulterated crops
- Remember that boots and shoes may track contaminated soil and water from flooded areas into produce handling areas and fields

## **Harvesting Crops**

There is no practical way to recondition the edible portions of adulterated crops that will provide reasonable assurance of food safety for human consumption, neither by disinfecting, sanitizing, cooking, or processing. These crops will still be considered adulterated, regardless of how it may be washed or processed post-harvest. *For crops with edible portions that were not directly contacted by floodwater*, growers should carefully consider the level of risk that is associated with harvesting a crop, including the potential to create a foodborne illness event that may affect consumer wellbeing and confidence in locally grown produce. To do this, growers should conduct a risk assessment to evaluate the safety of the crop. Risks to consider may include the following:

- Floodwater and what upstream contaminants may be present
- Type of crop and its stage of growth
- Likelihood for crops to absorb or internalize contaminants from floodwater or soil
- Degree and duration of exposure to flood waters that includes the depth and time the water was present in the field, how quickly the soil began to dry out after the water receded, and whether the conditions may have exposed the crop to prolonged periods of moisture to foster fungal, mycotoxin or mold growth

*If the edible portions of crops were not developed at the time of the flooding,* it may be possible to allow the crop to mature. It is important to be aware that edible portions of crops may be developing when pathogens may still be present and cross-contamination would still present a risk if soils were flooded. If crops that contact the ground, such as leafy greens, germinate after waters have receded, they should not be sold because they are considered high risk. These crops would be in direct contact with flooded soil as they mature and may become contaminated. Crops that are commonly eaten raw carry the greatest risk of foodborne illness because there is no kill-step like cooking to 135°F to destroy microbial pathogens. Plants that did not have any fruit at the time of the flood (e.g. tomato, eggplant, beans) and crops contacting the ground that did not yet develop edible portions (i.e. cabbage, broccoli, etc.) may be allowed to continue to maturity and harvest after conducting a risk assessment. If any heads (e.g. cabbage, head lettuce) started to form prior to the flood, they must not be harvested and sold as human food. A buffer zone of 30 feet is recommended between flooded areas and areas to be harvested for human consumption. This buffer area provides enough space for farm equipment to turn around, preventing cross contamination.

### **Replanting in Flood-affected Fields**

A 60-day waiting period is recommended, but there is no required length of time. The choice is up to the grower to decide when the risk is low enough to replant. The longer one can wait before replanting the better, as pathogenic microbes naturally die-off over time within the environment.

For more information, please visit these online 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](#) [Produce Safety Alliance: Food Safety for Flooded Farms](#)

If you have questions about farm food safety, please contact your Extension Agent.

### **Key Points**

- ⇒ Discard produce if the edible portions of the crops came in contact with floodwaters. These crops are considered adulterated by the FDA and cannot be used or sold as food
- ⇒ Edible portions of crops cannot be salvaged by washing, using a sanitizer, peeling, or cooking. They will still be considered adulterated by the FDA
- ⇒ Prevent cross-contamination between affected crops and non-affected crops by separating and proper cleaning and sanitizing
- ⇒ Before harvesting any crops that were not directly contacted by floodwater, conduct a risk assessment to evaluate the safety of the crop



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