

## KENTUCKY SHIITAKE PRODUCTION WORKBOOK

# Incubation and Stacking

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Shiitake logs will produce mushrooms 6 to 12 months after inoculation. Logs inoculated in the late winter (February–March) show a successful “spawn run”—where the mycelium covers the entire surface of the log under the bark—more quickly than logs inoculated in the fall (October–November). Spring-inoculated logs will often fruit that fall, while fall-inoculated logs may not fruit until the fall of the following year.

## Incubation

There are only three things to be concerned about during incubation of the shiitake logs:

- Moisture content
- Shade
- Insect or disease problems

### Moisture content

Shiitake logs will do best if their moisture content is kept between 30 and 35% (see FOR-82: *Monitoring for Moisture Content* for instructions on how to measure). Once the logs have been inoculated, choose a sample of average size logs, plus a few large ones and small ones, weigh them and record that weight. Weigh and record the weights of the same logs a week later. If the new weights are more than 10% less than the original weights (35 lb becomes 29 lb) you will need to water the logs, either by soaking in some kind of tank or by sprinkling them with water overnight. Check the weights again to be sure the moisture content is up again. During hot, dry weather, continue weighing on a weekly basis. If the weather is not so hot and rain is coming frequently, you could weigh every two weeks or every month if the weights remain stable.

### Shade

Shiitake is a forest mushroom and grows in the forest naturally (in its native Japan) under dense shade. Growing shiitake on logs therefore requires that those logs are

not in direct sunlight. Place your “laying yard” in a location where the logs will be shaded year round. Stands of trees with pines, hemlocks or other evergreens are good on two counts: there will be shade all year, as these trees keep some leaves at all times, and the relative humidity under constant tree shade is usually higher than that in the surrounding area, and so the logs will keep their moisture longer than they would in more exposed locations. If you do not have an area with evergreen trees that is suitable, use shade cloth (80 to 90%) over the log stacks.

### Monitor for insects and disease

After inoculation, it will be several months before the shiitake mushrooms will be ready to emerge. Competing fungi and insects can attack the logs during the incubation time, so monitor the logs on a regular basis (at least once a week). If you see something different about your logs, you can stop a problem before it gets out of hand. (See FOR-84: *Pest Control* for the kinds of problems to look for.)

## Stacking

Shiitake logs may be stacked in several different ways during the incubation period. The recommended stacking methods are:

- Firewood
- Lean-to
- Teepee
- Log cabin

### Firewood stacking

Just what it sounds like—stack the logs the way you would stack firewood. Lay four or five logs on some kind of base off the ground (use bricks, concrete blocks, logs that aren’t inoculated, landscape timbers).

Leave an inch or two of space between the logs so that air can circulate. Stack the second layer of logs across



**Firewood stacking**

the lower logs. Continue to criss-cross logs up about five layers, leaving air spaces between the logs in each layer.

If you are checking sample logs for moisture content, make sure your sample logs are in different locations in the stacks—some in the middle, some on the bottom, some on the top—so that checking them will give you a good representation of what is happening for all the logs.

### *Lean-to stacking*

Lay one log across the pad or log bed, then lay three or four across the end log (the number depends on the length of your inoculated logs). Leave air space between the logs and lay another cross log on the ends of these logs. Repeat the pattern. The logs will be closer to the ground surface but not resting on the ground directly. This kind of stacking is very good for moisture retention in the logs because they are close to the ground surface, where there may be a higher relative humidity in the air. Gravel pads are ideal for the logs to rest on, so that there will be good drainage around the logs and they will not be in contact with soil. This kind of stacking provides an environment that is more uniform for the logs, but it also requires the most space on the ground and therefore may not be practical for some growers.

### *Teepee stacking*

This kind of stacking requires some support for the logs—either a rail fence—like bar or a heavy wire strung between posts. The logs are stacked upright, leaning against the support and stacked from both sides of the supporting framework. This form of stacking would



**Lean-to stacking.**



**Teepee stacking**

benefit from a gravel base; the lower log ends could be propped on landscape timbers or other support or placed on tarps to avoid direct contact with the ground.

### *Log Cabin stacking*

Use this formation when you are ready to harvest the mushrooms (see FOR-85: *Harvesting*). Place two logs about 3 feet apart on some kind of base support—landscape timbers, uninoculated logs, bricks, concrete blocks. Then place two more logs crossing the first logs at each end. Continue stacking, two at a time, until you have five logs on each side (a stack of 20 logs) with a large open space in the center. Cover the stack of logs (that have already been soaked) with a clear plastic cover until the mushrooms begin to appear (usually within 3 to 4 days). The cover should extend down to the **top** of the support logs and **not** down to the ground. The first mushrooms will be ready to harvest within a day or two of appearing. This formation allows for maximum air circulation within the stack, and the plastic cover keeps the log moisture **in** and the rain, insects, and other pests **out** while the logs are producing.



**Log cabin stacking**

## Summary

Monitor your logs for shade, moisture, and pest and disease problems while they are incubating. If firewood- or teepee-stacked logs are losing too much moisture, you may need to rearrange the stacks. (The bottom logs will always retain more moisture). Lean-to stacked logs should be more even in their moisture content, but they too can be reversed if necessary.

*Mushroom illustrations by Dennis Duross, Extension Communications Specialist*

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## Shiitake-Turkey Burgers

From Deborah B. Hill

### Ingredients

- 1 pound lean ground turkey
- 1 egg
- ½ cup whole wheat bread crumbs
- 2 tablespoons butter
- 1 medium onion (about 2½ inches in diameter), finely chopped
- 3 ounces fresh shiitake mushrooms, finely chopped
- 1 clove garlic, finely chopped
- 1 tablespoon Spike seasoning
- 1 tablespoon Worcestershire sauce
- 2 teaspoons tamari
- Salt and black pepper to taste
- Non-stick spray for frying

### Directions

- Mix together the meat, egg and bread crumbs.
- In a skillet, melt the butter and sauté the onion, mushrooms and garlic until the onion and mushrooms are wilted.
- Add Spike, Worcestershire sauce and tamari.
- Mix seasoned vegetables into meat mixture.
- Add salt and black pepper to taste.
- Form the meat mixture into hamburger patties.
- Coat the skillet with non-stick spray.
- Cook the burgers until nicely browned and done.

*Serves 6 to 8.*