

KENTUCKY SHIITAKE PRODUCTION WORKBOOK

# Processing and Storage

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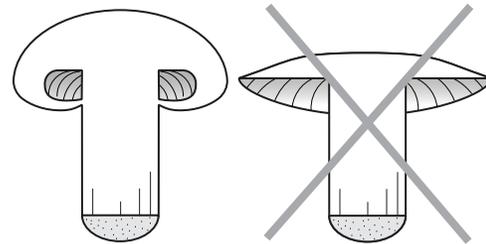


Once you have established a shiitake production business—that is, cut and inoculated logs of the appropriate species, health, and size at the best times of year (October–November or late February–March)—your mushrooms will be ready to fruit within a period of 6 to 12 months of incubation. How you handle your mushrooms depends on whether you plan to market them fresh or dried, retail or wholesale.

The mycelia is the actual mushroom organism, and the mushroom is the fruit of the organism. When mycelia appears on the ends of the inoculated logs, they are ready to fruit. The white mycelia often looks almost like paint spots on the ends of the incubated logs, and it is usually visible around the edges of the logs just next to the bark. When you see the white spots, you can “force” them to fruit faster by immersing them completely under water for 12 to 24 hours (see FOR-87: *Harvesting*).

Once the mushrooms have pinned (pushing the small tips of the mushrooms through the bark of the log) and begun to grow out of the logs, they should be harvested when the mushroom caps are still rolled under and are not flattened out. The caps will continue to enlarge and flatten out even after they have been harvested (see diagram), and, like any other type of fresh produce, their “fresh” quality will begin to deteriorate immediately.

The stems (stipes) of shiitake are tougher than the stipes of other mushrooms (and tougher than the mushroom caps themselves), so you will have a cleaner harvest if you cut the mushrooms off the logs with something like a paring knife rather than simply twisting them off. The clean cut surface on the log is more difficult for other organisms and insects to get into and helps keep your logs cleaner for future harvests.



**Section drawing of shiitake mushroom. On the left caps are curled under, perfect for harvesting. On the right the mushroom cap has flattened out and is not as marketable.**

The stage at which the caps are curled under is the optimal time for taking the mushrooms to market. Harvesting the mushrooms too early (when the caps may still be attached to the stipe) or too late (when the caps have flattened out like a parasol) will affect the market value of your product. If you pick too early, you will have smaller mushrooms and your yield per log will be smaller; if you pick too late, the mushrooms will be of poorer quality, will have a shorter shelf life, and will therefore be of lower value in the marketplace.



**White mycelia showing on ends of incubated logs.**



**Immersing logs under water to hasten fruiting.**

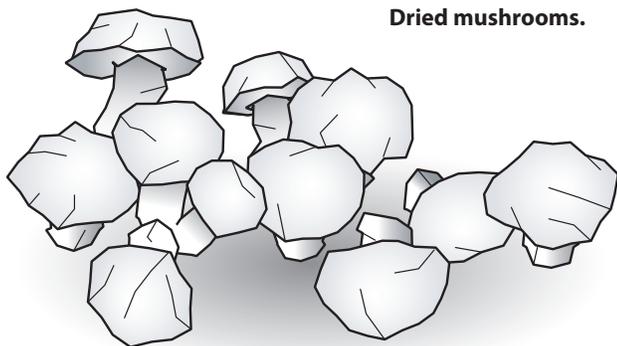
## Refrigeration

To delay the deterioration of product quality as much as possible, harvested shiitake should be refrigerated immediately after harvesting, ideally within one hour. Regardless of the outside temperature (although higher temperatures are more damaging than lower temperatures) getting the temperature of the harvested mushrooms down rapidly to about 33 to 35° F is critical. Coolers for the mushrooms should have good air flow and high humidity as well as the target temperatures.

**Do not freeze shiitake mushrooms!** Freezing breaks down the structure of the mushrooms and degrades their market value. Keep the mushrooms in the recommended cool, moist, refrigerated environment until they are ready to go to market. One particular value of shiitake is that, under these optimal conditions, they have a shelf life of at least a week, often longer.

## Drying

A processing alternative is to dry your shiitake mushrooms and sell them in that form. Usually 7 pounds of fresh mushrooms yield 1 pound of dried mushrooms. If fresh shiitake sells for \$5 to \$8 a pound, dried shiitake should bring a price of \$35 to \$42 a pound. However, dried shiitake are more difficult to sell successfully. Asian-produced dried shiitake is available and sells very inexpensively, so your quality, locally grown shiitake may not be economically competitive. However, if you have done a good job marketing your fresh mushrooms, your buyers will buy the dried ones from you because they know the value of your product and know that it has been produced locally. Although selling them is a more difficult market, dried mushrooms have the advantage of much longer shelf life (6 months to a year). That long shelf life gives you more flexibility about when to sell your mushrooms. You may have dry mushrooms to sell even when the logs are not producing fresh mushrooms due to hot weather or other production variables.



Dried mushrooms.

Mushrooms can be dried in a food dehydrator (probably only 2 to 3 pounds at a time) or in a controlled, forced air or convection air dryer. They can also be dried in the sun, but their visual quality may not be as good as it is when dried in an air dryer or dehydrator. Mushrooms dried in the sun **do** absorb vitamin D, so their improved nutritional value may compensate for their less-than-perfect appearance.

You can dry mushrooms in the sun, either by cutting the stipes off (the stipes can become “woody” when dried) and drying only the caps, face down, or you can slice the caps (from top to bottom) for drying. The mushroom pieces (caps or slices) can be spread out in a single layer on special drying racks or on clean screens. Make sure there is good air flow on both sides of the racks or screens. On a warm (say, 50° F) day, the pieces can dry to the recommended 13% moisture content *in one day*. Follow the recommendations for your chosen drying equipment to determine how much time it will take to reduce the moisture content of the mushrooms to the desired 13%.

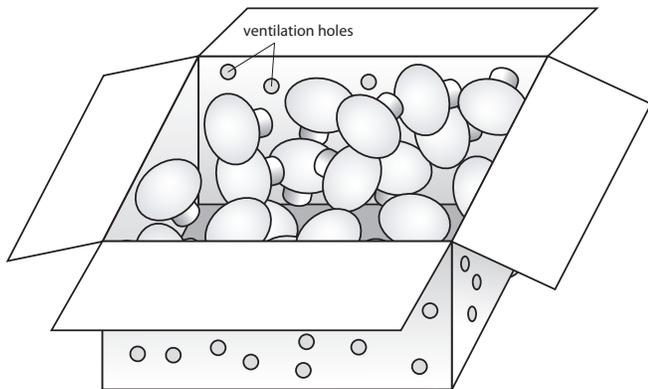
## Storage

Fresh mushrooms can be harvested directly into woven or plastic baskets and can be stored in those baskets or in produce market boxes that have ventilation holes in them. It is helpful, but not necessary, to use boxes with a waxed inner surface. Cardboard boxes are made in many places, so you may be able to work with a local manufacturer to have boxes made for you in 3-, 5-, or 10-pound boxes, which are common sizes for all kinds of fresh produce.

If your production level is high enough to be selling multiple boxes each week, you may want to “personalize” your boxes with your farm’s logo or with an unusual color (different from the standard brown kraft cardboard). One shiitake grower in northern Florida who was selling mainly to a regional produce market in Atlanta, Georgia, packed his shiitake in white boxes. He produced a quality product, and it did not take long for the buyers to ask for the mushrooms in the white boxes.

If you are selling to local supermarkets (especially locally owned stores in contrast to the large national chains), you may be able to sell your shiitake mushrooms in bulk to their produce people so that customers can select the individual mushrooms and the amount of mushrooms they want to buy. Another option is to package your mushrooms in 3- to 4-ounce containers. The pressed cardboard or paper containers (like the ones used for berries, for example) are better for mushrooms than plastic mesh or clamshell containers because they allow the mushrooms to breathe. These containers would be labeled according to Food and Drug Administra-

## Produce market box.



tion (FDA) requirements, including your farm's name (and possibly your logo), "SHIITAKE MUSHROOMS," weight, and price.

If you are selling in a farmers market, other growers often sell from a bulk container (one of those 3- or 5-pound ventilated boxes, for example) and package into paper bags for the customer. Shiitake do better in paper bags than plastic bags. Mushrooms stored in paper may dry out over time, but those stored in plastic bags may become slimy and unusable. Your customers can keep their shiitake in the refrigerator in a paper bag for at least a week. If they forget about them, the mushrooms may just dry out in the bag and could still be reconstituted in warm water for use in cooking.

## Summary

Shiitake mushrooms are a tasty, healthful product that have now become common in the marketplace. Producing a quality product will help you sell them easily through a variety of outlet options. Fresh shiitake mushrooms need very little processing, other than possibly brushing off some soil or leaf pieces that have fallen on them. (**Do not wash them!**) Store them in appropriate containers, whether in harvesting baskets, multi-pound market boxes, paper bags or small pressed containers. Make sure fresh mushrooms are kept in a cool, moist environment under refrigeration until the time of sale. Dried mushrooms should be kept in a dry environment at room temperature and can be stored in glass containers or paper bags.

*Mushroom illustrations by Dennis Duross, Extension Communications Specialist*

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## Shiitake and Low Tide

From Thomas J. Motycka

### Ingredients

- 4 cups cooked rice
- 1 can (10¾ ounces) condensed New England clam chowder soup
- 2 cups chopped shiitake mushrooms, separated
- 1 can (10¾ ounces) condensed oyster stew soup
- 1 cup broccoli, chopped
- 1 cup cauliflower, chopped
- 6 slices cheese

### Directions

- Preheat oven to 400° F.
- Layer the rice in the bottom of a 7-inch square casserole dish (4 inches deep).
- On top of the rice, layer the broccoli, cauliflower, and half of the shiitake.
- Thoroughly mix the two soups and pour over other ingredients.
- Top the casserole with the remaining half of shiitake.
- Bake the casserole, covered, for 40 minutes.
- Uncover and place cheese on top.
- Re-cover and cook for another 5 minutes.

*Serves 6 to 8.*