

Chapter 4:

The Laying Yard

The laying yard is where inoculated logs are stored while the spawn runs. This may be inside or outside. How logs are stacked and the environmental requirements are similar for both. Therefore, the term "laying yard" can refer to an outdoor or an indoor location.

Location of Laying Yard

The topography, altitude, latitude, and amount of shade affect how easily logs become contaminated. The initial yard should be a location not previously used for cultivating shiitake and should be well away from areas previously used in cultivation. Like crops in a field, contaminants and pests will build up in an area if continuously used for the same crop. If using adjacent areas each year, then the direction of each new stack should be upwind from the previous year. The maturing yard can be the same area used from year to year.

If an area warms up rapidly after a rain and becomes too humid, it is more susceptible to contamination. If the yard is located where it receives a breeze after rain, the logs there will dry easily and be less likely to be contaminated.

The radiant heat from the sun creates heat in the logs and stimulates the growth of the spawn in the colder months. If the sunshine is too strong, it will raise the temperature too high inside the log and kill the spawn. The lack of heat from the sun can result in too much humidity, which is not desirable. For this reason, air movement is very important. If a log is inoculated in fall or winter, leave it unshaded during the first winter until April or so. After this time, shade is required until fall. The shade can best be provided by different conifer trees or by shade cloth. About 80 percent shade is generally ideal in the South.

Shade provided by a tree canopy is different depending on the type of tree, the size of the tree, and how dense the forest is. Generally, pine, cedar, and deciduous trees (not as good because of contamination) are used. The shade of oak trees is much denser than that of conifers so the spawn growth slows down on logs in their shade compared to logs stacked under conifers.

The type of conifer is also important. A pine forest is ideal because it allows good sun exposure and is drier than most other conifers because of the air movement. However, if a forest is too thin, too much sunlight in summer can be a problem. Pine forests previously were considered less than ideal, but research has shown them giving the best results.

If artificial shade must be used, consider the percentage of shade it will provide, the air movement even when raining, economy, and weight. Plastic shade cloth is generally considered best because it is lightweight, durable, and inexpensive. It also provides the proper shade and allows good air movement. The shade cloth can be suspended 6 inches over the logs or about 7 feet off the ground. Plastic or nylon line is better than wire for suspending the cloth. Elevated shade is more costly and requires more support but is easier to work under. The shade covering can be overlaid with plastic to extend the fruiting season of some of the logs. In spring and fall, when changing temperatures and increased rains cause natural fruiting, some of the logs can be protected from the rain and fruited later to extend the harvest season. Place burlap over the logs to provide shade and hold moisture (Figure 9, next page). Remember that burlap can also reduce airflow and increase contamination.



Figure 9. Logs covered with burlap will hold moisture longer than logs in the open air. However, the increased moisture can promote rapid contamination.

Stacking the Logs

You can see the effects of temperature in winter and summer by observing the fruiting of different logs taken from a crib stack of colonized logs. The logs on top and the outside will be warmer in winter and, if soaked, will produce more mushrooms than the logs from the interior of the stack. In summer, the interior and lower logs will be cooler and, therefore, will produce more mushrooms when soaked.

Logs stacked in winter should be stacked far apart and placed where they will receive a maximum of sunlight to warm them up. Conversely, in summer, logs should be stacked in a shady area, more vertically and closer together, in order to reduce the temperatures. If logs are too close and have too much shade, the higher humidity may cause contaminants to flourish.

Several stacking methods have been used:

- A-frame stack
- Lean-to stack
- Triangle
- Crib stack

A-frame stack: A good method because the rain will hit all along the length of the log. Be careful not to make the horizontal support too high as this will make the stack too upright. A 45- to 60-degree angle to the ground is best (Figure 10).



Figure 10. In the A-frame stack, logs are at a 45 to 60 degree angle to the ground. Water will run off rapidly and it is easy to monitor logs.

Lean-to stack: This method provides the best exposure to sun and rain. Be sure the stack is at a 45- to 60-degree angle with the ground, and keep the number of logs in a row small. In this

method, it is best to stack downhill when stacking on hillsides to provide maximum exposure to the sun and rain while the logs lay almost horizontally (Figure 11).



Figure 11. The lean-to-stack provides the best exposure to sun and rain. If more than three logs are used per row it will be more difficult to spot log problems. However, fewer logs per row require more space.

Crib stack: This allows a large number of logs to be stacked in a small area, but the stack contains different microclimates and results are uneven. The more logs in a stack, the worse the results are. This method should only be used for incubating logs to provide high-moisture conditions (Figure 12).

Triangle: Logs are stacked to form a triangle on the ground and then cross-stacked to increase light exposure. This method provides more sunlight and air than the crib stack method and it is more successful (Figure 13, next page).

Firewood stack: If this stacking method is used to conserve space, separate logs with a small piece of lattice wood or shims to keep them from touching (Figure 14, next page). If logs touch for any period of time, the mycelium will grow from log to log and when they are moved, the bark will come off of one of the logs. Stacking logs this way will keep the inner logs cooler and moister, but may encourage *Trichoderma* (see glossary). Small



Figure 12. [Right] This crib stack method accommodates many logs in a small space. This stacking method is unsuitable for fruiting, since access to the logs is limited.



Figure 13. In the triangle stack, logs are stacked to form a triangle on the ground and then cross-stacked to increase exposure. This method provides more sunlight and air than the crib stack method.

shims, separating logs, may provide sufficient aeration for drying inner logs. Don't stack logs this way in winter if left outdoors; logs will stay too cool and mycelium growth will be slow.

Management of the Laying Area

During the spring, light is increasing in intensity, trees are budding, and rains usually come. The temperature is increasing, often accompanied by more wind. The inoculated logs begin to lose their vitality and contamination rates begin to climb. This is the most important time to work on creating the proper conditions in the laying yard.

Many books suggest that logs be turned every month or every 3 months, but tests have shown this practice to be unnecessary. In fact, the opposite may be true. Contaminants may begin on one end and then spread more rapidly when the logs are turned. The shiitake mycelium forms a fungistatic barrier against the other organisms in the log. If the log is turned, the contaminants begin to grow because the log dries out at the top, and the shiitake mycelium slows down.

Success or failure is usually determined during the time from spawning until the end of the first summer. This is the most critical period in the cultivation process. Pay careful attention to the conditions at that time. Spawn strains that grow slowly require more care.



Figure 14. Logs should rarely be stacked like firewood. Interior logs will not be ventilated nor will they receive much moisture. Once the mycelium begins to run, any logs touching will knit together and when the logs are moved, bark will be pulled off adjoining logs.

Growers must choose a location and stacking arrangement that favors fungal growth. Ideally, all logs should have equal access to rainfall and enough air circulation to allow log surfaces to dry out between rainfalls or sprinklings. Optimal conditions for shiitake growth are temperatures of 60 to 75 degrees F with a relative humidity of 80 to 85 percent. Experiment to find out which laying position works best for your site.

Factors that influence log moisture content and retention are as follows:

- Log species and diameter: Thick-barked species such as oak absorb water through the bark better than thin-barked species such as birch or cherry. Thin-barked species take water better through butt ends.
- Amount and duration of shade: Evergreens provide shade year round.
- Amount and duration of rainfall and relative humidity.
- Strength and duration of wind.
- Slope of the laying yard (southern exposure versus northern exposure)
- Position on the slope (windy ridge top versus cool damp valley)
- Surrounding vegetation