

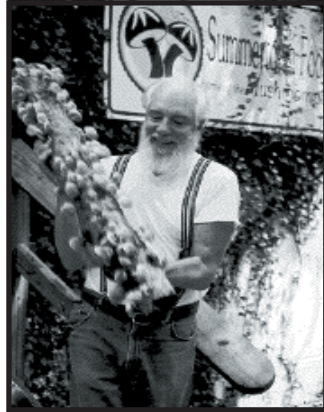
How to Cultivate Mushrooms in Natural Logs

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Select healthy trees with medium-thick bark. Oaks are best, but hornbeam, ironwood, hard maple, and sweet gum work well. Fir, pine, cedar and other softwoods have fungicidal aromatic resins, so don't use them.

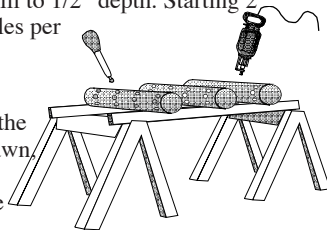
Cut your logs in the Fall, Winter or Spring. Firewood cutters or farmers can be good sources of logs. Trees should be felled when the leaves are off, and logs should be inoculated within 3 weeks. Moisture is everything. After inoculation the internal moisture content of the logs is raised to 45 to 60 percent, by periodic soaking with a sprinkler and rainfall, avoiding wind and direct sunlight, and by stacking the logs correctly. Detailed instructions are summarized here, but we also urge serious growers to buy a book on the fine points of cultivation. In commercial operations this translates to maximizing profits.

The logs should be 3" to 6" in diameter and 40" long. It's important not to damage the bark by rough handling. Store the logs off the ground to reduce direct contact with dirt; 3" of gravel works well. Inoculate the logs within 1-3 weeks after cutting. Downed or felled trees uncut into logs last for up to two months. If you've experienced a recent drought, soak by immersion for 24 hours, then let the bark dry before inoculating.

Drilling Place the logs on two boards between sawhorses. You will need a drill and bits. For plug spawn, use a 5/16" bit, drill to 1" depth. For sawdust spawn, use a 7/16" bit, drill to 1/2" depth. Starting 2" from the end of the log, drill 20-30 holes per log in a grid pattern, 6"- 8" apart down its length, and 2 1/2" across.

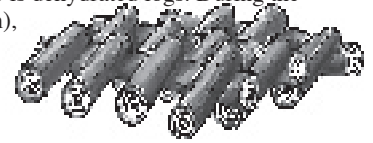
Inoculate each log immediately after the holes are drilled. When using plug spawn, tap a plug into each hole with a hammer until the plug is flush with the bottom of the bark. With sawdust spawn, jab the end of the inoculating tool into the bag of spawn, place the end of the inoculation tool on a hole, and squeeze the handle down with your thumb, packing the spawn into the hole up to the bottom of the bark. Knock off the excess with your finger.

Waxing Check that all the holes in a log are inoculated. Dab a thin coat of melted, hot cheese wax over each inoculated site, using either a wax applicator, a bristle brush, or a dauber. Do not let the wax get too hot or the smoke can flash into a fire.



Tagging Use a ballpoint pen or a paint stick to write on an aluminum tag or a plastic tag cut out of a milk carton the date and mushroom strain used. Staple or nail the tag to the end of each log with a roofing nail.

Spawn Run Stack the logs in a shady spot, using the lean-to stack method (see drawing), placed inside the pattern of your water sprinkler. When the leaves fall off the trees, the logs can be shaded using 60-80% shade cloth or pine boughs. Evergreen trees make an ideal shade. The most common cause of failure is dehydrated logs. During the nine-month spawn-run (incubation), soak your logs with a sprinkler or soaker hose for 2-3 hours once or twice a week, or by immersing them for 12-24 hours about every two weeks, depending on the weather. The idea is to maintain 45-60% internal log moisture content. It is equally important to **ALLOW THE BARK TO DRY BETWEEN SOAKINGS** to discourage weed fungi. Do infrequent deep soakings and frequent light ones. Flip the logs end-over-end every few months to reduce the accumulation of moisture in one end of the log.



Fruiting The spawn-run requires at least one warm season. *The mycelium produces mushrooms in response to stress, such as a rapid increase in moisture and a sudden drop in temperature.* Once fruiting has begun, keeping optimal temperatures and high humidity will produce higher yields and uniform quality. Fruiting is close when white splotches of mycelia appear at the ends of the logs. The first harvest occurs naturally after a cool Fall or Spring rain. You can choose to let the logs fruit naturally with an occasional deep soaking during hot, dry weather. This "natural" fruiting method yields lots of mushrooms in the Spring and Fall, but few or none in the Summer and Winter. The other method is forced fruiting:

Forced Fruiting for Daily Harvests To simulate Spring and Fall conditions, a log is immersed in clean cool water for 24 hours. Within 2-4 days, buds (primordia) emerge from the log and attain maturity in 4-6 days. To harvest, cut the stems close to the bark with a sharp knife. Place the mushrooms in a paper bag, which can be stored at 34-41°F for up to a month. After fruiting for 7-10 days, the harvest tapers off. The mycelium now needs 6-8 weeks to digest more of the wood for the next fruiting. In this "resting" stage, the logs may be crib-stacked (see figure) in a sheltered place and covered to allow *slow drying*. While excessive drying of a log can kill the mycelia, allowing rain to soak "resting" logs causes premature fruiting, small harvests at the next soaking, and contamination in the closely-stacked logs.

For Year-Round Continuous Harvests, separate and label your logs into 5 or 6 stacks. Rotate each stack through the soaking tank and fruiting area every 6-8 weeks. An indoor space or greenhouse kept around 70°F allows year-round production. Logs to be fruited in the Winter and Spring are also **rested** indoors, since mycelia does not feed if the average temperature drops below 50°. To reduce heating costs, force-fruit the wide-range and cold strains in cold months, and the wide-range and warm strains in warm months. On average, each log yields 1/4 lb per fruiting, or 2-4 lbs. over the lifetime of the log. The best mushroom prices go for high-quality mushrooms and reliable deliveries to restaurants, produce, and health-food stores.



Inoculating during freezing weather: after inoculating, keep your logs indoors for about 2 months, covered with large plastic bags to prevent excessive evaporation. Otherwise freezing weather damage to the mycelium will delay fruiting for several months.

Growing mushrooms commercially? Our Commercial Information Kit includes:

1. The best manual for growing shiitake on logs year 'round: Growing Shiitake on a Continental Climate by Krawczyk & Kozak.
2. An in-depth article covering the financial aspects and payoffs of a shiitake log farm by Professors Baughman and Rathke.
3. Mushroompeople's mushroom marketing hints.
4. A flyer from a useful and entertaining mushroom newsletter, listing monthly wholesale prices of all cultivated mushrooms.
5. The Hot 50 Farm Marketing Tips.

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