

MUSHROOMS

PRODUCE SAFETY REGULATIONS FOR CULTIVATED AND WILD FORAGED MUSHROOMS

Cultivated and wild foraged mushrooms are considered produce that is commonly consumed raw under the Produce Safety Rule. Therefore, mushrooms must comply with the standards for growing, harvesting, packing and holding of produce for human consumption within the Produce Safety Rule.

To determine if your mushroom operation is covered under the Produce Safety Rule regulations, determine your produce sales on average over the past three years, have an understanding of if you sell a majority of your produce to wholesalers/distributors or direct to the consumer, and then utilize the [FDA Coverage and Exemptions Flow Chart](#).

The Produce Safety Rule is a regulation that serves to implement the Food Safety and Modernization Act. The Produce Safety Rule regulations developed a "farm to fork" approach to food safety with a focus on preventing the spread of foodborne illness causing pathogens in fresh fruit and vegetable production.

FORAGING FOR WILD MUSHROOMS

Wild-foraged mushrooms are covered under the Produce Safety Rule. Foragers must follow the Produce Safety Rule standards for harvesting, packing, and holding fresh produce just as a mushroom cultivator would.

In North Carolina, to sell wild foraged mushrooms to a retail food establishment, it is the responsibility of the wild mushroom forager and the food establishment to provide and maintain documented proof that the forager is an "approved mushroom identification expert" in accordance with Conference for Food Protections guidance document criteria, per the North Carolina Food Code.

Reach out to the [North Carolina Department of Health and Human Services](#) for more information on 'Wild Foraged Mushrooms in North Carolina Food Establishments.'

LEARN MORE ABOUT THE PRODUCE SAFETY RULE

Become more familiar with the Produce Safety Rule regulations by attending a [Produce Safety Alliance Grower Training Course](#) offered in collaboration with [NC State Extension](#). This is a one-day course that teaches the importance of produce safety practices, as well as the skills needed to implement those practices on your farm.

After completing the Produce Safety Alliance Grower Training Course, [request](#) a free educational [On-Farm Readiness Review](#) where someone from the NCDA&CS Produce Safety Program and someone from NC State Extension plan a visit to your farm where they will walk through your farm food safety practices with you.

MUSHROOM PRODUCTION AND FOOD SAFETY

The primary stages of the mushroom production cycle include phase 1 composting, phase 2 composting, spawning, spawn colonization, casing, case run, pinning, harvesting, packaging, storing, and transportation/sale. Produce safety practices that work to prevent the spread of foodborne illness causing pathogens in mushroom production are important at every stage in the cycle.



CONSIDER:

- Employee Health and Hygiene
- Handwashing
- Excluding Pests
- Water Safety and Quality
- Sanitary Handling of Harvest Tools and Containers
- Grow Room and Pack Room Sanitation
- Refrigeration Sanitation
- Packaging and Storage
- Record Keeping
- Processing Activities



NCDA&CS PRODUCE SAFETY PROGRAM

The Produce Safety Program within the North Carolina Department of Agriculture and Consumer Services is here to help you understand the importance of implementing produce safety practices when handling mushrooms.

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MUSHROOM PRODUCTION AND FOOD SAFETY



EMPLOYEE HEALTH AND HYGIENE

It is important that employees entering the mushroom grow room arrive to work clean and wearing clean clothes and footwear, remove or cover hand jewelry that can't be easily cleaned, do not eat, chew gum, or smoke around the mushrooms, notify their supervisor if they are ill, wash their hands properly before starting or returning to work, before putting on gloves, before and after eating and/or smoking, after using the toilet, after touching animals or animal waste, and any other instance where their hands might have become contaminated.



WATER SAFETY AND QUALITY

All agricultural water must be safe and of adequate sanitary quality for its intended use to prevent the contamination of the mushroom crop from the water being used. For example, pre-harvest agricultural water used for soaking grow logs, must be assessed annually to determine if that water is likely to introduce known or reasonably foreseeable hazards into or onto covered produce. Additionally, harvest and post-harvest agricultural water used for humidifying the grow room as well as cleaning hands, tools, work surfaces, and containers that the mushrooms contact must have zero generic *E. coli* per 100mL sample.



GROW ROOM, PACK ROOM, AND REFRIGERATION SANITATION

Mushroom grow rooms utilize humidity to manage mushroom quality, thus creating an environment where pathogens can thrive, such as *Listeria*. Therefore, prevent areas of standing water or condensation which can harbor *Listeria*. Also implement cleaning and sanitation practices on harvest utensils, growing shelves, and reusable packing containers to prevent cross-contamination. Mushrooms are typically refrigerated after harvest to provide a longer shelf life by decreasing rates of dehydration and spoilage. Proper maintenance is also important in refrigeration areas. Lastly, assess the food contact equipment to ensure the equipment itself is not a point of possible contamination in these areas.



TRAINING AND RECORD KEEPING

Workers must be trained appropriately for their job duties upon hiring with refresher trainings throughout the season, at least annually, or if a problem arises. These trainings should be in depth, easily understood, be supervised by a qualified person, and documented. All trainings should be provided in the worker's native language to ensure it is easily understood. Document the date of the training, the topic covered, and the names of the individuals trained. Additionally, keep records required for agricultural water, for compost treatment, and for cleaning and sanitizing.



EXCLUDING PESTS

Domesticated and wild animals as well as pests are a food safety concern because they can carry human pathogens in their excreta and, if they make their way into the mushroom grow room, they can spread those pathogens around as they move. Therefore, for fully-enclosed buildings, you must take measures to exclude pests from your buildings. Additionally, you must exclude domesticated animals from fully-enclosed buildings, such as mushroom grow rooms, where covered produce, food contact surfaces, or food-packing material is exposed.



SANITARY HARVEST AND HANDLING OF HARVEST TOOLS AND CONTAINERS

When harvesting mushrooms, it is important to do so safely as to not contaminate the produce with any pathogens of concern. Pathogens can be introduced to the produce through the environment, through human contact with the mushrooms, and through equipment is not cleaned and sanitized regularly. It is important for mushroom growers to visually assess the cleanliness of their harvest equipment, tools, and containers to determine an appropriate frequency of when they should be cleaned and sanitized. These items come in direct contact with the produce and are considered food contact surfaces.



PACKAGING AND STORAGE

Mushrooms have high rates of respiration; therefore, packaging must provide enough air flow to avoid speeding up the spoilage process. Additionally, low oxygen levels in packaged mushrooms are unsafe. **You must package mushrooms in a manner that prevents the formation of *Clostridium botulinum* toxin if such toxin is a known or reasonably foreseeable hazard. Therefore, do not use reduced oxygen packaging, such as vacuum sealing, to package mushrooms.** Do use cleanable packaging or packaging that is designed for single use that is unlikely to support growth or transfer of bacteria. Paper bags, parchment paper, and slotted clamshells are recommended.



PROCESSING ACTIVITIES

Drying/dehydrating of whole mushrooms falls under farm activities that must meet the regulations within the Produce Safety Rule. However, any cutting, slicing, dicing, grinding, brining, spice blending, marinating, canning, pickling, fermenting, tincture formation, capsule formation, etc. of mushrooms is considered processing that must meet the regulations within the Current Good Manufacturing Practice, Hazard Analysis, and Risk-Based Preventive Controls for Human Food. Reach out to the NCDA&CS Food Program at 984-236-4820 for more information on processing.