

KENTUCKY SHIITAKE PRODUCTION WORKBOOK

Pest Control

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Shiitake mushrooms do not have many pests. Many problems with insects and competitive fungi can be avoided by timely cutting and inoculating of shiitake logs, and by good hygiene and maintenance practices.

Shiitake logs should be inoculated within two weeks of cutting the trees. Remember that the selected trees should be both *alive* and *healthy* when they are cut. The best times to inoculate appear to be when the trees are dormant—without leaves (October–March)—and when there is likely to be the most sap movement activity, when the leaves begin to drop in the fall. In the fall, the carbohydrate-rich sap is moving down into the roots for the coldest months of the winter. In late winter (February–March), the stored sap is beginning to rise up to the branches to provide nutrition for the expanding leaf buds. Logs may be cut and inoculated at any time, but the shiitake spawn seems to “take” better when inoculated at these times.

Once the logs are inoculated, it is important to monitor their moisture content (see FOR-82: *Moisture Content Monitoring*) and to keep the logs out of direct sunlight. If you don’t have natural shade from evergreen trees, use shade cloth of 80% or higher over the newly inoculated logs.

PESTS

Other Fungi

The spores of many fungi are in the air always, so if your logs are incubated outdoors in a “laying yard,” you can be sure that these spores will be in the environment. Some of them are annoying or unsightly, some will restrict the growth of the shiitake spawn, and some will actually kill the shiitake.

- *Hypoxylon spp.* are fungi that invade logs in the early spring months and can stop the growth of shiitake. It forms a yellowish-green growth on the ends of the logs and grows towards the bark, forming colonies there.
- *Bulgaria spp.* are weed fungi that are more annoying than harmful. It forms small ($\frac{1}{4}$ –1 inch), almost globe-like dark brown fruiting bodies on the bark of the logs.
- *Coriolus spp.*, commonly called “turkey tail,” are very common. It has some medicinal value of its own. It will compete with the shiitake spawn for space and nutrients but isn’t as aggressive as *Hypoxylon*.
- *Trichoderma spp.* are the most damaging of the competing fungi. Logs that exhibit this greenish-blue fungus on the bark should be removed from the shiitake laying yard and destroyed so that other logs will not be contaminated.



Hypoxylon spp.

USDA Forest Service - North Central Research Station Archive, USDA Forest Service, Bugwood.org



Coriolus spp.

Robert L. Anderson, USDA Forest Service, Bugwood.org



Trichoderma spp.

Robert L. Anderson, USDA Forest Service, Bugwood.org

Insects

Flies, midges, gnats and mites attack mainly the fruiting bodies (that is, the mushrooms themselves) in a shiitake yard, but with proper hygiene and maintenance should not present a problem. Since they tend to attack the mushroom caps, harvesting the mushroom crop in a timely fashion can avoid many problems with these creatures. Covering the fruiting logs with a plastic “bag” as recommended in *FOR-85: Harvesting* will also protect against insect attack.

Shiitake logs can also be susceptible to several beetles.

- Long-horned beetles (**cerambycids**) overwinter in leaf litter or rotting logs. Their larvae can penetrate the bark of the shiitake logs. A powdery sawdust on the surface or under the logs may indicate the presence of these beetles.
- Ambrosia beetles (**scolytids**) bore into the sapwood of freshly sawn logs and introduce a fungus that continues the damage. Their activities produce a whitish dust on the surface of the bark.
- Pleasing fungus beetles (**erotylids**) feed on the mushrooms, and different beetles are specific to different kinds of mushrooms. *Dacne fungorum* is one that is specific to shiitake.

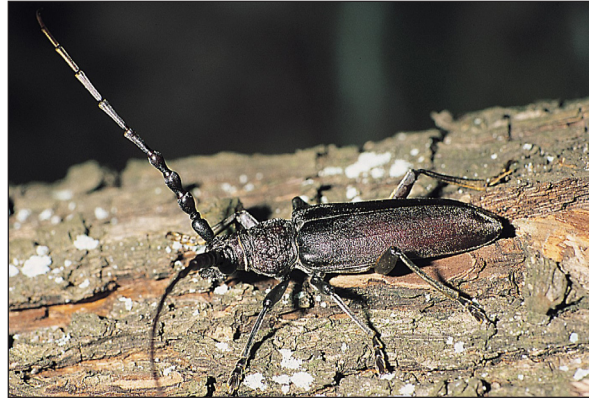
Slugs and snails feed on the mushrooms directly. They do not do serious harm, but if you are producing shiitake for market, they can cause unsightly problems. Some options for deterring them include:

- Place your log stacks on gravel pads so that there is not an organic surface for the slugs or snails to move across.
- Sprinkle lime and wood ash around the stacks, forming a kind of “moat” that these creatures cannot cross.
- Leave a flat container (pie plate or regular plate) with some stale beer in it close enough to the ground surface that the slugs can get to it easily.
- Leave scraps of other favored foods such as cabbage leaves nearby to lure them away from the mushrooms.

Mammals

Unfortunately, lots of creatures like to eat shiitake mushrooms. Mammals are rarely a serious problem, however, and much that has been suggested to avoid problems with other fungi and insects is useful here. Mice, squirrels, deer, rabbits, ducks and geese all like the mushrooms. Timely harvesting may be the most important factor. If any particular animal—rabbit, deer, squirrel—becomes a significant problem, netting or fencing may be the solution. Repellents can also be used.

Long-horned beetle (*cerambycids*)



Gyorgy Csoka, Hungary Forest Research Institute, Bugwood.org

Ambrosia beetles (*scolytids*)



Jiri Hulcr, Michigan State University, Bugwood.org

Pleasing fungus beetles (*erotylids*)



Pennsylvania Department of Conservation and Natural Resources - Forestry Archive, Bugwood.org

Summary

The following actions will go a long way toward controlling most shiitake pests:

- Cut logs in the appropriate season from trees that are alive and healthy.
- Inoculate logs within two weeks of cutting.
- Keep logs moist.
- Keep inoculated logs out of direct sunlight.
- Locate your shiitake laying yard
 - » Under shade
 - » Near a source of water
 - » In a relatively clean environment (no weeds or rotting logs)
 - » With inoculated logs not in contact with the soil (gravel pads if possible)
- Monitor logs on at least a weekly basis to check for any developing problems.
- Correct problems when first observed.
- Remove and destroy logs with *Trichoderma*.
- Look for spots or blocks of white mycelia next to the bark on the ends of the logs as a sign that mushrooms are ready to fruit.
- Harvest mushrooms from logs as soon as they are big enough (usually around a 2-inch cap) and cut them cleanly off the logs.

Mushroom illustrations by Dennis Duross, Extension Communications Specialist

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Hot Dong Go

From Mushroompeople newsletter 1991

Ingredients

- 1 pound fresh shiitake, finely chopped
- 4 tablespoons vegetable oil
- 1 tablespoon lemon juice
- 16 ounces sour cream
- 4 tablespoons parsley, chopped
- 2 tablespoons onion, minced
- 2 tablespoons jalapeño pepper, minced
- 2 tablespoons nutritional yeast

Directions

- In a medium saucepan, warm the oil, then add mushrooms and lemon juice.
- Simmer for 10 minutes.
- Add remaining ingredients and mix well.
- Simmer another 10 minutes.
- Can be served as a dip, hot or cold, with raw vegetables, crackers or soft bread such as pita.

Makes 4 cups.