

Mushroom Good Agricultural Practices Program

**Industry-Wide Food Safety Standards for Fresh
Mushroom Growing, Harvesting, and Shipping**

2016

Applicable for all mushroom varieties

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**Introduction to the Mushroom Good
Agricultural Practices (MGAP)
Program**

Introduction

The Mushroom Good Agricultural Practices (MGAP) program provides a set of standards and procedures that mushroom growers can use to enhance and document safe mushroom growing practices. There are several types of commercially grown fungi each with their own unique growing procedures. Species include *Agaricus bisporus* (common white mushrooms, portabella, crimini), *Lentinus edodes* (Shiitake), *Pleurotus ostreatus* (Oyster), *Grifola frondosa* (Maitake), *Hericium erinaceus* (Pom Pom), and *Pleurotus eryngii* (Royal Trumpet). However, the guidelines in this document are broad enough to apply to each type of mushroom.

MGAP standards are consistent with current food safety guidelines for the fresh produce industry described in the Food and Drug Administration (FDA) document “Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables.” The following core principles for maintaining the safety of fresh mushrooms apply:

- Principle 1.** Prevention of food safety hazards is favored over reliance on corrective actions after a problem has occurred.
- Principle 2.** Mushrooms can become contaminated at any point between growing and shipping.
- Principle 3.** When animal manures or animal by-products are used to prepare growth substrate or casing soils, preparation and handling procedures shall be managed carefully to minimize the potential for microbial contamination of mushrooms.
- Principle 4.** Worker hygiene and field sanitation practices play a critical role in minimizing the potential for microbial contamination of mushrooms.
- Principle 5.** Water has the potential to be a source of contamination during mushroom growing and subsequent handling.

Mushroom growers who participate in the MGAP program agree to comply with each listed food safety standard. Growers further agree to develop and implement a written food safety plan that identifies and documents potential food safety hazards, hazard control measures, and monitoring and verification procedures. Guidelines for controlling potential food safety hazards and monitoring and verification procedures are provided under each standard.

Summary of Requirements

Growers *shall* provide evidence of procedures and policies in place for meeting each of the MGAP food safety standards. Records *shall* be made available upon request.

The following documents are required for an effective MGAP program:

1. Names and contact information for individuals responsible for developing and implementing the food safety plan;
2. Description of the type of products, how they are packaged, and intended use.
3. A flow chart that describes each step of the mushroom growing process; from raw material receipt to shipment of products.
4. Standard Operating Procedures (SOP) that describe hazard control measures, monitoring and verification procedures, and records for each of the 14 critical food safety areas identified in the MGAP standards.
5. Checklists that document compliance with the food safety plan including:
 - a. Daily Checklist
Conducted by a production supervisor or foreman during each harvesting operation. Documents adequate worker hygiene and that the facilities, equipment, tools, and containers are adequately clean for their intended purpose.
 - b. Verification Checklist
Completed at least 4 times per year by the Food Safety Coordinator or a designated individual. Reviews the condition, cleanliness, security of the grounds and buildings to verify that pre-operational checklists and inspection logs are regularly completed, and that corrective actions are taken when deficiencies are found.
 - c. Annual Checklist
Completed once per year by the Food Safety Team. Verifies the accuracy of the composition of the food safety team and contact information and that the farm layout diagram, toxic chemicals used, and water sources are accurate and up to date. SOPs are reviewed for their accuracy in documenting the food safety policies and practices in place on the mushroom farm. Product security, trace back, and training policies and procedures are reviewed for their effectiveness. The Food Safety Team also reviews verification checklists to verify they are complete and deficiencies are followed-up on.

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Mushroom Food Safety Standards, Goals, and Guidelines for Implementation

1) FOOD SAFETY PROGRAM DEVELOPMENT

The food safety plan provides evidence that the mushrooms are grown in a safe and sanitary manner. An effective plan documents procedures for controlling potential hazards, monitoring and verification activities, and requirements for corrective actions in the event a hazard occurs.

GOAL: A systematic and documented food safety plan that monitors and verifies compliance with safe mushroom growing practices

STANDARD 1.1	Each mushroom farm <i>shall</i> have a food safety plan that identifies and documents potential hazards, hazard control measures, and monitoring and verification procedures.
	<p>Guidelines:</p> <ul style="list-style-type: none"> • Document management plans or programs that describe information and procedures related to the food safety plan including, but not limited to: <ol style="list-style-type: none"> 1) Name, location, and contact information for each mushroom farm 2) Name and contact information of a designated food safety coordinator and food safety team members responsible for implementing and overseeing the food safety plan 3) Location and description of water sources and testing frequencies 4) Location and description of potentially hazardous chemicals stored on site 5) Standard Operating Procedures (SOP) for each of the 14 critical food safety areas
RECORDS	<ul style="list-style-type: none"> ▪ Standard Operating Procedures (SOPs) that describe monitoring and verification procedures and required records ▪ Grower Information and Food Safety Contacts Form ▪ Diagram of Farm ▪ Production Flow Chart ▪ Water Source and Testing Frequency Form ▪ List of Potentially Hazardous Chemicals ▪ Toilet and Hand Washing Station Check List ▪ Daily, Verification and Annual Review checklists

2) SAFETY OF WATER	
<p>Water is used for preparation of substrate, casing soils, irrigation, pesticide use, steam generation, cleaning and sanitizing of equipment and food contact surfaces, hand washing, and drinking. Water can also be a vehicle for the spread of pathogenic microorganisms and chemical contaminants. It is, therefore, important to be aware of the source and quality of water used throughout the mushroom farm.</p>	
<p>GOAL: Water that contacts mushrooms or food-contact surfaces is safe to use and potable drinking water is available for employees</p>	
STANDARD 2.1	<p>Water quality shall be known to be adequate for substrate preparation, irrigation, and/or chemical application and potable drinking water shall be available for employees.</p>
	<p>Guidelines:</p> <ul style="list-style-type: none"> • Not less than every six months, test water at the source for microbial contaminants. • Water that contacts pasteurized substrate or casing soil shall meet U.S. EPA microbial standards for drinking water. • Inspect wells for absence of holes or cracks in the well casing, presence of tightly fitting caps, vent screens, and adequate grout seal between casing and soil. • Protect wells from surface water run-off or flooding by maintaining casing height more than 12” above grade and diverting surface water away from wells using grass/sod waterways, diversion berms, run-off control structures, vegetative buffer areas or other effective means. • If new wells are drilled, locate them upslope from all pollution sources and case to 100 feet or more below water level in the well or to bedrock. • If contaminated water has contacted mushrooms, the level of risk to the consumer shall be determined and the product discarded or diverted for processing.
STANDARD 2.2	<p>Faucets, fixtures, and hoses in production areas shall be fitted with backflow prevention devices where necessary to prevent cross-contamination of the water supply.</p>
	<p>Guidelines:</p> <ul style="list-style-type: none"> • Install vacuum breakers on attached hoses and maintain air-gaps between the fresh water supply and chemical tanks of at least twice the diameter of the water supply pipe to prevent backflow of contaminated water into the water supply. • Monitor for proper use and storage of hoses.
RECORDS	<ul style="list-style-type: none"> • Water Source and Testing Frequency Form • Annual water laboratory tests (municipal source) • Laboratory test results (private wells) • Daily, Verification and Annual checklists

3) WORKER HYGIENE AND PRACTICES TO PREVENT CONTAMINATION OF MUSHROOMS

Basic worker hygiene is important because pathogens can be transmitted from people to mushrooms. Contamination can occur through hand contact, from facial and body hair, dirty clothes, and with coughing and sneezing. Growers must provide adequate training on employee hygiene and monitor hygiene practices of all employees who work in areas where mushrooms are handled.

GOAL: Prevention of employees from becoming a source of contamination

STANDARD 3.1

Workers, contractors and visitors shall follow good personal hygiene practices.

Guidelines:

- Train workers upon hiring and on a regular basis thereafter on good personal hygiene practices.
- Require all food handling employees to maintain an overall clean appearance and to wear clean work clothes that prevent contamination from body hair, perspiration, cosmetics, and topical medications.
- Prohibit open toed shoes, sandals, sleeveless shirts, and long fingernails in harvesting areas.
- If special outer garments are required, instruct workers to remove them and store them on a rack or apron holder before entering restrooms, break areas, or areas where raw materials are handled.

STANDARD 3.2

Workers in mushroom growing and handling areas shall wash their hands before beginning work, each time they use the toilet, after any absence from their workstation for breaks or lunch, or after handling soiled materials.

Guidelines:

- Train workers upon hiring and on a regular basis thereafter on the proper way to wash hands.
- Workers who handle mushrooms should wash their hands for a total of about 20 seconds using the following procedure:
 - Wet hands with clean running water
 - Apply hand soap
 - Vigorously scrub the surfaces of fingers, finger tips, areas between the fingers, under the fingernails, backs of the hands, and exposed portions of the arms for at least 10 to 15 seconds
 - Thoroughly rinse under clean, running water
 - Immediately follow the cleaning procedure with thoroughly drying cleaned hands using a disposable towel or electric hand dryer.

STANDARD 3.3	Hair restraints <i>shall</i> be worn in mushroom growing and handling areas.
	Guidelines: <ul style="list-style-type: none"> • Require workers and visitors to mushroom growing and handling areas to restrain head and facial hair using hairnets, caps, bandanas, or other effective means.
STANDARD 3.4	Harvesters with signs of an illness or infection that can be transmitted through foods <i>shall</i> not be permitted to handle mushrooms.
	Guidelines: <ul style="list-style-type: none"> • Prohibit workers with signs of diarrhea, fever, vomiting, jaundice, open sores, bleeding cuts, or exposed skin infections from handling mushrooms. • Protect minor cuts and scrapes on the arms, wrists, and forearms by covering with a tight fitting, impermeable bandage and further covering hand wounds with a clean, disposable glove. • Workers that have major wounds that show signs of infection and are not likely to be adequately protected by bandages and gloves shall be sent home or reassigned until the wound has healed.
STANDARD 3.5	Jewelry and other personal items that can fall into the product <i>shall</i> be prohibited from mushroom growing and handling areas.
	Guidelines: <ul style="list-style-type: none"> • Prohibit in production areas wearing of watches, earrings, chains, rings with stones (unless covered with a glove), or other small jewelry items that can fall into the product and cause injury. • Prohibit in production areas pens, pencils, paperclips, coins, and small personal items in shirt pockets unless they can be adequately protected from falling into the product.
STANDARD 3.6	Food and beverages, chewing gum, and tobacco <i>shall</i> not be permitted in mushroom growing and handling areas.
	Guidelines: <ul style="list-style-type: none"> • Confine consumption of food and beverages and the use of gum and tobacco products to designated lunch and break areas away from production areas.
STANDARD 3.7	Movement of workers and visitors between mushroom growing and substrate preparation and staging areas <i>shall</i> be controlled to prevent cross contamination.
	Guidelines: <ul style="list-style-type: none"> • Require workers to remain in their work areas during their shift unless they have received authorization from a supervisor.

STANDARD 3.8	Procedures <i>shall</i> be in place to specify handling and disposition of mushrooms or food contact surfaces that have come into contact with blood or other bodily fluids.
	Guidelines: <ul style="list-style-type: none"> • Document procedures that specify handling/disposition of mushrooms, food contact surfaces or equipment that come into contact with blood or other bodily fluids. • Train workers to dispose of any mushrooms that come into contact with blood or bodily fluids. • Have a first aid kit readily accessible to all employees.
RECORDS	<ul style="list-style-type: none"> • Worker training log • Bodily fluid contamination policy • Daily, Verification and Annual checklists

4) HAND WASHING AND TOILET FACILITIES

Unsanitary hand washing and toilet facilities are a potential source of contamination. It is essential that there are adequate facilities to meet hygiene objectives. Therefore, both employees and management play important roles in assuring that workers do not become a source of contamination.

GOAL: Toilet and hand washing facilities that are adequate in number and are properly maintained

STANDARD 4.1	Toilet facilities and hand washing stations <i>shall</i> comply with U.S. Department of Labor Occupational Safety and Health Administration (OSHA) Field Sanitation Standards for Agricultural Facilities – 29 CFR Part 1928.110.
	Guidelines: <ul style="list-style-type: none"> • Maintain a ratio of at least one toilet facility per 20 employees, each within ¼ mile of the work site. • Maintain toilet facilities so they are clean and well-ventilated with self-closing doors and are continuously stocked with toilet paper. Maintain hand washing stations so they are clean, have running water and are continuously stocked with hand soap, disposable paper towels and trash receptacles. • Post a sign in an appropriate language at each toilet facility reminding employees to wash their hands before returning to work. • Post a sign in an appropriate language at each hand washing facility that instructs employees on the proper way to wash their hands. • Empty waste tanks from portable toilet facilities carefully so that adjacent production areas do not become contaminated.

STANDARD 4.2	Toilet facilities <i>shall</i> be maintained so that they are clean and sanitary.
	Guidelines: <ul style="list-style-type: none"> • Clean and sanitize toilet facilities daily when in use and remove trash on a scheduled basis. Monitoring/verification guidelines: <ul style="list-style-type: none"> • Inspect facilities daily when in use for compliance with standard.
RECORDS	<ul style="list-style-type: none"> • Toilet and hand washing station checklist • Daily, Verification and Annual checklists

5) PRODUCT SECURITY

Growers need to take measures to protect mushrooms from intentional contamination. Identify areas or activities where threats might occur and increase security in those areas. Plan how to respond to threats or tampering with mushrooms, equipment, chemicals, supplies, and water sources, as well as how to notify appropriate local law enforcement officials and federal and state agriculture officials.

GOAL: Prevention of intentional contamination of mushrooms

STANDARD 5.1	Control measures <i>shall</i> be in place to prevent entry of unauthorized individuals onto the premises.
	Hazard control guidelines: <ul style="list-style-type: none"> • Issue identification badges or cards to all employees that clearly indicate current employment status with the company. IDs should be returned upon resignation or dismissal. • Provide adequate outside lighting to permit adequate inspection of the facilities. • Prevent unauthorized entry into buildings by minimizing the number of entrances to restricted areas, securing doors and windows when not in use, and installing door and window alarms as necessary.

STANDARD 5.2	Employee activities <i>shall</i> be monitored so that product security is adequately maintained.
	Guidelines: <ul style="list-style-type: none"> • Verify the identity and eligibility for employment of each new employee by completing a U.S. Citizenship and Immigration Services I-9 form. • Train supervisors to be alert for suspicious activity on the part of employees such as coming to work unusually early, staying late, or wandering into restricted areas.
STANDARD 5.3	Movement of delivery truck drivers, contractors, inspectors, auditors and other visitors within the facility <i>shall</i> be monitored so that product security is adequately maintained and good agricultural practices are followed.
	Guidelines: <ul style="list-style-type: none"> • At main entrance, post signs that require visitors to check in with a designated individual before entering farm areas. • If practicable, while on premises visitors should be accompanied by an employee.
RECORDS	<ul style="list-style-type: none"> • Employment files – I-9 forms • Verification and Annual checklists

6) RECEIVING AND STORAGE OF MATERIALS

Materials used in growing and harvesting mushrooms include substrate ingredients, casing soil ingredients, (peat moss, spawn, supplements), and packaging materials. Although the high temperatures achieved during substrate pasteurization substantially reduce levels of harmful microorganisms, it is important to consider the potential for cross contamination between mushrooms and unpasteurized substrate materials by surface water run-off, pests, wind, or equipment and people moving about the farm.

GOAL: Prevention of cross-contamination of non-substrate materials and mushrooms with unpasteurized substrate

STANDARD 6.1	Raw materials and packaging materials <i>shall</i> be purchased from approved suppliers and are appropriate for mushroom growing and packing.
	Guidelines: <ul style="list-style-type: none"> • Purchase approved materials from approved suppliers. • Obtain documentation from suppliers that materials are appropriate for mushroom production, including origin and date of purchase. • Obtain documentation that packaging materials are approved by the FDA.

STANDARD 6.2	Storage and preparation for unpasteurized substrate <i>shall</i> be adequately separated from areas where pasteurized substrate is stored so that cross-contamination cannot occur.
	Guidelines: <ul style="list-style-type: none"> • When animal manure is used as a substrate ingredient, it and unpasteurized substrate mixture shall be kept as far away as possible from areas where harvest containers, packaging materials, spawn, and other sanitary supplies are received or where mushrooms are shipped. • Fill and grade areas where standing water can accumulate to permit adequate drainage. • Where necessary, cover substrate preparation areas to prevent run-off or construct barriers such as concrete blocks, soil berms, pits, or lagoons to divert or collect run-off. • Casing ingredients, casing soil mixtures, and other growth media that do receive pasteurization treatments shall be protected against contamination from pests and water run-off. Store them covered in dry locations that are physically separated from contaminated areas.
STANDARD 6.3	Substrate preparation procedures <i>shall</i> be based on scientific principles that reduce potentially harmful microorganisms to acceptable levels.
	Guidelines: <ul style="list-style-type: none"> • Maintain substrate treatment temperatures for minimum times and temperatures that reduce harmful microorganism to safe levels.
RECORDS	<ul style="list-style-type: none"> • Documentation from suppliers of raw materials and packaging materials • Substrate preparation records • Validation studies for substrate pasteurization treatments • Verification and Annual checklists

7) FARM SANITATION	
<p>A visitor’s first impression of a mushroom farm is often the condition of the grounds and the general layout of the facility. Farms that are kept clean and orderly convey to visitors and employees that food safety is the company’s number one priority. Critical areas where potential food safety hazards exist need to be identified and control measures taken to prevent product contamination.</p>	
<p>GOAL: Prevention of product contamination from buildings, grounds, equipment, and food-contact containers</p>	
STANDARD 7.1	<p>The grounds <i>shall</i> be cleaned on a scheduled basis and maintained so they do not become a source of contamination.</p>
	<p>Guidelines:</p> <ul style="list-style-type: none"> • Keep grounds reasonably free of tall grass and weeds, litter, debris, trash, unnecessary stored equipment, and standing water. • Store litter and trash in covered containers on well-drained surfaces and regularly remove them from the premises. • Store equipment and other materials at a sufficient distance from buildings so they do not provide sites for pests to enter. • Control vehicular traffic between substrate preparation and growing areas so that cross contamination is prevented.
STANDARD 7.2	<p>Buildings <i>shall</i> be maintained to prevent entry points for pests or water.</p>
	<p>Guidelines:</p> <ul style="list-style-type: none"> • Keep building foundations, walls, roofs, and gutters in good repair so that they are not entry points for pests or water. • Keep exterior doors and windows intact, in good repair, and sealed so that there are no gaps greater than ¼ inch. • Keep outside entrances closed when not in use or have screens, plastic strip curtains, or air curtains installed.
STANDARD 7.3	<p>Breezeways and growing rooms <i>shall</i> be kept clean and uncluttered.</p>
	<p>Guidelines:</p> <ul style="list-style-type: none"> • Minimize the amount of materials stored in breezeways and staging areas so there is adequate space for movement of employees and equipment. • Maintain sufficient space between interior walls and stored materials to allow for pest inspections. • Store waste materials in labeled, covered or otherwise identified containers and remove them from buildings on a scheduled basis.

STANDARD 7.4	<p>Building interiors <i>shall</i> be maintained to prevent physical hazards, condensate, and floor splash from contaminating mushrooms.</p> <p>Guidelines:</p> <ul style="list-style-type: none"> • Have written glass and brittle plastic policy in place. • The policy shall include at least the following points: <ul style="list-style-type: none"> ○ Glass and brittle plastics are prohibited in production areas, except where absolutely necessary (examples: laboratory, break rooms, maintenance areas) ○ When glass and brittle plastics are approved for use, they are restricted to authorized personnel and adequate measures are taken to prevent breakage ○ Procedures are described for clean-up and disposal of glass and brittle plastics where breakage has occurred ○ Procedures for isolating and discarding mushrooms in areas where breakage has occurred are specified. • Regularly clean overhead fixtures to minimize accumulation of dust, insects, and debris. • Maintain floor drains so that they flow freely. • Place pest control (not monitoring) lights so they do not attract pests into the building. • Only non-mercury thermometers are to be used.
STANDARD 7.5	<p>Reusable harvest containers and containers for soaking logs <i>shall</i> be kept in good repair and cleaned and sanitized before each use.</p> <p>Guidelines:</p> <ul style="list-style-type: none"> • Maintain harvest containers and containers for soaking logs so that they are free of splinters or shards and discard them if they cannot be repaired. • Clean and sanitize them before use, using only products approved for food contact surfaces. • Store cleaned containers in a clean and dry location where they are protected from contamination. • Prohibit food contact containers from any use other than holding mushrooms unless clearly marked.
RECORDS	<ul style="list-style-type: none"> • Glass Policy • Master Cleaning Schedule • Cleaning checklists • Daily, Verification and Annual checklists

8) FIELD PACKING AND PROTECTION OF HARVESTED MUSHROOMS	
Mushrooms are at risk for contamination during and after harvesting. Growers should take action to prevent contamination of mushrooms during harvesting, when they are moved to staging areas, and when they are loaded onto trucks.	
<i>GOAL: Harvest and post-harvest procedures that prevent contamination of mushrooms</i>	
STANDARD 8.1	Harvest containers shall not be permitted to contact the floor during packing or storage.
	Guidelines: <ul style="list-style-type: none"> • Prevent the underside of containers from contacting the floor by placing them on stools, carts, pallets, or on a dedicated and clearly marked or color coded inverted container. • Move filled containers out of growing rooms by carrying them or placing them on movable carts or pallets or by other effective means.
STANDARD 8.2	Mushrooms that spill on the floor or ground shall be considered contaminated and discarded.
	Guidelines: <ul style="list-style-type: none"> • Train workers that product that comes into contact with the floor or ground are no longer edible and must be discarded.
STANDARD 8.3	Containers of mushrooms in staging areas shall be protected from physical hazards, condensate, and floor splash.
	Guidelines: <ul style="list-style-type: none"> • Cover exposed containers of mushrooms with plastic or paper sheets if necessary to prevent contamination. • Instruct maintenance crew to remove all tools, loose nuts and bolts, and other physical hazards when a job is completed.
STANDARD 8.4	Mushrooms shall be loaded onto clean and secure trucks.
	Guidelines: <ul style="list-style-type: none"> • Do not load mushroom onto trucks that were previously used to transport animals, animal products, or other potentially contaminated materials unless they are cleaned before loading. • Inspect trucks for cleanliness, odors, and dirt or debris before loading. • Workers involved in the loading of mushrooms for shipping shall practice the same good hygiene and sanitation practices as harvesters. • Product containers must be secure during transit from farm to packing location.
RECORDS	<ul style="list-style-type: none"> • Worker training log • Truck Inspection form • Daily, Verification and Annual checklists

<p>9) CLEANING AND SANITIZING FOOD CONTACT AND CRITICAL NON-FOOD CONTACT SURFACES</p> <p>Food contact surfaces include harvesting containers and knives that contact mushrooms. Critical non-food contact surfaces include walls, floors, ceilings, and other adjacent areas that may contribute to the risk of mushroom contamination. Each grower should identify specific cleaning and sanitizing needs necessary to reduce food safety hazards by developing a master cleaning schedule. For each task, the schedule should communicate who will do the cleaning, how it will be done, and when it will be done.</p>	
<p>GOAL: A documented and effective program for cleaning and sanitizing food contact and critical non-food contact surfaces</p>	
<p>STANDARD 9.1</p>	<p>Cleaners and sanitizers <i>shall</i> be labeled for use in food production facilities and used in a safe and effective manner.</p> <p>Guidelines:</p> <ul style="list-style-type: none"> • Use all cleaners, sanitizers, and disinfectants according to label directions. • Use only sanitizers approved for use on mushroom farms on food contact surfaces according to label directions. • Apply cleaners, sanitizers, and disinfectants with appropriate care so that contamination of nearby mushrooms is prevented. • Knives and other harvesting equipment that contact mushrooms shall be cleaned and sanitized on a scheduled basis.
<p>STANDARD 9.2</p>	<p>Cleaning and sanitizing procedures <i>shall</i> be documented.</p> <p>Guidelines:</p> <ul style="list-style-type: none"> • Develop a Master Cleaning Schedule (MCS) that lists items and areas to be cleaned/sanitized (e.g. breezeways, growing rooms, cold storage rooms, ventilation and refrigeration units, bathrooms and handwashing stations, knives and baskets, trash collection areas, outside grounds, vehicles). • Develop Sanitation Standard Operating Procedures (SSOP) that document cleaning procedures, equipment, and chemicals used for items/areas identified in MCS.
<p>RECORDS</p>	<ul style="list-style-type: none"> • Master Cleaning Schedule • Sanitation Standard Operating Procedures (SSOP) • Worker training log • Daily, Verification and Annual checklists

10) PROPER LABELING, USE, AND STORAGE OF POTENTIALLY HAZARDOUS CHEMICALS

Potentially hazardous chemicals used on mushroom farms include pesticides, cleaners, sanitizers, disinfectants, fuels, coolants, paints, and solvents. All chemicals must be labeled, used according to the manufacturer's instructions, and stored in a safe manner so that chemical contamination of mushrooms is prevented. All relevant government regulations relating to the application, use, or holding of these products should be carefully followed.

GOAL: *Prevention of contamination from potentially hazardous chemicals*

STANDARD 10.1	Containers of potentially hazardous chemicals <i>shall</i> be easily identified through proper labeling.
	<p>Guidelines:</p> <ul style="list-style-type: none"> • Make sure original containers are labeled with the name of the chemical, the manufacturer's name and address, and instructions for use. • Clearly mark secondary or working containers used to hold or store prepared chemicals or chemical solutions with the name of the chemical and instructions for proper use. • Use approved "non-food" containers to prepare and hold chemicals or chemical solutions. • Material Safety Data Sheets and chemical labels shall be available for inspection by all employees.
STANDARD 10.2	Potentially hazardous chemicals <i>shall</i> be used according to label directions.
	<p>Guidelines:</p> <ul style="list-style-type: none"> • Train workers on proper preparation methods and precautions for use of potentially hazardous chemicals, including disposal of contaminated mushrooms. • Chemical compounds are used according to label directions.
STANDARD 10.3	Potentially hazardous chemicals <i>shall</i> be stored so that they do not become a source of contamination.
	<p>Guidelines:</p> <ul style="list-style-type: none"> • Store chemicals in clean, well-organized, secure, and dry locations. • Maintain an up to date inventory of hazardous materials and insure that all chemical storage areas are secured so they are only accessible to authorized individuals.
RECORDS	<ul style="list-style-type: none"> • List of Potentially Hazardous Chemicals • Material Safety Data Sheets • Chemical labels • Worker training log • Daily, Verification and Annual checklists

11) PEST CONTROL

Insects, birds, and rodents are capable of transferring human pathogens in their saliva, feces, or on their feet to mushrooms. Insects, rodents, and birds can transmit a variety of pathogens including Salmonella and Listeria. Even if pests do not cause illness, the presence of insects, insect parts, rodent hairs, or droppings can lead consumers to question the wholesomeness of the mushrooms they have purchased.

GOAL: *Exclusion of pests using safe and effective procedures*

STANDARD 11.1

A pest-control program shall be in place that documents safe and effective control of all pests.

Guidelines:

- Follow growing area sanitation standards that minimize pest entry points and harborage sites and that deny pest access to food and water.
- Apply and document use of EPA-approved pesticides according to state and/or federal regulations.
- Use poison bait stations only on the outside of buildings.
- Use tamper-resistant, labeled bait stations and traps, keep them clean by regularly inspecting for the presence of dead pests and placed at sufficient locations along the outside perimeter of the production buildings.
- Inspect bait stations and traps on a regular basis and document findings.
- Live traps, glue boards, or mechanical traps shall be spaced no greater than 30 feet apart along the inside wall of buildings and at both sides of an entrance, excluding breezeways and growing rooms.
- Maintain a pest control log that includes dates of inspection, inspection report, trend report and steps taken to eliminate any problems.

RECORDS

- Pest control contract (if outside firm used)
- Pest control report (in-house or contracted firm)
- Facilities map showing the location of pest control devices
- Daily, Verification and Annual checklists

12) TRACEABILITY AND PRODUCT RECALL	
If a food borne disease outbreak occurs, traceability procedures are useful for determining the source and distribution of suspected products. A trace-back and recall program can, therefore, protect individual growers and the mushroom industry by limiting an investigation to a specific region, packing facility or grower.	
GOAL: <i>The ability to track mushrooms from production to product shipping</i>	
STANDARD 12.1	Mushroom lots <i>shall</i> be labeled to allow trace-back to the grower.
	Guidelines: <ul style="list-style-type: none"> • For each shipment, provide invoices, barcodes, labels, tags, or other identifiers with the following information: <ul style="list-style-type: none"> - The name of the mushroom farm - The name of the product - The date and location of harvest and shipping
STANDARD 12.2	Each farm <i>shall</i> have a program in place for tracking and responding to a need to recall product.
	Guidelines: <ul style="list-style-type: none"> • Maintain a copy of contact information and trace-back procedures required by each packer/shipper. • Develop procedures for rapidly complying with any recall/trace-back requests from customers. • Conduct annual mock recalls to verify compliance with the standard.
RECORDS	<ul style="list-style-type: none"> • Copies of shipping records • Mock recall report • Verification and Annual checklists

13) EQUIPMENT MAINTENANCE AND CALIBRATION

A regularly scheduled preventative maintenance program is an important part of a food safety plan because it ensures that equipment and instrumentation used to monitor safety related processes are in working order and that they do not become a source of contamination.

Goal: Prevention of microbial, chemical, and physical hazards from occurring as a result of improperly maintained equipment

STANDARD 13.1	An equipment maintenance program <i>shall</i> be in place that ensures that all equipment used to control food safety hazards is in proper working order.
	Guidelines: <ul style="list-style-type: none">• Maintain and calibrate on regularly scheduled basis equipment, temperature probes, supporting hardware and software used to monitor substrate pasteurization time and temperatures.• Follow an equipment maintenance program to assure that all equipment is in proper working order and does not contribute to product contamination.• Schedule cleaning and maintenance checks on air handling, cooling, and other equipment used in mushroom production areas so that they function properly and do not contribute to contamination of mushrooms.• Use food grade lubricants on food contact surfaces and machinery.• Remove equipment, tools and used parts after servicing an area.
RECORDS	<ul style="list-style-type: none">• Equipment maintenance schedule• Calibration records• Verification and Annual checklists

14) EMPLOYEE TRAINING

Regular training and reinforcement is necessary to teach employees that they have an individual responsibility to assure the quality, safety, and wholesomeness of mushrooms. Growers must make a long-term commitment to regularly communicate and train their work force on food safety principles and procedures.

Goal: Employees who understand the principles of food safety and sanitation at a level appropriate to their job function

STANDARD 14.1	All workers involved in mushroom growing operations shall receive training in food safety, sanitation, and/or personal hygiene appropriate to their assigned responsibilities and supervisory level.
	Guidelines: <ul style="list-style-type: none">• Train each worker upon hiring of their responsibility in protecting food from microbial, chemical, and physical hazards and the importance of good personal hygiene practices.• Provide refresher training at least once per year.• Provide more comprehensive training in general food safety and food safety control systems to supervisors and managers.
RECORDS	<ul style="list-style-type: none">• Food safety training materials• Food safety training log• Verification and Annual checklists