

# Straw Log Tek

by

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original source: <http://mycotopia.net/archives/discus/messages/5/26684.html>

The inspiration for this Tek came from reading Paul Stamets book, *Growing Gourmet and Medicinal Mushrooms*. He describes a similar process for growing Oyster mushrooms on straw in vertical columns, where the fruits only form at holes you have previously punched. This works great if you're working with a strain of edible which will cooperate that way, but many mushroom strains simply want to fruit wherever they choose. It is for those strains of edibles that this Tek is intended. Although all edible and dung loving mushrooms love fruiting on pasteurized straw, the author wishes to make clear that this Tek is intended for the cultivation of legal, edible mushrooms only.



The Tek assumes the grower is familiar with grain spawn production, because building a 36" log, which we will be doing in this Tek, requires from 4 to 6 quarts of colonized rye or corn. If you're using smaller than quart (.9 liter) jars of colonized spawn, you'll have to do the math to figure how many to use. More spawn is better, as fast colonization of straw is essential. The pasteurization process doesn't kill all the contaminants; it only renders them harmless for approximately two weeks. If the mycelium hasn't colonized the substrate by then, contamination naturally will occur. The pasteurization process also spares the 'good bacteria' which help the mycelium to naturally fruit better, as well as to help fight off contaminants. If one were to put straw into a pressure cooker and sterilize it, harvests would be much lower as a result of killing these beneficial bacteria, and it would be considerably more susceptible to contamination. I've worked hard to put together what I think is the most concise and easy to follow directions for pasteurizing small amounts of straw on the net today.

Pictures accompany every step. Don't cut corners, and you'll be guaranteed success. I've tried to shrink the pictures as much as possible without sacrificing detail, to make downloads faster. I would recommend the reader print a copy of the Tek for future use.

1) Ok, the first step is to get a bale of straw from the local co-op or feed store. If you can find organic straw, it is preferable, because any contaminant or pesticide that is in the straw is likely to end up in the fruit bodies. The feed stores in my area carry organic barley straw and it works great. I know that wheat straw would also work.

2) Using whatever tools are at your disposal, chop the straw into 1-3 inch lengths. This is VERY important. The mycelium simply doesn't like to colonize straw if it can't get inside the hollow interior of the stems. Consider any length of straw longer than your pinky finger as too long. It's a pain in the neck, but don't cut corners here. Your project will fail.



3) Once the straw is cut, put it in a Sterlite or Rubbermaid container (or anything else similar, like a clean trash can) and cover it completely with hot tap water. I use the sink sprayer, to wet the straw evenly as the container fills. When you have enough water in the tub, place a screen and weight over the straw to push it down under the water. It needs to 'pre-soak' like this for at least an hour, but not longer than 2 hours. This is to hydrate the straw.





4) During the time the straw is hydrating, you need to get the pasteurization bath ready. You will need a container large enough to hold 14-16 gallons of water, plus the straw. Place one Sterlite or Rubbermaid container inside another for the insulation properties the dead air space between them provides. A very large insulated ice chest would also work well for this. The idea is that you want to hold the temperature of the pasteurization bath for an hour and a half. Without insulation of some sort, the bath will cool off before the time is up and not be effective.



Don't start this process until the straw is soaking, or else the pasteurization bath will be ready before the straw is hydrated, and either you put the straw in too soon, while it's still dry, or the water cools off too much waiting on the straw. What you want is to have a temperature of 140F-160F, after you put the wet straw into the hot water bath. I've found the best way to do this is to heat up six gallons of water on the stove until it boils. The two pots you see in the picture add up to six gallons between them.



When you have six gallons of water on the stove boiling, place two gallons of plain hot tap water into the clean tub, before pouring the six gallons of boiling water into it. Immediately place the two lids on the container to hold the heat in. Refill the pots with another six gallons of water and set them on the stove to boil. When this water boils, it will make 14 gallons total so far. Just before pouring in the second batch of boiling water, it's a

good time to add the lime. Use  $\frac{1}{2}$  cup of hydrated lime for this recipe which uses 14-16 gallons of water. Be sure to stir the lime into the water very well. If you're making a larger or smaller batch, adjust the lime accordingly. This will give the water a ph of 12-13 before the straw is added. This radical swing in ph, along with the heat will render the contaminants inactive for a couple of weeks.



5) Once you've added the second batch of water, it's time to put the wet straw into the pasteurization bath. At this time, the temperature of the bath will be around 180F, but as soon as you add the wet straw, it will cool it down to the proper range of 140F-160F. Simply use your hands to lift the straw out of the bath, let it drain briefly, then place it in the pasteurization tub.



Once all the straw is in the bath, stir it around gently to lift any lime that has settled on the bottom of the tub. Place a screen (hardware cloth works great) over the straw, and put whatever object you have handy on top to keep the straw submerged. Don't worry about a few floaters that escape the screen. They will pasteurize just fine floating on the surface. You don't want to mash it all the way to the bottom or pack the straw tight while in the bath, because you want the hot water to be able to circulate throughout the straw during pasteurization.





Now, put the double lid on the tub to hold the heat in, and leave it alone while you go clean up all the mess you just made. Make a note of the time. Check on it after 45 minutes, and if the temp is approaching 140F, go ahead and add a couple more gallons of boiling water to bring the temp back up. Don't worry about adding more lime. After an hour and a half, it's done. Don't go more than an hour and a half either, or you'll kill too much of the 'good bacteria'.

6) Ok, it's been an hour and a half and it's time to take the straw out of the pasteurization bath. Place the screen that was holding the straw submerged into the bottom of a clean tub, and transfer the straw to this new tub to drain/cool.





Cooling will take an hour or more. Don't waste all your hard work, by spawning hot straw. It will kill the mycelium. Leave the lid off the tub so air can get to it, and if it's cool outside, take it there. Don't worry about contaminants landing on your straw; Millions of them will, but with the high ph of the straw, they won't be able to grow for at least two weeks, and your log will be pinning by then anyway. By that time the mycelium will be strong enough to fight off all invaders.

7) Now that your straw has cooled to room temperature, it's time to move it from the screen it's been draining on, to a clean tub for spawning. (You DID wash the pasteurization tubs while the straw cooled didn't you?) Don't squeeze it out or anything. The water that drains naturally while the straw cools will leave it at the right moisture content for spawning. At this time, cut your tubing to the appropriate length. We're making a 36" log, so cut it 18" longer than that.



Tie a knot in one end of the tube, and using a sharp kitchen knife, poke a few small holes in the plastic near the knot. These holes are to let the air escape as you pack the log. Take the 4-5 quarts of colonized grain or corn you have so carefully incubated, and beat them against a car tire to loosen up the kernels so they can be poured out into the tub of straw. I like to start with 2 quarts right on top of the straw.





Mix it into the top two to four inches only, before loading this top layer of spawned straw into your tube. Add another quart of spawn and mix it in, and continue the process until you reach the bottom of the tub, and your log is built. It seems to work better to thoroughly mix the spawn into the straw, as opposed to making a layer of straw, followed by a layer of spawn. This next part is **VERY IMPORTANT**. As you fill your log with straw, hold the straw in your hand, and gently sprinkle it down into the tubing, making sure it spreads evenly. You don't want big clumps of straw, with air cavities between them. After each handful or two of straw, stop and pack it down really tight with your hand.





Hold the tubing in one hand and pull up, while you stick the other hand down the tube and push down on the straw with all your might. I weigh close to 200 lbs., and I push down on the straw as hard as I can. It's very important that the straw is packed tightly into the tube. The mycelium can't colonize across large air gaps, so spread the straw out evenly, and push it down really good. Don't stand on it or use mechanical means to get it tighter. Just push as hard as you can with your hands, and that will be perfect.

8) Now that you've filled up your tubing to within 9 inches of the top, it's time to tie the second knot, sealing the log. Push the straw down really tight, and squeeze the neck of the tubing against the straw. Holding the tubing with one hand, spin the log around with the other to wrap up the plastic tubing so you can tie a knot in it. Just make sure you tie the knot right against the straw, so the tubing keeps the straw tight. Now lay the finished (almost) log on the floor, and with both hands, roll it gently back and forth, to even up the surface. Roll it like a piece of dough, to get it very smooth on the outside surface.



This is an important step to help achieve full colonization. Now, carefully take your log, and place it on the shelf you are going to incubate it on. Leave it alone for 3-5 hours, but not longer than 8 hours before doing this next step.



9) Almost done. Your log has been sitting for 3-5 hours now, so the moisture content has had a chance to equalize. All that packing during filling had pushed your moisture to the bottom of the bag. Some excess water may have run out the small slits you cut in the bottom of the tubing while you packed. That is good. Now, for the mycelium to colonize the straw, it needs a small amount of air exchange. It doesn't need a lot of air, just some. Also, you want to keep as much of the CO<sub>2</sub> inside the log as you can during colonization. I use a hunting arrowhead to punch holes into the tubing. You can just as easily use a sharp knife, or box cutter. Cut slits in a + shape about every 2 to 3 inches all along and around the log. The slits only need to be half an inch or so long. Just make sure no place on the log is more than 3" from a vent. The idea is to have a small amount of air exchange, while maintaining moisture content. Now, put your log into its final fruiting location, and don't touch it again until you see pins forming invitro. This will be in two to three weeks. The growing mycelium HATES to be handled, so resist the temptation to pick up your log, or otherwise disturb it. Let it be exposed to normal room lighting during colonization, and don't let the temps get too high. Room temperature is fine. With a marking pen, record the date and strain on the end of the log.

The logs will produce more than casings, and much faster than casings, hands down. Yeild is hard to pinpoint, because so many other factors come into play, such as the age of your spawn (senescence), vitality of strain, temps and humidity, your ability to LEAVE THE LOGS ALONE to colonize, etc. Here's the catch 22; larger logs yeild much better, but they are more likely to get bruised by handling if you move them in any way. I found by experience that smaller logs don't bruise as easily, but they tend to dry out sooner, and the fruits are smaller. Here's an example of how fast this works. This picture is the 36" log built 24 hours ago to demonstrate this tek. As you can see, the corn is already growing out.





The picture below is a log spawned 7 days ago. Almost full colonization!



10) It's day fifteen, and you have pins! You've noticed for a few days already, that you had full colonization. It's time to birth your log. Try to do this without moving or disturbing the log in any way. Use sharp clean scissors to carefully cut the knots off both ends of the log. You'll have to cut a circle around the knot to get it off. You can't cut the whole knot off in one snip, because it's up against your log, and you'd bruise the mycelium. Once the knots are cut off, carefully cut the tubing lengthwise along the top edge of the log, trying not to touch the mycelium with the scissors. Peel the plastic down and away from the log, exposing the entire surface to air, then gently and loosely fold it back into place. There should be lots of air gaps around the log now. Once each day, fold the plastic back, then immediately replace it. This will stimulate a massive pinning. You can cut another length of tubing to go over the top of the log where the seam is, to keep it from drying out. Be sure to cut lots and lots of holes in this plastic. All you want to do is slow down the rate of evaporation, so you don't have to mist. You do want lots of constant air exchange. If you see a great deal of condensation forming on the plastic sheeting, make the holes a bit bigger. As your log fruits, the mushrooms will push the plastic away from the log as they grow. Don't worry about the fruits being in contact with the plastic. It won't hurt or bruise them. They'll love the humidity, and you'll love not having to constantly mist.

original source: <http://mycotopia.net/archives/discus/messages/5/26705.html>

I've been working on this new TEK for a few months now, trying to perfect the process. I hope a bunch of you will try it and let me/us know how it goes. I think it's the next logical progression from the Laundry Basket TEK, because it completely eliminates the need to mist. The straw gets colonized inside a vented plastic tube, so the moisture and CO2 stays inside where it belongs. After the first few pins form (invitro), you cut the plastic off, and use it as a 'humidity tent' to allow air exchange while keeping the evaporation level under control, so the most awesome flushes can develop. I'll write the full TEK and post it here if anyone is interested. These straw logs produce the FASTEST and largest crops I've ever seen. The logs you see in the pix below were pinning on the 14th day after spawning with grain. The longest I've waited for pins to form was 18 days. Some were spawned with rye, and some with corn. I've made straw logs anywhere from 12" in length up



to 72". The smaller ones are easier to handle, and I've stopped making them any longer than 24" for that reason. The six foot log weighed in at over 100LBS, and was very hard to move after full colonization without bruising the mycellium. The fruits form in a full 360 degrees around the log, so the yield is incredible. You don't case, don't fan, and don't mist! The 48" log you see below produced 17 lbs of fresh mushies, including the 74 gram fatty, on the first flush, from less than a dollars worth of straw. It was spawned with 6 quarts of either rye or corn, I forgot which. (I've even mixed rye and corn together in the same log) The 72" log 'only' produced 18 lbs, because I damaged it quite a bit getting the plastic off. After full colonization, they don't like to be moved, because if the log flexes, it bruises the mycellium. Try to let them incubate where they will fruit at. I incubate mine on a shelf in a 72F room. Enough heat is produced by the mycellium running through the straw, that if it was in much warmer of a room, it would overheat and kill the myc. The 12 inch log shown below has over 100 pins on it, so I think smaller logs are the way to go.



Full Colonization. Invitro pins forming. The two spots you see at the left that aren't fully colonized is where I didn't pack the straw tight enough in the tube. You want to really pack it with all your weight, so it's pressed tight against the plastic tubing.



A 12 inch log that has just been 'birthed'. Use scissors to cut the tubing along the TOP edge of the log, and let



it serve as a 'tray' for the log to sit on. (you can cut another piece of plastic to lay loosely over the top to keep the humidity up, just be sure to poke lots of holes in it for air exchange) Also if you HAVE to move the log, use the plastic so you don't touch the log.



The same 12" log, 24 hours later.





This is a 48" log, 24 hours after birthing.



The same log, 48 hours later. Notice how the pins just exploded! I counted over 800 pins before I lost count. All on less than a dollar's worth of straw!





Here's a 24" log, on the second day after spawning. You can clearly see the mycelium growing out of the rye, and into the straw.



I've only pulled 5 aborts out so far! For some reason, they don't abort on the logs. I don't know why. I've had ZERO contams, probably because the straw colonizes so fast, and this is in a house with wall to wall carpet. Hell, I even build the logs on the kitchen floor. Can't think of a worse place, but it's all I have.





Hungry?