How to Use a Liquid Culture Syringe

A Brief Guide to Making Mushroom Spawn

www.fungaia.life

Dear Fungaian,

What a joy! You are a symbiont with the mycosphere.

Hopefully this guide offers some helpful tips, but for more information about making your own mushroom spawn, see www.fungaia.life/guides or invest in some great books for do-it-yourself mushroom growers:

- Organic Mushroom Farming and Mycoremediation by Tradd Cotter
- Radical Mycology by Peter McCoy.

Thank you for your work to foster fungi. The world could use a lot more people like you.

Fungaia is a homegrown, donation-based business. Your support is deeply appreciated, and helps to sustain a vision for creative education. If you have any thoughts, questions or issues, please get in touch. I'm here to help, and I'd love to hear from you.

Mush love!

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Liquid culture is pure, living mushroom mycelium suspended in sterile water. It is packaged in a syringe for safe transport, sterile storage and ease of use. A liquid culture syringe is the most affordable, reliable, convenient and efficient way to produce your own mushroom spawn at home, allowing you to enjoy the consistency of sterile culture technique without any specialized equipment.

If you don't plan to use this culture within a few days, store it in the refrigerator. While cultures are always most vigorous when fresh, they usually survive in the fridge for several months. If you wish to use the syringe more than once, see below for some extra precautions to maintain sterility.

Inoculation

For the most part, syringes are used to inject the liquid culture into a sterile environment, such as a jar or mushroom bag, outfitted with a sterile injection port to prevent the entrance of other microorganisms.

Create a clean workspace, free of drafty air. Wash your hands thoroughly. Use an alcohol swab to wipe the injection port on your jar or bag of sterilized material and sanitize the surrounding surfaces. It's best to perform the inoculation quickly to provide the smallest possible window for ambient spores to find their way into the nutritious substrate.

Shake up the contents of the syringe. Peel open the top of the sterile needle package, unscrew the syringe cap, and quickly twist the needle onto the syringe without touching it directly, if possible. Remove the cover from the needle and gently insert it through the center of the rubber plug into the bag. Careful, the needle is extremely sharp.

Steadily inject the contents of the syringe into the jar or bag, distributing the liquid over the contents. The more you add to each container, the more quickly the mycelium will "leap off," but you can also stretch it pretty thin, using only 1-2 mL per quart jar and 4-5 mL per 4 lb. bag. Remove the needle gently to avoid peeling the rubber. Wipe the injection port with the alcohol swab again, let it dry, and place a piece of tape over it for good measure. Gently shake the container around to distribute the liquid culture.

How to Make Your Own Mushroom Spawn

The simplest approach is an all-in-one grow bag of grain and mushroom substrate with an injection port, available from the Fungaia shop and many other vendors. The most affordable approach, especially if you intend to make a routine of it, is to prepare and sterilize the spawn yourself. See the resources listed below for more information about this technique. Here's what you'll need:

- **A sterilizer.** A good pressure cooker is an invaluable tool for the mushroom cultivator. They can be dangerous, so do some research and closely follow the manufacturer's guidelines.
- **Filtered containers.** Mycelium needs oxygen, so your container needs to allow for air exchange while keeping out airborne spores. The two most common cropping containers are mushroom bags and mason jars. Grow bag kits can be added to any purchase from the Fungaia shop for a $1 suggested donation. (If you purchased one with this order, the instructions are included separately.) Mason jars and soup containers are modified with "airport" lids. You can purchase these lids from other vendors or easily make them yourself.
- **Hearty mushroom food:** The most common type of spawn is grain spawn. I prefer rye, but any whole, unhulled grain or seed will work. Bird seed, oats, brown rice and millet are also popular choices.

Sterility: why all the fuss?

The basic principle of mushroom cultivation is to create the ideal environment and then let the mycelium weave its magic, providing what's needed with minimal interference. But there are many organisms that thrive in the same conditions, and not all of them are friendly, so the real trick is less about growing what you want and more about avoiding what you don't. This is why the most reliable way to grow a particular, desirable fungus is to give it a running start in a sterile environment.

Like most organisms, a fungus is delicate and vulnerable during the earliest stages of its growth. Once it "grows up" and achieves a sufficient biomass, it has a remarkable array of biochemical tools to ensure its survival. Making sterile spawn may seem like a lot of fuss, but the reward is well worth the trouble.

As long as the liquid culture syringe and needle stay tightly sealed, they should remain sterile. If you want to use part of the culture and then store the rest for later, it's worth going through a little extra trouble: wear gloves, sanitize surfaces thoroughly and work quickly to reduce the chances of contamination. Set the syringe cap on its side on a sanitized surface and replace it immediately. Rinse the used needle with water, and be sure to sterilize it before using it again.

Consider building or buying an alcohol lamp. The rising heat of a clean "working flame" creates a small, semi-sterile environment around it for inoculation. You can also use it to flame-sterilize a used needle. For best results, get the needle red hot, dunk it in alcohol for a few seconds, then pass it over the flame again to burn it off.

What Is Liquid Culture?

Mushrooms reproduce by *spore*. Spores are like seeds: each one is different. *Liquid culture*, on the other hand, is the mycelium of a single isolated fungal strain.

A good analogy is with apples: if you plant an apple seed, the chances are 10,000 to 1 that you will get sweet, tasty fruit. This is why apples grown for food are always *cloned*. A clone is genetically identical to its "mother," and retains the particular qualities of the fruit.

Mushrooms are often grown from spores, which leads to a remarkable amount of genetic variability. This is great for their long-term vitality, but the results are unreliable. When a desirable, productive culture is isolated from innumerable possible spore combinations, it can be cloned indefinitely and grown to maturity with consistent success.

Typically, the cloning process takes place in petri dishes in a sterile laboratory setting. A single petri dish can be expanded by many orders of magnitude, and ultimately give rise to thousands of pounds of mushrooms and billions of new spores, so great care must be taken at this early stage to prevent problems later on.

Liquid culture is the most efficient way to expand a mushroom clone for cultivation. The specimen is fragmented in a sterile, nutritious broth and fermented with constant, vigorous agitation.

A small amount of this liquid contains thousands of clusters of cells, all making separate points of simultaneous initial growth after inoculation. Invisible for the first days, the mycelium rapidly expands, finds its genetically identical counterparts, and fuses back into a single organism. To the observer it appears to suddenly explode into life.