

Good Agriculture Practices for Sprouts

Western Kentucky University



General Commodity Information

Sprouts are a common fresh produce to be consumed raw. Sprouts are used to add flavor to complex foods like salads, soups, and other dishes. Additionally, sprouts contain a wide variety of essential nutrients. However, unless proper equipment and procedures are used to grow sprouts, microbial contamination can easily occur. The FDA recommends the sprouts should always be cooked before consumption. Furthermore, the FDA advises that sprouts should not be consumed by the very young, the very old, or anyone with a compromised immune system.

Harvesting Considerations

Growers should clean and sanitize any surfaces that sprouts may come into contact with, and growers should always wash their hands before and after handling the plants. After germination, sprouts should be handled carefully. Growers should not touch sprouts directly with bare hands, but instead use sanitary disposable gloves. Adequate sanitary facilities and bathrooms should be provided to all workers so that handwashing can be performed adequately. Workers who are sick or exhibit symptoms of sickness should be excluded from handling sprouts. When the sprouts are packed and prepared for transport, food grade packing materials should be used, and lot/batch numbers with grower's contact information should be placed on packaging. If sprouts are stored after harvest, they should be stored at a temperature of 41°F/5°C or less, although 32°F/0°C is ideal.

Foodborne Illness Outbreaks

Sprouts present a unique risk to consumers, because they require humidity and warmth to grow. These same conditions are ideal for pathogens such as *Salmonella*, *Listeria*, and *E.coli* O157:H7. Bacteria can internally infect seeds and multiply to high levels during sprouting. In one notable outbreak in 2009, *Salmonella* Saintpaul in alfalfa sprouts sickened 235 consumers in 14 states. A 1996 outbreak of *E.coli* in Japan from sprouts sickened 10,000, primarily students and teachers who consumed the sprouts in school meals. 12 of the sickened consumers later died. With more than 30 foodborne illness outbreaks occurring from sprouts between 1996 and 2009, alfalfa sprouts are a produce of concern to small-scale farmers.

Bacteria	Year	Food Vehicle	Location	States Affected	Illnesses	Deaths
<i>Salmonella</i>	2014	Sprouts	US	11	115	0
<i>Listeria</i>	2014	Sprouts	US	2	5	2
Non-O157 STEC	2014	Sprouts	US	5	19	0

Table 1. Selected Foodborne Illness Outbreaks Attributed to Sprouts, 2014 (Outbreak Database, 2015)

Cooling and Storage Conditions:

Immediately after harvesting, sprouts should be cooled to 32 °F, or 0 °C. Sprouts are an extremely perishable raw agricultural commodity and should be sold and consumed within 10 days of harvest. Hydro-cooling, forced-air, and vacuum cooling are permissible, but misting is not.

Produce	Optimal Storage Temp., °C	Optimal Humidity (%)	Cooling with top ice acceptable	Cooling with water sprinkle acceptable	Ethylene Production	Ethylene Sensitivity to	Storage Life
Sprouts	0	95-100	No	Yes	Minimal	N/A	5-10 Days

Table 2. Storage and Cooling Conditions for Sprouts (DeEll, 2014)

Good Agriculture Practices

- Sprout producers should conduct microbiological testing of spent irrigation water from each production lot to ensure that contaminated product is not distributed.
- Any workers who handle sprouts should routinely wash hands and/or use disposable sterile gloves.
- During seed treatment, prior to sprouting, seeds should be cleaned with water which has been tested for microbial quality.
- Just prior to sprouting, seeds should be subjected to one or more treatments that can effectively reduce or eliminate pathogenic bacteria (e.g. 20,000 ppm calcium hypochlorite).
- Raw materials and other ingredients should be inspected upon receipt to ensure they are clean and suitable for processing into food. Bags of seed which have been contaminated with rodent urine will glow when viewed using a blacklight.

Pathogenic Behavior in Commodity

Growing conditions contribute to the risk of microbial contamination in sprouts. Pathogens can enter sprout seeds through small cracks, contaminating the interior. To sprout and grow, sprout seeds require a combination of humidity and warmth comparable to ideal growing conditions for harmful bacteria. Consequently, sprouts often harbor pathogens which grow internally in the plant and are later consumed with the produce. According to the FDA (2015), contaminated seeds are responsible for the vast majority, if not all, of foodborne illness outbreaks attributed to sprouts. Microbial contamination of sprouts is difficult to eradicate, however, as pathogens can endure months of dry storage, which is common for sprout seeds.

References

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