MUSHROOM CULTIVATION

ON LOGS USING PLUG SPAWN

NORTH SPORE

SHIITAKE *Difficulty: Beginner*
Shiitake mushrooms can be grown using any of the log methods. They are a nutritious and medicinal mushroom that produces brown umbrella-shaped caps. Our particular strain is wide range and therefore will fruit in a larger range of temperatures.

OYSTER *Difficulty: Beginner*
Blue oysters can be grown on logs, in beds or in containers. They are the most common native strain of oyster mushrooms worldwide, often with single brown caps in the wild. This cultivated species can vary in color from grey to a steely blue. They tend to prefer cool weather and may fruit naturally as temperatures drop.

ITALIAN OYSTER *Difficulty: Beginner*
Italian oysters can be grown on logs, in beds or in containers. One of few species that may grow well on pine family trees, though yields can be lower or more inconsistent than hardwood substrates. Italian oysters have large pale brown caps. They grow well in a wide temperature range, often fruiting in mild summers and into the shoulder seasons.

SNOW OYSTER *Difficulty: Beginner*
Snow oysters can be grown on logs, in beds or in containers. As their name suggests they are snow white. They are cool to cold weather loving and therefore typically fruit during the cooler months.

GOLDEN OYSTER *Difficulty: Beginner*
Golden oysters can be grown on logs, in beds or in containers. This tropical oyster produces beautiful clusters with yellow caps which can be quite brittle when mature. They fruit naturally as temperatures warm up, preferring higher temps than blues.

LION'S MANE *Difficulty: Intermediate*
Lion's mane prefers the totem method but can be grown using any of the log methods. They produce a pure white cluster of icicle-like teeth. Lion's mane prefers to fruit during the cooler months.

CHESTNUT MUSHROOM *Difficulty: Intermediate*
Chestnut mushrooms can be grown in beds or by using the log inoculation method; trenching is advised after colonization. They have small brown caps resembling the color of their namesake nut. Chestnuts prefer to fruit during the cooler months. **Chestnuts have poisonous look alikes, be sure to properly identify them! Be familiar with the deadly Galerina autumnalis.**

NAMEKO *Difficulty: Advanced*
Nameko mushrooms can be grown in beds or by using the log inoculation method; trenching is advised after colonization. They are amber in color and known for their gelatinous cap. Namekos prefer to fruit during the cooler months.

REISHI *Difficulty: Advanced*
Reishi can be grown using any of the log methods; trenching is recommended if using the traditional log technique. **Ganoderma lucidum is a species that grows only on hardwoods. Ganoderma tsugae will not grow on hardwoods, we recommend hemlock wood.** Reishi has beautiful, waxy, reddish-brown shelf-like fruit bodies that are a highly prized immune-boosting medicinal. Reishi prefers to fruit during the warmer months.

HEN OF THE WOODS *Difficulty: Advanced*
Hen of the woods is difficult to cultivate. We recommend treating logs prior to inoculation and burying or trenching after colonization. Hen of the woods resemble small leaf covered hens. They can fruit during the more mild of the summer months through the cooler months.

CHICKEN OF THE WOODS *Difficulty: Expert*
Chicken of the woods is very difficult to cultivate. We recommend treating logs prior to inoculation and burying after colonization. Chicken of the woods have large bright orange and sulphur yellow fruiting bodies. They fruit in shoulder seasons as temperatures are changing, though more often as they cool.

SPAWN STORAGE

- Plug and sawdust spawn will store for six months to a year in a refrigerator. The fresher the better, but mycelium is pretty resilient. If you don't get around to inoculating right away, tuck it away in your refrigerator until you're ready. *Note: Pink oyster and almond agaricus cannot be refrigerated. Almond agaricus will keep at room temperature for six months while pink oyster is best used within one month of receipt.*
- Only open your spawn bag when you are ready to use it. Opening it prematurely will increase the risk of it molding.
- It is not ideal to use spawn for more than one inoculation day.

Is My Mushroom Spawn Moldy?

Mushroom spawn will naturally develop a white (or yellow for chicken of the woods), mold-like layer called mycelium. This branching network of threads is the primary body of fungi, the vegetative structure. A good analogy is if a mushroom is like an apple, then mycelium is like an apple tree. Seeing mycelium grow through your bag is normal and indicates healthy mushroom spawn. Break up your spawn bags thoroughly before use.

Often, mycelium is broken up in shipping, so it can appear less myceliated. Let it sit for a few days and it should bounce back.

EQUIPMENT

DRILL AND BIT

For plug spawn, we recommend a drill with a 8.5mm or 5/16" drill bit. If you are using a standard drill bit the bit can be marked with tape to ensure an accurate depth of 1" for either type of spawn.

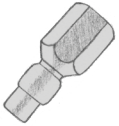
NORTH SPORE OFFERS A SPECIALIZED DRILL BIT FOR LOG INOCULATION WITH A STOPPER TO ACHIEVE THE CORRECT HOLE DEPTH.

WAX

All of the holes need to be sealed with hot wax (cheese wax, food grade paraffin wax, beeswax etc...) to prevent them from drying out and to seal them off from contamination. One pound of wax is enough to seal about 10 logs with some variability depending on the size of the logs and whether you choose to seal the ends. A wool dauber is a great tool for applying melted wax to your inoculated logs.

ANGLE GRINDER ADAPTER (OPTIONAL)

If you are inoculating several logs, you will find that an angle grinder adapter with an 8.5mm drill bit will help the work to go more quickly.



What Are The Little 'Dots' I Am Seeing In My Plug Spawn Bag?

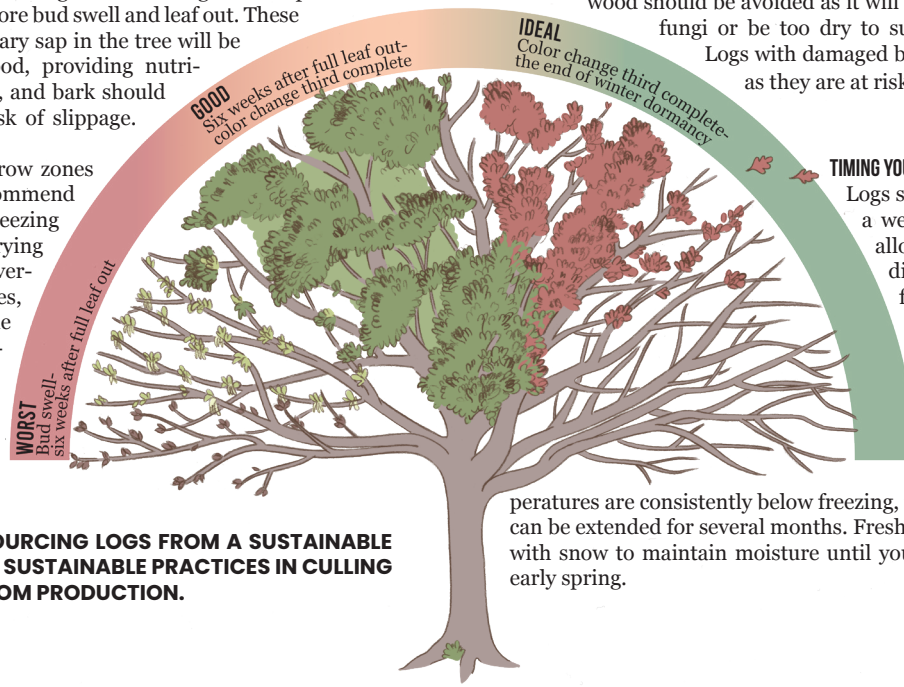
Millet! We grow out our mushroom cultures on a mix of nutrient-rich grains to help them transfer onto wood. They are totally normal and can be ignored in your inoculation process.

WHEN TO CUT YOUR LOGS

Healthy, living trees can be felled for mushroom logs nearly any time of year. It is not recommended to harvest logs during the spring between bud swell and full leaf out. During this time, most of the nutrients and energy of the tree are expended in a push to develop flowers and foliage, leaving little for fungal growth. Also, bark is loose, increasing the risk of damage during cutting. Intact bark is very important for the spawn run. Never cut dead, dying, or diseased trees for mushroom growing.

Timing log harvests with sap flow can help increase the yield and longevity of your mushroom logs. This typically coincides with dormancy cycles. Two ideal times for harvest are: during the fall, after ⅓ of tree leaves have changed color through leaf drop and in late winter to early spring before bud swell and leaf out. These are both times when sugary sap in the tree will be concentrated in the wood, providing nutrients for mycelial growth, and bark should be tight reducing the risk of slippage.

For fall inoculation in grow zones 7 and higher, we recommend protecting logs from freezing temperatures and drying winds. Logs can be overwintered in heated spaces, tucked away close to the walls of heated structures, or stored close to the ground and covered with leaves, blankets, and tarps.



WE RECOMMEND SOURCING LOGS FROM A SUSTAINABLE FORESTER OR USING SUSTAINABLE PRACTICES IN CULLING TREES FOR MUSHROOM PRODUCTION.

LOG SIZE

Any size logs will work. You can use branches or saplings, if that is what you have available. Small-diameter wood will colonize faster, but will not produce for as many seasons as a larger log. You don't want the logs to be so large or heavy that they are difficult to use. For drilling methods, a 4-6" diameter with a 3-4' length is ideal. For the totem method, they can be up to a foot (or more!) in diameter, and 6-18" high.

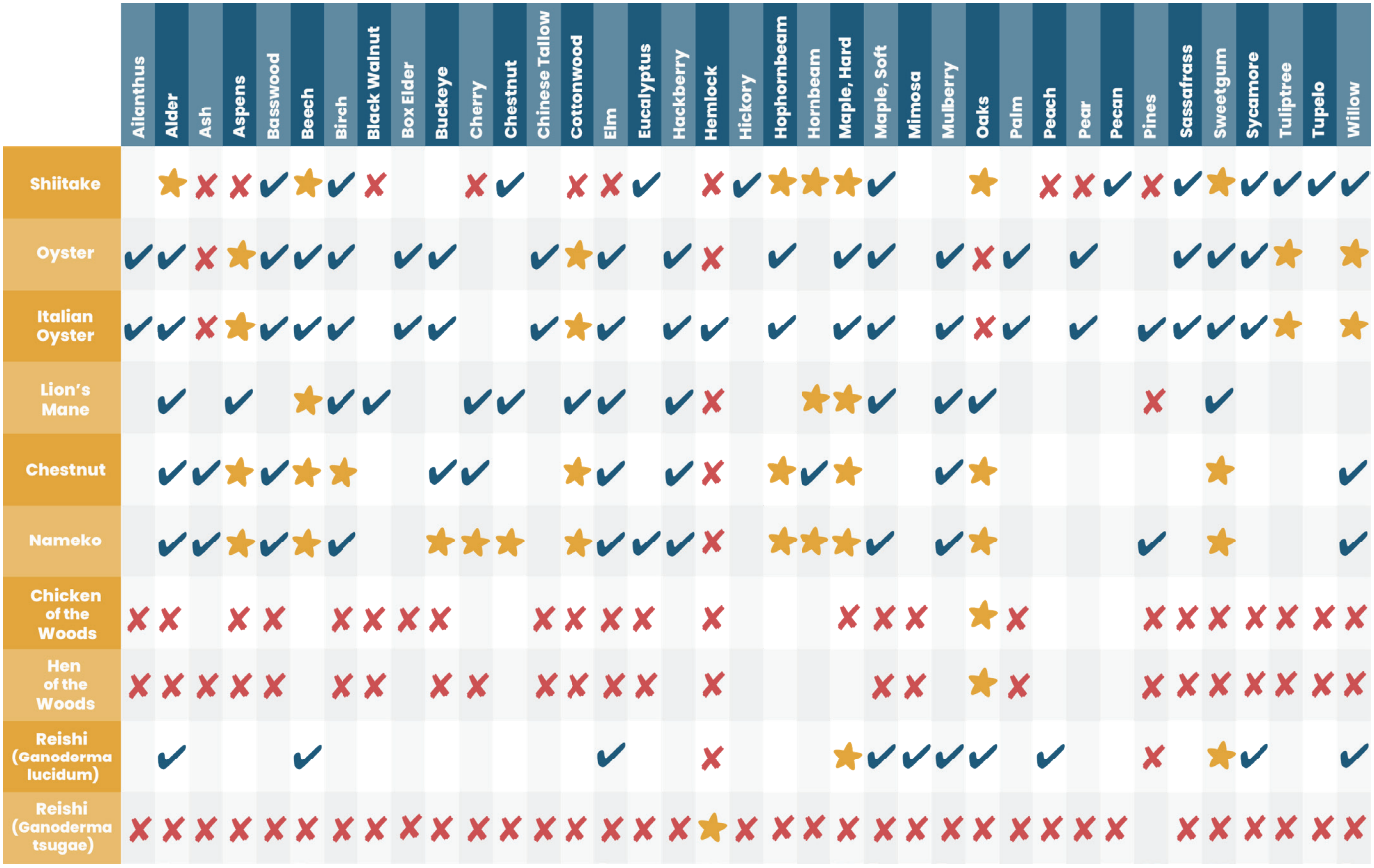
OLD VERSUS FRESHLY CUT WOOD

Only freshly cut, disease-free wood should be used. Old or rotting wood should be avoided as it will likely contain contaminant fungi or be too dry to support mushroom growth. Logs with damaged bark should also be avoided as they are at risk of more easily drying out.

TIMING YOUR INOCULATION

Logs should be inoculated within a week or two of cutting. This allows the cells in the tree to die but is not long enough for the log to dry out or for other competitor fungi to become established. One month would be about the longest reasonable stretch of time between cutting and inoculating your logs. When temperatures are consistently below freezing, the window for inoculation can be extended for several months. Freshly cut wood can be covered with snow to maintain moisture until you are ready to inoculate in early spring.

LOG INOCULATION SPECIES COMPATIBILITY CHART



KEY

- ★ BEST
- ✔ SUITABLE
- ✘ NOT RECOMMENDED

- BLANKS REPRESENT UNKNOWN OR UNTESTED
- FOR MOST MUSHROOMS, CONIFERS OR SOFTWOODS SHOULD BE AVOIDED

TRADITIONAL LOG METHOD

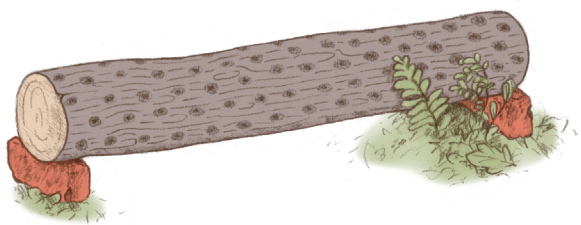
For drilling methods, a 4-6” diameter with a 3-4’ length is ideal. Larger logs can be used but you don’t want the logs to be so heavy that they are difficult to move.

1. Use a 8.5mm or 5/16” bit and drill to a depth of 1” in a diamond pattern all over the perimeter of the log, omitting the cut ends. We recommend spacing holes four inches apart in rows that are staggered two inches apart.

2. Place plugs into your holes and use a hammer or mallet if the fit is snug.

3. Brush melted wax over each plugged hole. We use a crockpot to melt the wax and a wool dauber or paint brush to apply it. The double boiler method can also be used. Sealing the holes is critical to success because it protects the spawn from drying out and from contamination. Keep in mind that it can be difficult to clean away the wax so allocating a thrift store crockpot or bowl to the job is a good idea.

For initial log colonization, wood can be stacked like firewood in a shady area of forest. At this stage stacks should be kept low to the ground where it’s more humid, yet out of direct contact with the forest floor. A pallet or pieces of scrap wood work well for this. After the colonization period is finished, restack the logs in a log cabin fashion for easy harvesting and airflow. Place in a shady part of your garden or in the woods.

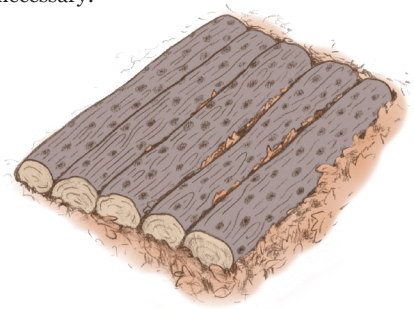


TRENCHING OR BURYING YOUR LOGS

Burying or partially burying logs has been found to be critical to the successful fruiting of a few specific species. The advantages of burying or trenching these logs include additional moisture around the logs, beneficial microbes in the soil and triggers for fruit body development including light and oxygen limited to a smaller surface area.

WE RECOMMEND BURYING OR TRENCHING HEN OF THE WOODS, CHICKEN OF THE WOODS, CHESTNUT, NAMEKO AND REISHI LOGS AFTER FULL COLONIZATION. One way to check if your log is colonized is by looking for mycelium on the ends of your logs. Mycelium does not always cover the entire end but should be visible on most of the end, either on the surface or under the wax. If no mycelium is visible you can use the average colonization time of the species you selected. If in doubt we recommend waiting approximately one year in areas with snowy winters while those in areas with mild winters could trench their logs after three seasons have passed. Keep in mind larger diameter logs will take longer to colonize.

In order to trench your logs dig out an area half as deep as the diameter of your logs in a shaded location. Reserve the soil you remove from this area. Place your logs in your dug trench in a raft formation. Then take your reserved soil and pack it around and between the logs so only the top surface area of the logs are exposed. For chestnut and nameko, wood chips or sawdust can be used in addition to or in place of soil. Water the area so the material around your logs compacts and add more if necessary!



STACKING YOUR LOGS

Fully colonized logs can be leaned against a support or stacked in the log cabin arrangement above for aeration and easy harvesting.

STUMP METHOD

Any size stumps can be inoculated, but they should be from freshly cut trees. All inoculated stumps should be located in a shady environment. Make sure you can identify the stump and you know what species of tree it is!

1. Girdle your stump by removing a two inch wide band of bark, make sure to remove both the outer and inner layers of the bark. This helps to prevent suckers from growing.

2. Use a 8.5mm or 5/16" bit and drill to a depth of 1" all over the top, sides, and exposed roots of the stump.

3. Place plugs into your holes and use a hammer or mallet if the fit is snug.

4. Brush melted wax over each plugged hole. We use a crockpot to melt the wax and a wool dauber or paint brush to apply it. The double boiler method can also be used. Sealing the holes is critical to success because it protects the spawn from drying out and from contamination. Keep in mind that it can be difficult to clean away the wax so allocating a thrift store crockpot or bowl to the job is a good idea.

STUMPS TAKE LONGER THAN LOGS TO COLONIZE BUT CAN PRODUCE FOR UP TO A DECADE.

HOW LONG WILL IT TAKE FROM THE TIME OF LOG INOCULATION TO HARVEST?

That will depend on what species you're growing, the size of your logs, and environmental conditions. Most mushrooms on standard size logs in temperate climates will take about a year to fully colonize before they fruit. This can vary between 6 months to two years. Smaller diameter logs and soft hardwoods will typically fruit sooner, though they'll have less longevity.

Often, mushrooms need cool weather and moisture to fruit. Growth slows in the heat of the summer. If you inoculate in the spring, you might get your first flush of mushrooms in the fall but most likely it will take a full year until you see your first fruiting. If you inoculate in the fall and are able to keep the mycelium from going dormant, you may get mushrooms as soon as the next spring, though more likely the following fall.

WHAT KIND OF YIELD CAN I EXPECT?

The general rule of thumb is one year of production per inch of log diameter. However, yields will vary greatly depending on the strain of mushroom, tree species used, whether or not it's forced and environmental conditions each season.

HOW OFTEN SHOULD I WATER MY LOG?

It's important not to let the log dry out but it's also important not to over-water the log. Logs should be stored in shady outdoor locations close to the ground. In temperate climates, they generally retain enough moisture to colonize fully without watering. During especially dry years, droughts, and in arid climates, watering may be necessary. Most of the time though, no supplemental watering is needed.

Logs shouldn't stay wet on the outside for long periods of time. Frequent light watering can even damage logs and cause contaminant growth. Long periodic soaking of no more than 24 hours is the preferred method of renewing water content should your logs appear dry or lose vitality.

NEVER EAT A MUSHROOM YOU HAVE CULTIVATED WITHOUT BEING ABSOLUTELY SURE YOU HAVE CORRECTLY IDENTIFIED IT.

CAN I ALLOW MY LOG TO FREEZE OVER WINTER?

Logs will be fine outdoors in the winter as mycelium goes dormant and does not die. A blanket of snow will help to protect the logs from drying out.

CAN I SOAK MY LOGS TO FORCE THEM TO PRODUCE MUSHROOMS?

Force fruiting works best with shiitake mushrooms. We recommend soaking your logs overnight and not more than 24 hours. You should allow your log to fruit once naturally (after a rainfall or other triggering event) before attempting to force fruit your log. Allow at least one month of rest before attempting to force fruit again.

Mycelium visible on the ends of colonizing logs.

SPORE REWARDS

We want to give back to you, as a thank you for choosing to take your mushroom journey with us. So we set up our Spore Rewards program! As a member you'll be able to save on all of your regular purchases, get special perks, and you can help us bring more folks into the mycological fold.

Ready to dive in? Find out more and sign up at:

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