Guidance for Harvesting Produce Affected by Flood Waters for Human Consumption (Version 2, 15 February 2023)

This guidance is for commercial produce growers following flooding events. The guidance has been developed by New Zealand Food Safety (NZFS) based on international guidance, scientific evidence, and best practice. The guidance follows a precautionary approach, with NZFS acting with caution where there is uncertainty about the effects of taking a particular course of action – in this case, flooding.

The guidance applies to produce affected by flood waters (immersion or contact), not product directly damaged by rainfall. Produce that has been damaged by rain and has not come into contact with any flood water should be safe to consume.

Sources of Contamination

1. Flood waters may be contaminated by sewage, dead animals, decaying plants, chemical contaminants such as pesticides, heavy metals, petroleum products and may harbour pathogenic microorganisms, and physical contaminants such as glass and debris.

2. The level of contamination in flood water is an important factor and will vary depending on contamination source (i.e., it can originate from sewage, animal excrement, leaks from septic tanks, etc.). This can result in a high, or very high concentration, of pathogenic microorganisms.

3. Similarly, chemical contamination is an important factor to consider when harvesting flood-affected produce. Chemical contamination can come from leaks from submerged farm and personal vehicles (petrol, oil) or other mechanical equipment, pesticides stored by nearby farms or by individuals, buried farm waste, chemical dumps, petrol stations and any industrial factory or manufacturing plant.

4. During a flooding event, contamination will be widespread. In some cases, all product will be affected, especially when the field has been submerged, even for short periods of time.

Risk Assessment

Risk assessments ensures actions to help reduce the incidence of foodborne illness.. Consider the following factors when determining whether flood-affected produce is safe to consume:

1. Flooding of a produce crop can represent a major increase in risk compared to the normal risks that exist during production and harvest.

2. A large range of contaminants (microbiological and chemical) could be present in the flood water. Therefore, testing is not feasible or possible. If growers aren't sure as to whether the flood water is contaminated, produce should not be harvested for consumption.

3. Can you identify the exact source of contamination? It may not be possible to identify these, as there are likely to be multiple sources.

4. Contaminants can be carried over an unknown distance and can still pose significant risk of contamination to the crop. Contamination risk also depends on the type of contaminant, water flow rate, strength of the flow, volume of water, nature of the debris being carried away, etc.

5. Growers that have robust evidence and expert advice that justifies harvesting a flood-affected crop for human consumption should still consider the degree of risk. For example, growers that can identify the type and level of contamination for a particular crop and specific production area must still consider run-off from neighbouring properties and other contamination sources, etc.

6. The risk of crop being affected by contaminated flood waters is much lower in areas that are situated on elevated points, with no physical and geographical possibility of submersion by river water or run-off. In such cases, a submerged field could only be from pooled rainfall water and the risk would be negligible.

7. If the edible parts of a fruit or vegetable crop have <u>not</u> been in contact with flood waters, then growers should consider how the crop could be harvested and consumed, and the risks associated with that decision. The risk assessment should consider:

    - The type of crop
    - The stage of growth
    - The distance between the edible parts of the crop and the flood affected soil.
    - The potential development of moulds and subsequent production of mycotoxins after the crop has been harvested – especially during storage, when fruit and vegetables have been exposed to prolonged periods of moisture.

8. If the degree of contamination cannot be determined based on the points above, growers are advised to err on the side of caution and assume that flood waters are contaminated, and therefore, that the produce is contaminated. Produce that has been in contact with

flood waters should not be harvested for consumption and needs to be appropriately disposed of.

Managing Food Safety Risk

The following steps should be considered to ensure produce is safe for consumption

Edible portion of crops that have been in contact with flood waters:

1. All mature crops (ready to be harvested), that have been in contact with flood waters should not be harvested/consumed and should be destroyed. This applies to all types of crops, fruit and vegetables, vine and tree fruit, surface crops, underground crops, and produce with or without a skin or shell.

2. There is no practical method of reconditioning the edible portion of a crop that will provide a reasonable assurance of human food safety. While peeling and cooking will reduce the level of contamination, there is no certainty it would be sufficient.

3. Cooking and cleaning does not remove or reduce chemical contamination of a crop, therefore produce that is known to be contaminated and in contact with flood water should be disposed of.

4. There is no method ensuring that contamination could be removed by washing the produce. Leafy greens such as lettuce or spinach contain ridges and crevices. Such crops which have been submerged in flood water or have had edible portions of the crop come into direct contact with flood waters, cannot been properly cleaned. In such cases, the crop should be disposed of.

5. Mature underground crops (ready to be harvested) should be discarded if they are in a field that has been submerged by flood waters. However, underground crops, such as beets, carrots, and potatoes, that are still early in their growth (with at least 4 weeks before they are due to be harvested) can be grown to maturity and harvested.

6. Alliums, including onions, that are still in their early growth with at least 4 weeks growth can also be harvested.

Edible portion of crops not in direct contact with flood waters:

7. Edible crops that did not come into direct contact with flood waters can be harvested two weeks after the flood event. This includes all types of fruit and vegetables, vine, and tree fruit. Discard any that are soft, cracked, bruised, or have open fissures where contamination may have entered.

Consideration of additional food safety measures:

1. Extra precautions should be taken to ensure that produce directly affected by flood waters does not mix with or cross contaminate produce that is deemed 'safe to eat':

    - A 10-meter buffer zone between flooded and non-flooded fields could be considered as a tool to prevent cross-contamination

    - Growers should also consider the possibility of cross contamination from hands, utensils, and equipment. Extra precautions need to be taken – such as growers, packers and everyone in the supply chain washing hands, sanitising equipment and utensils and maintaining high levels of cleaning – to avoid the spread of potentially pathogenic microorganisms from the affected produce to other food products

    - Undertake a risk assessment of the water used for irrigation, washing and other packing operations – especially when this water is sourced from surface water, or wells, or any source potentially affected by the flooding event

      Growers should consider working with retailers to provide consumers with information on washing or peeling of fruit and vegetables to further reduce food safety risks.

Testing produce

1. Growers may consider testing produce that has not come into direct contact with flood waters to help them with their risk assessment. Testing will only be valuable in scenarios where there is knowledge of what contaminant(s) will be tested for, or the absence thereof, in order to give confidence that the produce tested is free of that particular contaminant (e.g., specific pesticide from a nearby farm).

2. Growers should be aware that testing for *E. coli* and/or *Salmonella* may not be sufficient to ensure that their produce is safe to eat as a large range of diverse contaminants may be present, and *E. coli* may not be a good indicator to signal their presence. Furthermore, a robust, often prohibitively comprehensive and expensive, sampling plan would need to be considered to provide the desired assurances.

If you have further questions, please email food.compliance@mpi.govt.nz or call 0800 00 83 33 and ask for Food Compliance.

References:

US FDA - Guidance for Industry: Evaluating the Safety of Flood-affected Food Crops for Human Consumption – October 2011, last reviewed 17/09/2018
University of Wisconsin-Extension - Safely Using Produce from Flooded Gardens.
University of Vermont Extension – Frequently asked questions about handling flooded produce. Revised July 10, 2013