

Managing Food Safety Hazards in Flooded Vegetable Gardens

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It is difficult to know exactly what is in the flood waters that ravage communities, especially since the water is flowing in places where it was not expected to be. Aside from the standard level of pathogens or contaminants that may be in the water, there could be additional contamination from sewage systems, manure storage, industrial chemical storage, pesticide or fertilizer storage, and more. Due to all the unknowns in regards to flood water, gardeners and produce growers should exercise caution in flooded gardens, even when flooding occurs outside of the active growing season.

Food Safety Hazards- A Waiting Game

For the most part, the biggest risk from flooding in garden areas is the potential of food borne illness from pathogens such as *E. coli*, *Salmonella*, and others. Food safety hazards are a concern for all individuals, but are especially worrisome for those with compromised immune systems, the elderly, pregnant women and young children.

Even when flooding occurs outside of the normal growing season, there should be a waiting period between when the flood waters recede from the garden/field and when produce is harvested to minimize human pathogen risks. Plants may be sown or planted in the garden during the time period, but produce should not be harvested until after the waiting-period has ended. Exposure to the solar energy from the sun can help reduce pathogens exposed to the environment, but keep in mind that some pathogens can persist in the soil for several years.

In this instance, the recommendation comes from food safety best practices for farmers relating to the application of manure, which are based on standards from the National Organic Program. Research shows that the health risk from non-composted manure is higher than the risk from flood waters, so this recommendation is usually considered a good starting point for flood garden safety decision.

The recommendation depends on whether or not the crop comes in contact with the soil. **For crops that do not have direct contact with the soil, such as tomatoes, peppers, beans, etc. the waiting period between flooding and harvest should be at least 90 days. For crops that do have direct contact with the**



The remains of a tomato crop after a flood.

soil, such as lettuce and leafy greens, pumpkins, and root crops such as potatoes and carrots the waiting period should be at least 120 days. If the crops that don't typically make contact with the soil are allowed to make contact, like tomatoes that aren't staked, the 120-day recommendation should be followed. Harvests from perennial food plants, such as rhubarb, asparagus, strawberries, fruit trees, bushes, or brambles should also be subject to the waiting period. Any edible portions maturing before the end of the waiting period should be removed and discarded.

Food Safety for Actively Growing Gardens

In cases where flooding occurs in actively growing gardens and fields, any produce that is touched by flood water should be removed and destroyed. There is no method of preparation that can reduce or remove the hazards associated with direct contact of flood waters on produce.

While the safest practice would be to discard all plants and produce from a flooded garden, there are some steps that home gardeners can take to salvage produce from areas of the garden that were not covered with flood water. The following criteria should be met before salvaging produce:

- **the plants were in an area of the garden that was not covered with flood water,**
- **the edible parts of plants will ripen/mature at least a few weeks after the flood**
- **AND were not touched by splashing water.**

Flood waters can create food safety risks from produce grown in flooded gardens, even after flood waters have receded. The following are minimum recommended practices for evaluating and managing risks.

DISCARD PRODUCE TOUCHED BY FLOOD WATER

There is no method to eliminate pathogen or chemical contamination from flood waters to assure that produce is safe. Discard any edible plant parts that have been touched by flood water.



WAITING PERIOD TO HARVEST

In areas of gardens covered with flood water, a minimum waiting period should be observed between flood and harvest. **Crops may be planted during the period, but should not be harvested until the waiting period has passed.**

90 Days Edible portions **do not** come in direct contact with soil
Examples: corn, beans, peppers, tomatoes (staked), cucumbers (trellised)

120 Days Edible portions **do** come in direct contact with soil
Examples: lettuce, leafy greens, potatoes, carrots, pumpkins, watermelon

If flooding occurs early in the season, you may be able to remove any edible portions present during the flood but save the plant for harvests after the waiting period if it is a:

- Perennial crop plants like rhubarb, asparagus, fruits, and berries
- Annual crops like tomatoes and peppers that still have a long period left in the growing season when flooding occurs early in the season

SALVAGING PRODUCE FROM NON-FLOODED AREAS OF THE HOME GARDEN

Removing all produce present during the flood is recommended to minimize risk, but some gardeners may wish to salvage produce from non-flooded areas of the garden. To do so you must be certain that:

- plants were in a non-flooded area of the garden
- the edible parts will mature at least a few weeks after the flood
- were not touched by splashing water

All salvaged produce must be cooked to reduce possible pathogen contamination. All crops generally consumed raw must be discarded. Thoroughly rinse all produce with cold water. Produce may be soaked in a dilute bleach (2T/gallon of water) and rinsed for further reduction of potential pathogens.

According to federal food safety guidelines and due to potential liability this process is not recommended for produce farmers. Farmers should remove and discard all produce.

Any edible portion of the plant that is mature at the time of flooding or within a few weeks should be discarded. The following recommendations are for salvaging immature produce affected by floodwaters in home gardens. **For produce farmers affected by flooding in crop fields, food safety recommendations state that no produce should be harvested from flooded fields and sold (until after the waiting period has passed), even from areas of the garden that were not covered with flood water.** The risk and liability is too high. In many instances, farm insurance or federal assistance can help cover crop losses.

First, discard any crop plants that are consumed raw, such as leafy greens. There is no way to properly clean the produce and remove all of the contamination and there is no way to know if any flood waters splashed on the non-submerged parts. Any soft fruits, such as berries or tomatoes should be discarded if they cannot be cooked or peeled or if you think there could be chemical contamination.

If the edible portion of the plant was not touched by flood water, you may be able to harvest it and cook it for consumption. Thorough cooking can destroy aerobic food borne pathogens, but does not destroy chemical or industrial contaminants. If you feel that there could be such contamination in the water, all produce should be discarded and plants destroyed. Prior to cooking, any produce that is salvaged from flooded garden areas should be completely washed with cold tap water. Discard any damaged produce. This is a good recommendation for any garden, but it is especially important the season following a flood. Do not use soap, however you can soak produce in a dilute bleach (2 Tbsp per gallon of water) for two minutes then rinse again with cold tap water.

Potential contamination can also depend on how mature the plant is at the time of flooding and what part of the plant is covered by floodwater. For example, if a tomato plant is covered by floodwater but that tomato plant doesn't currently have tomatoes on it, future tomatoes growing on that plant could be considered safe after the 90-day waiting period has passed. But remember, when in doubt, don't risk it. If you are unsure about the safety about any garden produce, remove and destroy all plants.

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