Shiitake Mushroom Spawn Plugs

The shiitake mushroom (*Lentinula edodes*) prefers cool temperatures (45-70° Fahrenheit, 7-21° Celsius), and a high humidity (75-85% relative humidity). It requires filtered light such as that provided by a forest canopy – direct sunlight is too strong.

Richters certified organic spawn plugs are a major technological advance over traditional sawdust spawn. They make it much faster and easier to inoculate logs. No wax is needed to seal in the spawn because the styrofoam caps provide the seal when pushed into properly sized holes. You also get the benefit of the much faster spawn run and earlier “fruiting” compared to sawdust spawn.

**Plug Care On Arrival**

Each plug sheet contains 600 plugs, enough to inoculate 10-15 logs depending on diameter. The plug sheet may be cut into two halves for ease of shipping.

The spawn plugs you have received are at their peak. If you do not intend to use them within the next 10 days, refrigerate them at 2-5°C. The spawn will keep for a few months, however immediate use is recommended. If the spawn has been refrigerated, bring it to room temperature for a few days before using it.

Enclose the plug tray in plastic film to prevent dehydration. When handling, minimize exposure to ubiquitous contaminants such as bacteria and especially wild moulds.

**Log Preparation**

All hardwood can be used for shiitake cultivation. However the best is oak. “Shii” means “oak” and “Take” means “mushroom”. Other hardwoods will work in varying degrees. Maple tends to de-bark faster than oak so maple logs should be handled more carefully. Ironwood, beech, alder and others will all produce but with smaller yields.

You can only use FRESH LOGS. Old logs that have been laying in the bush for longer than six months WILL NOT work. They are either too dried out or contaminated with other fungi.

The best success is achieved with fresh winter cut logs. In other words they should be cut as the leaves are falling or later, and before the leaves come out in the spring. This will ensure the highest concentrations of vitamins and nutrients in the wood for the mycelium. Inoculation should take place in the early spring, when the temperature is above 10 C or 55 F. There is no point in inoculating at much lower temperatures as the spawn will not be very active. Ideally inoculation should be finished before temperatures rise above 18 C or 70 F as higher temperatures can lead to more contamination.

The diameter of the logs should be no smaller than 8cm or 3”. Small diameter logs of 8-10cm (3-4”) dry out easily and require more attention to prevent drying out; thicker logs 13-20cm (5-8”) or more in diameter will hold moisture better.

If your logs are cut in late fall or winter, inoculation can take place immediately in the spring. If however they are cut just before leaf out, it is advisable to leave the logs for a month to dry out a bit and kill the cells. If a log is used immediately after cutting it is still alive and will fight off the shiitake mycelium. Be careful however not to dry out the logs too much. Do not leave them fully exposed to the sun for long periods of time. The ideal moisture content should be close to 40%. If you think the logs are too dry you can soak, or sprinkle them with water for a day before inoculation.

**Log Inoculation**

Spawn plugs are used to inoculate winter-cut hardwood logs that have rested for at least 1 month. You need a drill with a 12mm or 0.5” bit. A depth stop is helpful. Drill holes should be drilled 1-1/8” deep. The holes should be in rows 8cm (3”) apart and should be 10-15cm (4-6”) apart within the rows. The rows should be drilled so that holes are not directly opposite each other in a square pattern but alternate in a diamond pattern. A typical 3-4 foot log needs 40-50 or more plugs per log. Pop the plugs out of the tray and push them in the drilled holes. The plugs should be snug enough to create a good seal. No wax is required.

Following inoculation the mycelium will colonize the sapwood. During this “spawn run” stack your logs flat off the ground in a shaded area. The ideal location is well drained with air movement. It is recommended that you water the logs once a week unless there is sufficient rainfall. The objective is to keep the moisture inside the logs high but allow the outside to dry so as not to rot the bark off. Logs should not be exposed to full sun – in winter keep logs covered if they are under forest canopy.

**Log Management**

After about a year the logs will be ready to “fruit” and with the proper handling should give you 4-5 years of enjoyment. The logs will produce mushrooms outdoors from May to
November, they can also be fruited in a greenhouse during
the winter months.

Briefly, shiitake is a saprophytic mushroom that survives
by breaking down the wood in the logs with enzymes and
using it as food. The mushroom organism (mycelium) established
itself in the sapwood under the bark of the log, and will start
digesting the heartwood as well. After it is established it has
gathered enough nutrients to try and reproduce itself, given
the proper environmental stimuli. The mushrooms that the
mycelium will produce are its means of reproduction. They
are the fruiting bodies of the organism, like the apples on a
tree. They carry the reproductive spores, which upon
maturation will be released to the wind. They are also quite
a treat to eat!

The most important facts to remember are that the
mycelium is adversely affected by lack of moisture inside
the log, and high temperature. To prevent those things from
happening the logs must be kept in the shade and must be
prevented from drying out inside. Shade can be natural, as
under trees or bushes, or man-made such as a shade cloth
or lathing which would allow rain to penetrate. Dehydration
can be prevented if there is enough rainfall on the logs or by
manually watering them. The integrity of the bark must also
be maintained. The bark is like the skin of the log, it keeps
moisture in and other organisms out. The logs should be
handled with care especially as they age and the bark
becomes more fragile. The outside of the log must be
allowed to dry to prevent molds from growing. Therefore
the logs need to be in well ventilated area and not in standing
water such as a swamp. Ideally the logs should be stood,
with one end on the ground, leaning against a tree, or you
can string a rope or wire between two trees or posts and
lean the logs on that. This prevents the mushrooms from
getting squashed or dirty when they come out and lets the
log absorb some moisture from the ground.

Generally a log will fruit spontaneously in the spring
producing a few mushrooms. To get larger and predictable
fruitings the logs must be “forced”. This forcing is achieved
by adding moisture to the log. Soaking the whole log in cold
water for 6-18 hours (older logs require less soaking as they
are more porous) is the best way to achieve this. However
irrigation with a sprinkler for about 24-48 hours also works.
The logs must also be “shocked”. This is achieved by the
movement if you soak them or by dropping them to the ground
when you turn them end over end, which you should do peri-
odically if you sprinkle.

Approximately a week after soaking or irrigation the logs
will start to “flush” with mushrooms. From the time you see
little mushroom pins coming out, to maturity depends on the
ambient temperature. Spring and fall usually is slow, summer
fruitings can mature in a couple of days. The mushrooms
should be harvested shortly after the veil has broken under
the cap revealing the gills. After the harvesting the logs should
be left alone so the mycelium can re-energise itself. This
means six to eight weeks rest, then the soaking can be
repeated. Three to four harvests can be produced in one
season producing in total 1-2 kg. of mushrooms. Less
frequent soakings thus allowing the mycelium to store more
nutrients will generally produce larger mushrooms. The logs
will last with proper care for an average of five years.

Feedback
We welcome your feedback on your experiences. The
information you provide will help us refine our recommendations
to other enthusiasts. Please email your comments to InfoSheet
Feedback at feedback@richters.com.