SACRED MUSHROOM CULTIVATION COURSE

STUDENT WORKBOOK

SACRED MUSHROOM CULTIVATION COURSE

CONTENTS

MODULE

1

INTRODUCTION AND BASICS

WELCOME TO THIS COURSE!

We're beyond excited to finally share the **fungal wisdom** with you!

Our dream is one where people from all over the globe learn to love the beautiful symbiosis of art and science that we call **Mushroom Cultivation!**

And **you** are one of them! We truly believe that you, right now, are on the verge of becoming an ambassador for the fungus.

The knowledge you are about to obtain is infectious. Watch out. Your peers will see your success and also catch the disease that we like to call...

Mycophilia!

So, what will you actually be learning in this course?

- Where to get **all the cultures and equipment** you need for successfully cultivating mushrooms
- How to create a **sterile workspace**, wherever you are!
- How to propagate **mycelium from spores**
- How to train your own **strong and healthy mushroom cultures**
- How to **expand the mycelium** onto all kinds of substrates
- How to create the **ideal growing conditions** for your mushrooms

1.1 DISCLAIMER

We do not endorse nor condone the cultivation and use of psilocybin mushrooms, especially if it is not yet legal where you live.

This course is intended to educate responsible adults about all kinds of mushroom cultivation and psychedelic harm reduction.

You can **customize your learning experience** by starting this course with a (non-psychoactive) mushroom strain of your choice. Oysters (Pleurotus ostreatus) or Button mushrooms (Agaricus bisporus) work great for all the techniques we'll be learning in this course!

Fungi Academy and its affiliates can not be held liable for any action you take. We are not Doctors! We're experienced mushroom cultivators. Our intention is to educate people by sharing the lessons we have learned from our decades of experience. Please be responsible and seek professional attention when necessary.

SOME USEFUL INFORMATION

- The legality of Psilocybin worldwide
- Psilocybin decriminalization in the United States
- 10 Psilocybin studies in the last decade

We aim for mushroom cultivation skills to become *common knowledge!* **We envision a world where psychedelics are not only legalized, but normalized** for healing, self-development, and/or recreation!

Unfortunately, our culture isn't there yet. But that's where people like you come in.

What can you do to make sure every responsible adult can have access to this amazing medicine?

- Join a local Decriminalize Nature Initiative

Decriminalize Nature

- Donate to MAPS (Multidisciplinary Association for Psychedelic Studies)

MAPS
MULTIDISCIPLINARY ASSOCIATION FOR PSYCHEDELIC STUDIES

- Volunteer for an organization focused on Psychedelic Harm Reduction like Zendo or DanceSafe

ZENDO PROJECT

DanceSafe

- Talk with your family, friends and coworkers about psychedelic medicine

LET'S CHANGE THE WORLD TOGETHER!

1.3 HOW TO USE THIS COURSE

Here's a legend of all of the icons we use in this course:

THEORETICAL LESSON
Have your notebook ready!

PRACTICAL LESSON
Watch first before acting! We recommend re-watch a few times before trying the techniques yourself.

MODULE 1
Introduction to this Course.

MODULE 2
Spores & Cultures.
You will learn how to source and use different fungal expressions to grow your own mushrooms!

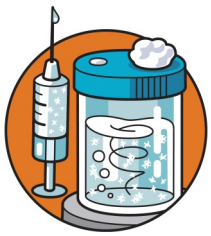
MODULE 3
Mushroom Cultivation Equipment.
The equipment you need to become a successful mushroom cultivator.

MODULE 4
Nurture your Mushroom Culture.
All about your Lab Space, Sterile Workflow,work with pressure cooker and agar.

MODULE 5
Mushroom Cultivation Principles.
Elements and Principles of Mushroom Cultivation and Beginner Mistakes to Avoid.

MODULE 6
Grain Spawn.
The equipment and environment types to work with grain, and how to prepare your grain properly.

MODULE 7
Liquid Culture.
The process of making and maintaining your very own liquid culture and Common Mistakes to Avoid



MODULE 8
Bulk Substrate.
Bulk Substrates and Additives, Fruiting Containers, Pasteurization vs. Sterilization.

MODULE 9
Storing Your Cultures and Spores. Storage Techniques, Making Culture Slants and Spore Prints, Storing in sterile water.

MODULE 10
Grow Mushrooms!
Fruiting, Harvesting & Storing Your Mushrooms. Getting Multiple Flushes from Your Monotub.

MODULE 11
Graduation!
Graduation!
Graduation!

Also you can find
ESSENTIALS INDEX
in Appendix

1.4 JARGON USED IN THIS COURSE

Here's a quick overview of some of the **jargon and mushroom cultivation terminology** used in this course:

Colonization
The process of a mushroom culture expanding and consuming a substate

Culture
A living mycelium structure grown in isolation

Field Capacity
The perfect water saturation level in a fruiting substrate (straw, horse manure, coco coir). Field capacity can be determined by squeezing the substrate lightly. If only a few drops of water drip out, the substrate is at field capacity.

Fungus
A member of the diverse Kingdom of Fungi; a single-celled or multi-nucleate organism that survives by decomposing and absorbing the materials in its environment.

Germinate
The process by which a plant or fungus begins to grow and develop. Plant seeds typically germinate into sprouts. Fungal spores germinate into hyphae to form mycelium.

Hypha, Hyphae (pl.)
The individual filaments of the fungus, hypha are single cells that grow into long tubes and weave together to form mycelium, yet never grow more than one cell wall thick.

Incubation
Setting the ideal condition for a fungus to colonize its substrate at maximum speed.

Inoculation
Intentionally introducing a living mushroom culture onto a substrate.

Mushroom
The fleshy, spore-bearing fruit body of certain fungi. Not all species of fungi produce mushrooms, but all mushrooms are fungi.

Mycelium
The main body of the fungus, mycelium consists of a network of fine filaments (hyphae) that weave together to form mycelial networks. Mycelium is almostalways in a state of continuous expansion in search of water and nutrients.

Mycophile
A person that loves mushrooms.

Pasteurization
A process in which mild heat is applied to a medium to kill the pathogens within. During pasteurization, about 80% of living organisms in the medium are killed. The remaining 20% prevent new pathogens from taking hold, kind of like security for your substrate.

Primary Decomposers
The 'first movers' of the fungal queendom. If anything dies, they are the first to start decomposing the organic matter.

Secondary Decomposers
A type of fungi that comes in after primary decomposers and also grows on animal feces (like the common Psilocybe Cubensis mushroom)

Spawn
A fully colonized substrate.

Spore
A fungal asexual reproductive 'seed' released by the fruiting bodies.

Sterilization
A process in which extreme heat is applied to a medium to remove, kill, and/or deactivate all forms of life in the medium.

Substrate
A food source and growing medium for fungi. It's like a house you can eat.

MODULE
2

SPORES AND CULTURES

From **spores** to **liquid culture** to **agar plates**, after this module you will know how to source and use a variety of different fungal expressions to successfully grow your own mushrooms!

At the end of your workbook you will find a list **"Where to find mushroom spores and cultures"**. We think it's a pretty amazing resource to help you get your mushroom cultivation journey started as fast as possible!

This lesson is all about fungal spores!

Want to learn more about how spores — basically the seeds of mushrooms — work?

Check out

Wikipedia

or read an amazing in-depth chapter about spores in

Radical Mycology

For mushroom cultivation purposes, we're interested in **three types of spore-containing vessels:**

- Spore Prints
- Spory Syringes
- Spore Swabs

SPORE PRINT

UPSIDES

- Easy to make, trade, and store millions of spores
- Easy to use and expand onto multiple agar plates
- Contamination can sometimes be spotted before use

DOWNSIDES

- High rate of contamination
- Can only be expanded onto agar plates
- Low success rate when expanded onto agar

SPORE SYRINGE

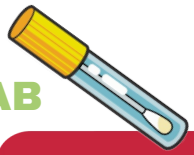
UPSIDES

- Versatile (can be expanded to agar or gains)
- Re-usable
- Easy to find online
- Easy to inoculate substrates with
- High success rate if sourced from reliable vendor

DOWNSIDES

- Intermediate/difficult to make yourself
- Difficult/impossible to see contamination until it is used

SPORE SWAB



UPSIDES

- Easy to use and expand onto multiple agar plates
- Contamination can sometimes be spotted before use

DOWNSIDES

- Intermediate/difficult to make yourself
- Can only be expanded onto agar plates
- Non-reusable

Liquid Culture (LC)
is, simply put, amazing!

When using liquid culture to inoculate any closed, sterilized substrate with a silicone, self-healing port, you do not need to work under **sterile conditions**.

In other words, you can work with liquid culture anywhere!

Liquid Culture is mushroom mycelium floating in a liquid substrate. Honey or corn syrup mixed into water and then sterilized is often all the ingredients and work that is needed to create your own liquid substrate.

Afterwards, it just needs to be inoculated with mycelium, then stirred every few days to create a beautiful liquid culture. The stirring oxygenates the liquid and breaks up the mycelium, speeding up its growth.

Stirring is *most easily* accomplished with a magnetic stirrer and stir-bar

But for a **cheap alternative method** you can always **add screws or marbles** to your LC before sterilization, then swirl the jar every day or two to oxygenate and break up the mycelium.

The only drawback to liquid culture?

It's prone to contamination and the contamination is hard to define.

Check this quick instructional article out to learn how to make your own magnetic stirrer and save a couple bucks.

We're going to go super in-depth into agar cultures in a future module.

So for now, we'll just touch on a few things.

We recommend using reusable petri dishes, whether they are **glass dishes** or

Polypropylene (PP5)

This is an effort to cut down on our plastic use.

That being said, most of the mycology community uses single-use plastic dishes. Why? They work and you never need to clean your dishes. If you decide to go that route, you can easily buy sleeves of pre-sterilized plates online.

But, for our United States and Puerto Rico growers, we have an even **better recommendation:** buying pre-poured dishes from our homie **MycTyson** for $1/plate!

You can get them here!

BONUS:

Since MycTyson is a Fungi Academy Friend, he's offering an 11% discount to all our students! Just use the code **FUNGIFRIEND** at check-out!

Cloning fresh or previously dehydrated mushrooms — known as a tissue culture — is a severely underrated way to get a new culture. You can clone:

• Wild Mushrooms

• Store-Bought Mushrooms

• Mushrooms you have cultivated yourself

Mushrooms are made out of mycelium so if you cut out just a little piece of previously unexposed mushroom — the inside of the fattest part of the stem is a great place to cut — and place it on a sterile agar petri-dish, voila, you have a new culture!

And if you do this technique with a store-bought mushroom, you end up with a commercial culture!

But the mushroom doesn't always need to be fresh. We've seen some people have success inoculating sterilized grain spawn with a dried mushroom cap!

There are even more reasons why cloning is such a great tool in your culture creating toolbox.

CLONING:

1. Allows you to **isolate desirable genetic traits** (big fruiting body, fast growing, massive canopy) and grow just one strain

2. Creates a culture that you know fruits and — if cloned from your own grow or from the wild — that fruits under conditions you can measure

3. Helps cut your gene pool down to only the traits you want with predictable results every time.

4. Is like saying: *"Look, there are the genetics I want right there,"* then going out, cloning it, and having that culture forever instead of trying to isolate cultures on petri dishes from germinated spores and never being sure of what you have until you fruit it.

Don't worry! We'll teach you all about how to successfully clone a mushroom in **MODULE 5**!

What about Non-Psychoactive, Edible, & Medicinal Cultures?

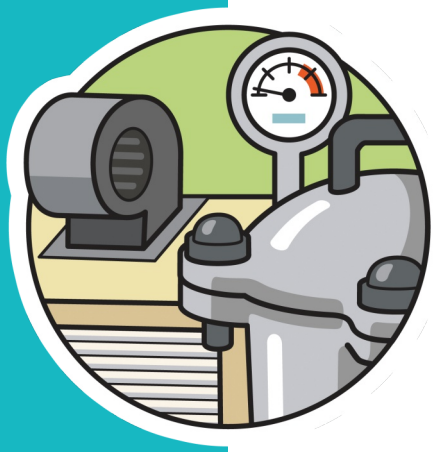
The Attachment **"Where to find Mushroom Spores and Cultures"** has a list of some of our favorite mushroom culture suppliers in the game! With so many mushrooms to cultivate and each species having its own unique requirements, we hope to soon offer a Masterclass Course for growing particular gourmet and medicinal mushroom species.

But for now, this course focuses on **Sacred Mushrooms** — Psilocybe Cubensis — and their ideal growing conditions and substrates.

Luckily, **most of the techniques you'll learn in our Sacred Mycology course are applicable to all kinds of mushroom cultivation!** In fact, both of us — Oliver and Jasper — started our mushroom journey cultivating Sacred Mushrooms before applying the same skills to successfully growing a wide variety of different gourmet and medicinal mushroom species!

Lion's Mane (hericium erinaceus) mushroom

MODULE
3



MUSHROOM CULTIVATION EQUIPMENT

MUSHROOM CULTIVATION EQUIPMENT

In this module, we'll take you through **all the equipment you need** to become a successful mushroom cultivator, and **why you need it!**

Here's a quick overview of the lessons in this module:

- Pressure Cooker
- Lab Equipment
- Incubation
- Fruiting Environment
- Substrate
- Sustainable Cultivation

To help you get started, take a look at the Attachment **"Mushroom Cultivation Equipment List"**, where you will find a description of all the equipment items you need and the explanation of why you need each piece.

Also be sure to check the **shopping list** we created with all the things you need for the course, as well as alternatives for the more costly pieces of equipment in case you're interested in a low-budget style of cultivation.

Keep in mind that **not everything on this list is essential.**

And if Amazon doesn't deliver to where you live, or you simply do not want to use the company, you can find most of the supplies at:

- **Hardware Stores** (Plastic boxes, silicone, jars etc.)
- **Gardening Stores** (Vermiculite, gypsum, coconut coir, seedling heat mat etc.)
- **Pharmacies** (Masks, gloves, alcohol, syringes, often you can ask them where to get scalpels, etc)
- **SuperStores** (Walmart etc.)(More plastic boxes, jars, scales, kitchen torches, spray bottles).

Meet the almighty

Pressure Cooker (PC)

- the **absolutely fundamental piece** of mushroom cultivation equipment.

In the Attachment **"Mushroom Cultivation Equipment List"** we help you source the best PC your budget can afford ⭐

But first, a quick explainer on PCs:

- When the pressure hits **15psi** (pound-force per square inch), the temperature is **121 Celsius (250 Fahrenheit)**.
- For most substrates, within 15 to 70 minutes at this temperature, all the microorganismswithin are killed, leaving you with a **sterilized substrate** — kind of like a blank canvas — ready to be inoculated
- If you can't get your hands on a PC that reaches 15psi, you can sterilize your substrate with a PC that reaches 10psi by simply **multiplying your cooking time by 1.75**.

WARNING!

DO NOT TRY TO OPEN THE PRESSURE COOKER BEFORE IT IS COMPLETELY DEPRESSURIZED (0 psi)! It can BLOW UP in your face! 💀

What are your options for a **sterile home mushroom laboratory?**

- A clean closed room without airflow
- A still air box (SAB)
- A Laminar flow hood (HEPA filter)

Containers to grow grain spawn in:

- Glass jars
- Glass bottles
- Polypropylene containers (PP #5)

Petri dishes for agar work:

- Glass petri dishes
- Polypropylene petri dishes ♻ (PP5)
- Small polypropylene food and sauce containers
- Single-use plastic petri dishes (pre-poured is an option). **Stay away from single-use plastics if possible**

Lab tools:

- Scalpel
- Glass, polypropylene ♻ (PP5), or ☹ single-use plastic syringes
- Thick gauge (14 to 20) syringe needles
- Good quality spray bottle
- Inoculation loop or a piece of wire (non-essential)

Other supplies:

- 70% Alcohol
- Hydrogen Peroxide (3% to 30%)

Check out the Attachment "Mushroom Cultivation Equipment List" for a full list of gear used in this course. There's also a handy shopping list to source your gear or use as a reference.

In mushroom cultivation, the **KEY** to incubation is **creating a clean, dark space where your mycelium can grow.**

The **ideal incubation temperature** for Psilocybe Cubensis mushrooms is **75 to 80F (24 to 27C)**.

To create an incubation environment in your home, you can store your cultures:

- Wrapped inside clean towels or blankets
- On a wire shelf inside a dark plastic container with a reptile heating mat at the bottom
- In a plastic storage container placed inside another plastic storage container with water between the containers and a fish tank heater submerged in the water (known as a tub-in-tub incubator)
- Inside a clean, dark, warm closet
- Inside a clean, dark, lightly-trafficked, warm room

Make sure you use a thermometer to keep your temperature in the happy zone.

PRO TIP!

Watch out for thermogenesis, where the mycelium creates heat as it expands and causes the temperature in your culture to be warmer than the ambient temperature around it. Don't worry. We talk more about this in our blog article **Common mushroom cultivation mistakes to avoid** Go take a look!

Fruiting is the next step after incubation, the final stage of your cultivation journey, and **the moment when your mushrooms finally grow!**

What do mushrooms need in the fruiting stage?

- Lower temperatures than during incubation
- Light (indirect sunlight or fluorescent light (6500 to 7000K works best)
- Fresh air exchange (FAE)

To create a fruiting environment in your home, you can build a:

- Monotub or mini monotub (**this is the main method we teach in this course**)
- Shotgun fruiting chamber
- Martha (check out our article "How to Build an Automated Martha Fruiting Chamber")
- Fruiting room

A mini indoor greenhouse, known as a Martha

Whether we say bulk substrate, grains, agar, growing medium, or fruiting block, they all basically mean one thing: **Mushroom food**

And in future lessons, you'll learn about all the different mushroom foods and how to create your own, including:

- Agar plates
- Liquid cultures (LC)
- Grain jars
- Bulk/fruiting substrates

But for now, we want to touch on the different roles mushrooms play in the environment and how that translates to their food.

Most mushrooms can be broken down into two categories: **Primary Decomposers** and **Secondary Decomposers**.

Psilocybe Cubensis mushrooms are secondary decomposers.

This means that in nature, they like to eat and grow on substrates that have already been somewhat decomposed, like manure or compost. That being said, Psilocybe Cubensis will also eat and fruit from coconut coir and/or shredded straw, which are not yet decomposed.

Primary decomposers include oyster mushrooms, lion's mane, reishi, and many others. They are first in line at the dining hall that is the forest floor, consuming organic matter that has not yet been decomposed. Some examples include straw, corn cobs, sawdust, and wooden logs.

Sacred Mushrooms fortify our bond with nature, allowing us to relate to her more deeply and care for her more intimately.

Unfortunately, due to the septic nature of mushroom cultivation, **the industry is plagued by the convenience of single-use plastics.** Most cultivators work with disposable, pre-sterilized, single-use petri dishes, syringes, scalpels, and grow bags.

Yet this doesn't have to be the case!

There are some great alternatives to single-use plastic in mushroom cultivation!

- **Metal and glass tools/jars** last for years and can be sterilized over and over in your pressure cooker.
- **Polypropylene plastic**, also known as ♻ **(PP5)**, can withstand the intense heat of pressure cooking, meaning they can also be resterilized! We use polypropylene instead of single-use polyurethane for our petri dishes.
- Plastic buckets and plastic baskets can be used for mushroom spawn and bulk substrate instead of plastic grow bag (aka Unicorn Bags).
- Wood-loving species like **Shiitake**, **Turkey Tail**, and **Oyster mushrooms** can be grown on logs in your garden or in a shady, moist spot on your property.

To conclude, **avoid single-use plastic as much as possible**

It's not only good for the environment. By walking a path outside the one most mycologists follow, you can find solutions, help and inspire others, and push mycology forward into an even more sustainable future!

We've even succeeded in growing sacred mushrooms outside!

THAT'S PERMACULTURE, BROTHER!

MODULE
4

MUSHROOM CULTIVATION PRINCIPLES

If you've been following along with us thus far, you're probably waiting for spores to germinate on your petri dishes. So, as you wait, we figured we'd use this time to dive a bit deeper into the mushroom cultivation process!

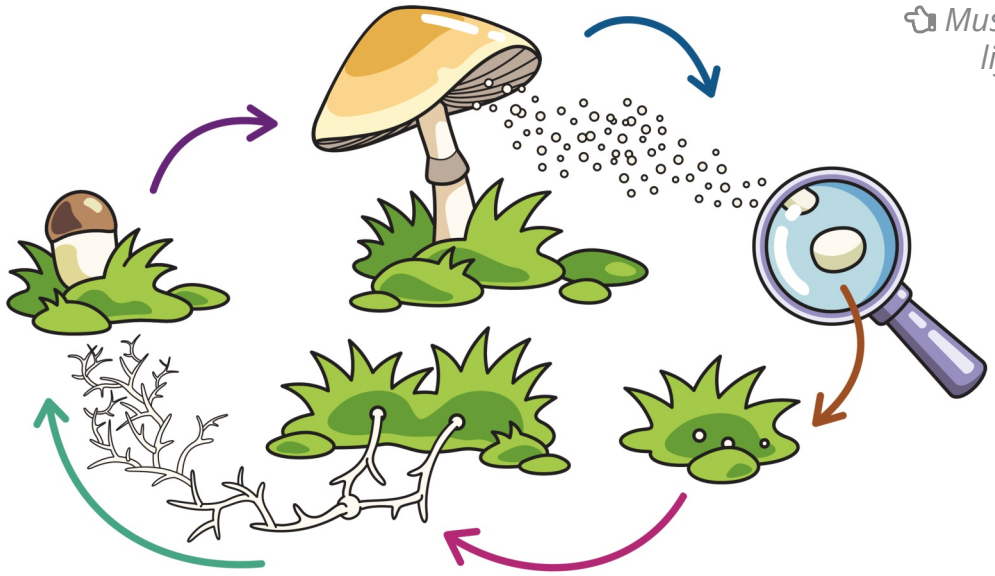
What you'll learn in this module:

1. The Mushroom Life Cycle
2. Four Elements of Mushroom Cultivation
3. Four Principles of Mushroom Cultivation
4. The Mindset of a Mushroom Cultivator
5. Vectors of Contamination
6. Beginner Mistakes to Avoid

After this module, you'll know all about how to treat your mushroom culture in the best way possible! You'll also know how to **successfully improve your technique**

to become a

MASTER MUSHROOM CULTIVATOR!



Mushroom life cycle

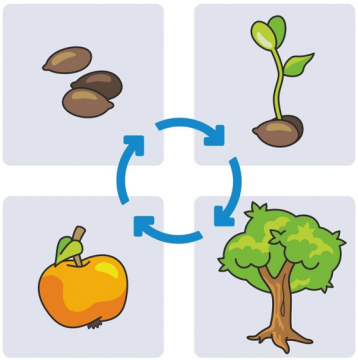
To understand the [mushroom life cycle], let's use **an apple tree as an analogy**:

Apple Seed = Mushroom Spore

Apple Tree Sprout = Mycelial Hyphae

Apple Tree = Mycelium

Apple = Mushroom



MUSHROOMS ARE NOT PLANTS!

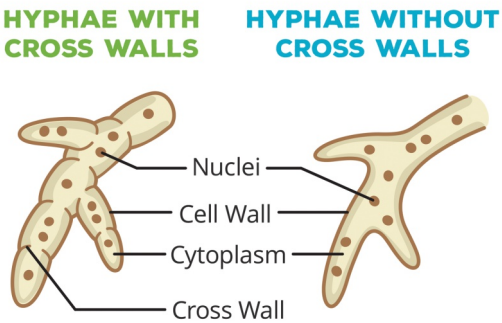
Fungi are actually their own Queendom in the [tree of life] and are **more closely related to animals than they are to plants!**

The queendom of fungi contains many Phyla, yet there are two particular fungal [Phyla] in the subqueendom known as [Dikarya] that we are especially interested in for this lesson:

1. [Basidiomycota] (Basido meaning "pin")
2. [Ascomycota] (Asco meaning "wine sack")

Hyphae (think apple tree sprouts) in the sub queendom of Dikarya **consist of a long line of single nucleate cells (aka haploid cells)**, each with different mating types! When compatible mating types meet, they can perform cell fusion known as [Plasmogamy]

These newly merged cells have just become a diploid cell and are now able to sexually reproduce!



If you want to learn more about fungal biology, we highly recommend checking out [this video]

ELEMENTS OF FUNGAL NEEDS:

1. Earth

Any quality mushroom substrate is **sterilized or pasteurized** (free of contaminants), contains plenty of nutrients (nitrogen, carbs, minerals) vital for strong, healthy mycelial growth, and is properly hydrated.

2. Air

Once your substrate has incubated and been consumed by mycelium, your mushroom culture wants a big breath of **fresh, oxygenated air**. This breath serves as a signal for the mycelium to start growing mushrooms. The mushrooms also need the oxygen to create **beautiful flushes of mushrooms!**

3. Water

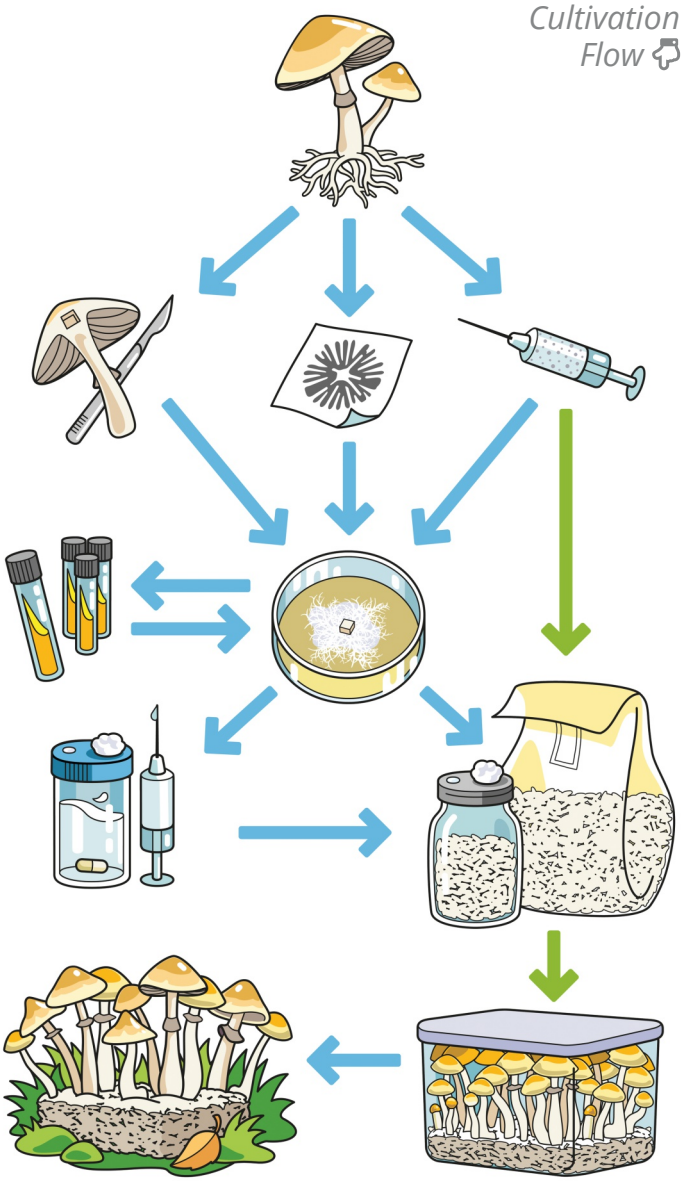
Water = Life! **Mushrooms are 90% water** so, to grow a bountiful crop of mushrooms, you're going to need water. Keep your culture hydrated and it will reward you! We love vermiculite for this reason: it holds water without making anything too wet!

4. Fire

Store your culture in too cold of an environment and it might not grow. Store it too hot and you might create a breeding ground for competition! As with life, i**t's all about** balance

PRINCIPLES OF MUSHROOM CULTIVATION:

Mushroom Cultivation Flow



1. Expand

Spores → Mycelium → Select the best part of the Mycelium (Rhizomorphic growth) → Grains or Liquid Culture → More Grains → Bulk Substrate → Mushrooms!!

Fungal mycelium is a living organism that desires and constantly seeks out new food sources. In other words, **keep your mushroom culture in one container for too long and it will transition into a digestive state, causing it to weaken**, grow slowly if/when expanded, and become prone to contamination.

In other words, **Move It or Lose It!**

2. Protect

Use sterile workflow and store your cultures in a clean, closed environment.

3. Fruit

Nothing is as satisfying as seeing your little babies grow into full-fledged fruits! The goal here is to create a **clean, controlled environmen**t that best emulates the natural conditions that cause mushrooms to fruit.

4. Have Fun

Having fun makes learning easier, which makes you more motivated and successful. If cultivation ceases being fun at any moment, **just take a break** and disengage for a moment.

THE MINDSET OF A MUSHROOM CULTIVATOR:

1. Think ahead

The best thing you can do when you're about to start any mushroom work is to **stop, close your eyes, breathe deep, and visualize what it is you're about to do**: the movement, the technique, the reason why.

2. Be Precise

A tidy house leads to a tidy mind. **Don't cut corners in mushroom cultivation and sterilization.** You'll end up saving five minutes at the front end and wasting hours of work, money, and materials on the back end.

3. Be Present

Be present, be mindful, be in the moment. It not only leads to perfect technique. It leads to a calm mind and steady hand. And don't forget to breathe!

4. Be Patient

"Nature does not hurry, yet everything is accomplished." Lao Tzu knew this. So does any successful, experienced mushroom cultivator.

VECTORS OF CONTAMINATION:

1. You dirty people

You aren't just a human. **You're the host of millions of other micro-organisms**. They're on your hands, hair, skin, breath, they're everywhere! We advise taking a shower, putting on clean clothes, and wearing gloves and a facemask before doing any mushroom cultivation work.

2. Air

The superhighway of all microscopic organisms. That's why we work with a Still Air Box!

3. Workspace

Metal or plastic working surfaces are best. **The most essential space that needs to be clean is EVERYTHING in your Still Air Box** (the box itself, tools, surface, etc.)

4. Technique

Quick, controlled, mindful, well-practiced movement is the goal. **Visualize all the steps you are about to perform BEFORE you act.**

5. Substrate

Insufficient or incorrect sterilization and pasteurization is a very common mistake for beginners. Don't worry, we'll go super in-depth about how to prevent this in future modules.

6. Tools

Petri dishes, jars, and syringes need to be sterilized in the pressure cooker. Scalpels and needles need to be flame sterilized before and while you work. Your work surface and bulk container need to be as clean as possible!

7. Pests

Insects and animals, like you, carry all sorts of junk on their bodies. In the wild, that's great for fungi since the insects and animals carry and spread spores. In the lab, it's disastrous.

MISTAKES OF BEGINNERS:

1. Poor sterile workflow

Contamination is the most common form of failure when cultivating mushrooms, and incorrect sterilization is the leading cause of contamination.

2. Impatience

Growing mushrooms is a meticulous and thorough process that cannot be rushed. Patience is a virtue.

3. Cutting corners

It's tempting to try and cut corners to save money, time, and/or materials. But usually, taking "shortcuts" ultimately leads to mistakes and is anything but short.

4. Succeed first, experiment later

Experimenting with new techniques is one of the most enjoyable and vital aspects of becoming a seasoned mycophile. But don't get ahead of yourself! Stick with proven methods until you're confident and experienced.

5. Working with poor cultures

You can do everything right but if your culture is weak, old, or tired, failure is the most likely result.

Check out our blog post on the

5 Most Common Beginner Mistakes to Avoid

Do not cut the corners

Opened too early

MODULE
5

NURTURE YOUR MUSHROOM CULTURE

INTRO TO AGAR

What is agar?

A gelatin-like substance derived from seaweed. In mushroom cultivation, it's what you pour into your petri dishes to grow mycelium. Agar powder is non-nutritious.

Why agar?

The unique two-dimensional mycelial growth that occurs on agar in a petri dish makes it easy to spot contamination and separate the good parts of the culture from the bad.

What can I do with agar?

You can use it to expand, clean, and breed new cultures, or save a culture from contaminated doom. Agar serves as the foundational building block from which you expand a mushroom culture onto larger substrates that eventually lead to fruiting your mushroom culture.

Some agar techniques include:

- Spores → Agar
- Tissue culture → Agar (cloning)
- Agar → Agar
- Grain → Agar
- Liquid Culture → Agar
- Agar → Grain (expansion)
- Agar → Liquid Culture

PRO TIP!

To keep your agar culture as healthy and vibrant as possible, we recommend **regularly transferring it to a fresh petri dish with a different agar recipe than its predecessor** to avoid senescence (genetic degradation).

Your mushroom cultivation space should be:

- Free of mold and contamination
- As still as possible
- Free of dust collecting materials like carpet, fabric, pillows

Some examples include:

- Clean basement
- Bedroom with a window you can close
- Bathroom

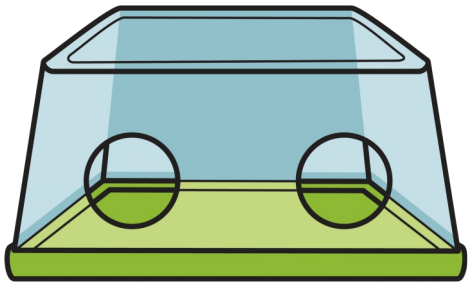
It helps if you are able to completely sanitize the whole space. But in our experience, you don't need to do this if you have a decently clean space!

The main idea is that you have a table that is **easy to sanitize**. Plastic and stainless steel tables are great! For this course, we are using a tiled table, which works fine, too.

Try to avoid wooden tables if possible, though a wooden table can also be used if your Still Air Box (SAB) has a nice, even, flat lid to work on. Just use the lid as the work surface.

Think of your SAB as your lab, because, well, it is!

So make sure it is very clean before beginning your lab work and try to limit unnecessary movement as your work inside it. **Remember, the goal is to keep the environment STILL as your work!**



A typical SAB

In sacred mushroom cultivation, **contamination is your biggest foe**.

That's why we work in sterile conditions: to create an environment for our fungal friends to **grow without competition**.

For successful, contamination-free mushroom cultivation, **work quick but not hurried**, **work clean**, and most importantly, **work on improving your technique!**

- To sanitize surfaces, spray them with a 70% alcohol/30% water mix in a spray bottle.
- To sterilize substrate, cook them in a pressure cooker at 15psi.
- To flame sterilize tools, heat it with a flame/blow torch until it is red hot.
- To kill off any unwanted spores, spray the area with a 5% to 30% hydrogen peroxide (H2O2) mix in a spray bottle.
- When working in a Still Air Box, the most important technique is to **reduce unnecessary movement**. This keeps the air inside still.
- Always wear gloves, a facemask, and clean clothes when doing lab work.
- Before doing any work, spray your work area and SAB with 70% alcohol and let dry.
- Before putting anything (tools, arms, petri dishes, jars, etc.) inside your SAB, spray it with 70% alcohol and let dry.
- Once everything is sprayed and placed inside your SAB and your work area is sprayed, dry, and ready, wait 15 minutes for things to settle before beginning your work.
- Don't forget to spray yourself down with 70% alcohol before putting your hands and arms into your SAB.
- And as you work inside your SAB, remember this adage: **Be quick, but don't rush.**

There are innumerable agar recipes. But aside from agar-agar powder, every recipe typically includes three main ingredients:

1. Carbohydrates/Sugars: Dextrose and Malt are very popular but you can use any kind of carb or sugar! Potato water, honey, and white sugar all work. Premixed agar recipes are also an option.

PRO TIP!

If you use honey or sugar, don't let it caramelize as it pressure cooks or the mycelium will struggle to eat it.

2. B-Vitamins: We use nutritional yeast (also known as "Hippie Crack") but regular baker's yeast works fine!

3. Minerals: Adding a pinch of gypsum provides some much-needed calcium and sulfur to your substrate! Happy food, happy mushrooms!

Our favorite recipe for P. Cubensis is:

MALT YEAST AGAR (MYA)

- 500ml of water
- 10g Agar
- 10g Malt
- 1g (nutritional) yeast
- 1 pinch of gypsum

**This is enough solution to pour about 20-25 plates.*

PRO TIP!

When mixing the solution prior to pressure cooking, use hot water so everything dissolves!

Want to try a different recipe? Use this basic recipe as a template and experiment away!

BASIC RECIPE

- 500ml of water
- 10g of Agar
- Any nutrient source you think could work (honey, glucose, dextrose, corn syrup, dog food, ...)

In mushroom cultivation, pressure cookers (PCs) are used for one enormous task:

KILLING EVERYTHING!

Muahahaha! More specifically, pressure cookers are used for **sterilization**.

You want a PC that can reach **15psi** (pound-force per square inch), which means it's **121 Celsius (250 Fahrenheit)** inside.

If you can't find a PC that reaches 15psi, you can sterilize your substrate at 10psi. Just multiply your cooking time by 1.75 and you'll get the same result.

EQUIPMENT LIST

- Pressure Cooker (Presto and All-American are two great brands)
- A metal rack so your materials do not directly touch the bottom!
- Material to sterilize (Petri dishes, agar, liquid culture, grain jars, tools, etc.)
- Tap water
- Aluminum foil

STEPS

1. Add about 1 inch (2-3cm) of tap water to the PC (add more water if you're sterilizing grain jars or fruiting bags, which take longer to sterilize and use more water).
2. Cover all jar lids, petri dishes, agar vessels, and tools in aluminum foil.
3. Place metal rack into PC.
4. Place jars, plates, tools, etc. on a metal rack, making sure nothing is touching the sides of the pressure cooker. **You can place a cloth or towel around the inside of the pressure cooker and use it as a barrier**. It will not burn or catch fire, trust us.
5. Put on PC top, make sure it is secure.
6. Cook for allotted time (do not start the timer until your unit reaches 15psi).
7. Turn off. **Do not remove the pressure valve! You want the pressure to release slowly from your pressure cooker**.
8. Wait 2 hours for the pressure to go back to atmospheric pressure (zero on the gauge) or leave it overnight to cool.
9. Take the pressure valve off the pressure cooker three minutes before opening it for lab work. Only open your pressure cooker in your clean working area.

PRESSURE COOKER TIMES
15 PSI

Grain spawn quart jars	70 min
Agar	30 min
Liquid culture blanks	15 min
Grow bags (10lb)	150 min

WARNING!

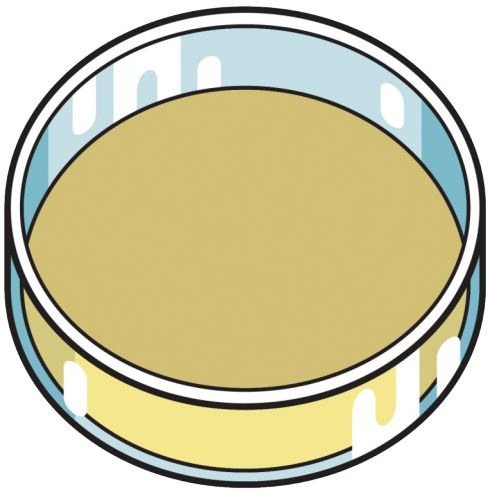
When pressure cooking agar, if using a vessel with a top, do not put the top on tightly. IT COULD EXPLODE WHILE COOKING Instead, use aluminum foil to cover the top.

PRO TIP!

If you add honey or other sugars to your agar recipe, try not to pressure cook it for more than 20 minutes at 15psi or **the sugars will caramelize** and it will be difficult for your mycelium to consume.

WARNING!

Never open a pressure cooker under pressure. IT IS VERY DANGEROUS
Very hot water can spray everywhere and the lid can shoot off with a lot of force.



EQUIPMENT CHECK-LIST

- Still Air Box (SAB)
- Spray bottle of 70% alcohol
- Gloves
- Mask
- Protective film (Parafilm, crafting tape, or cling wrap)
- Sterilized agar concoction
- Sterilized petri dishes wrapped in aluminum foil

STEPS

1. Make sure your workspace is prepared as explained in the Sterile Workflow lesson
2. Spray mask with 70% alcohol, let dry, put on mask.
3. Put on gloves and spray hands and arms up to your elbows with 70% alcohol, let dry.
4. Take your agar container and petri dishes out of the pressure cooker with clean, alcohol sterilized hands in gloves.
5. Spray the dishes and pouring vessel with 70% alcohol, place them into the SAB.
6. Spray yourself with 70% alcohol once more, let dry.
7. **Slowly** put your arms into the SAB.
8. Remove the tin foil from the plates.
9. Swirl your agar container to mix the liquid.
10. Remove the top from the agar container.
11. Take the lid off the lowest petri dish.
12. **Pour the agar in the petri dish, moving up the stack of petri dishes as you go**.
13. Let the petri dishes cool down so the agar solidifies. (⏱~ 30 min).
14. Once your agar solidifies, inoculate them or wrap them with Parafilm for later use!

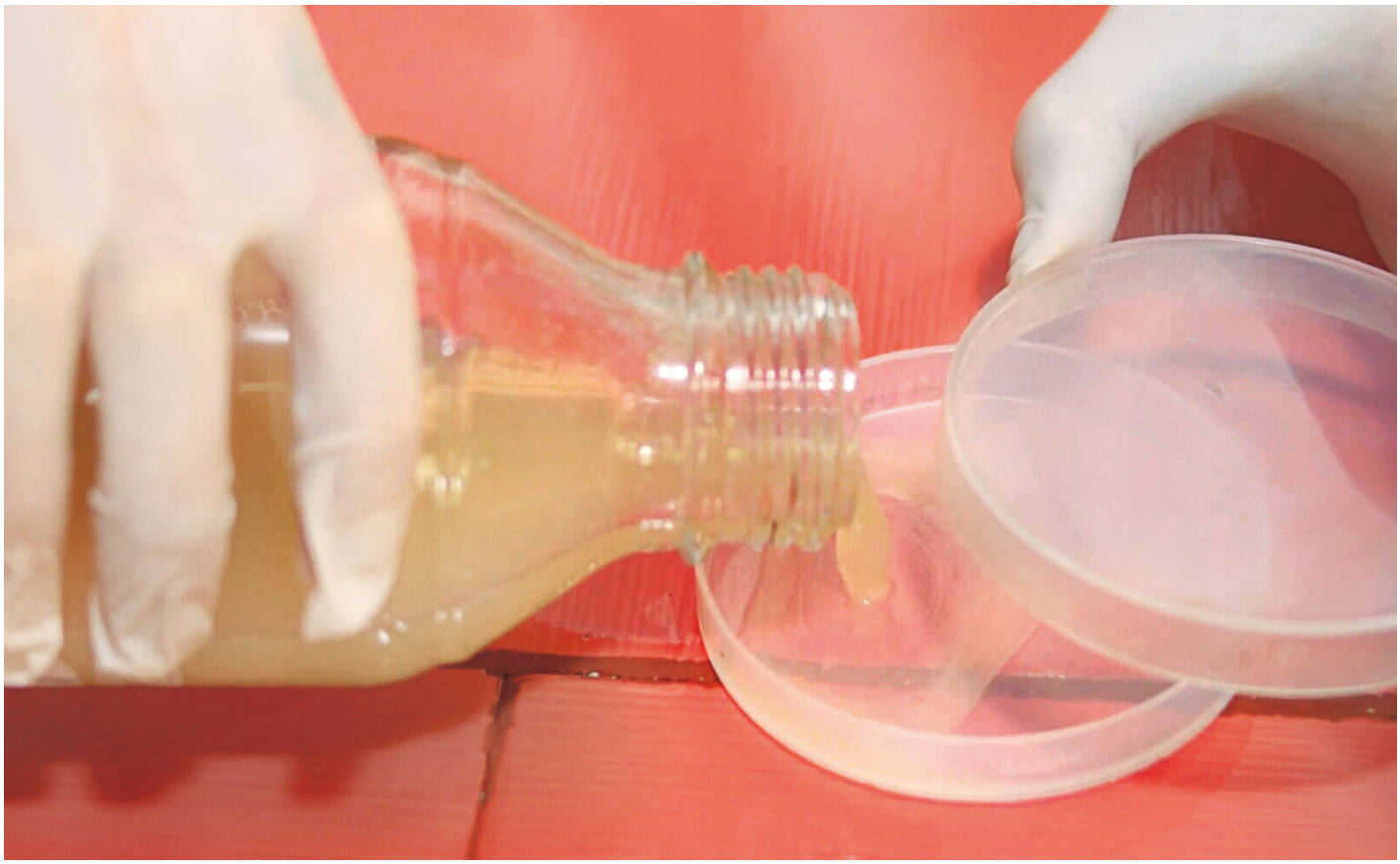
PRO TIP!

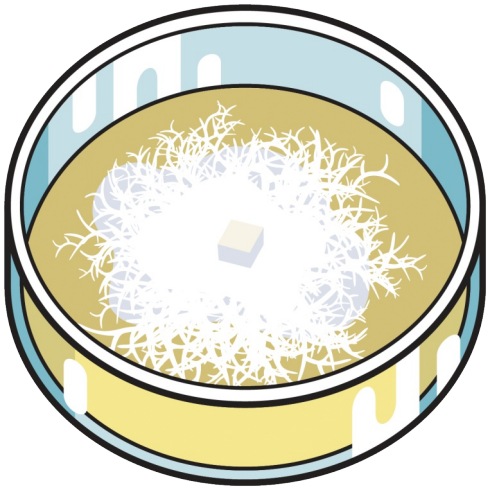
Put your warm, just used agar container or a clean, alcohol sanitized glass jar filled with hot water on top of your petri dish stack after pouring. This will prevent condensation from forming inside your dishes.

If wrapping your dishes for later use, store them in the fridge but keep two or three in your incubation zone. After a few days, check them. If they're contaminated, you know you made a mistake in the process of pouring or sterilizing.

WARNING!

Do not pour any agar onto the edge of the dish. This serves as a nutrient bridge for contaminants to enter your plates, increasing the chance of contamination.





EQUIPMENT CHECK-LIST

- Sterile, agar-filled petri dishes
- Scalpel
- Torch for flame sterilization
- Protective film (Parafilm, crafting tape, or cling wrap)
- Spray bottle of 70% alcohol
- Gloves
- Mask

TIPS PRIOR TO WORKING WITH AGAR

- Never open your culture in a non-sterile environment!
- Open your petri dish as little as possible and only as much as necessary.
- The proper technique to open a petri dish is to lift the top, tilt slightly, and slide it aside.
- Never put the petri dish top down anywhere! After opening the dish, keep the top in your non-dominant hand.
- Never touch anything with your scalpel other than agar. Not even your petri dish! If you do, re-sterilize the tool using flame sterilization.
- Mark down as much information as possible on your petri dish after inoculation. This helps you keep track of important information including:
  - Culture (e.g *P. Cubensis*)
  - Date (e.g *7/7/2020*)
  - Type of transfer (e.g *Agar 2 Agar* or *A2A*)
  - Agar recipe (e.g. *Malt Yeast Agar* or *MYA*)
  - Notes on technique, etc. (e.g. *touched the petri dish during transfer*)

This lesson is about learning two techniques:

- Spore Print to Agar
- Spore Syringe to Agar

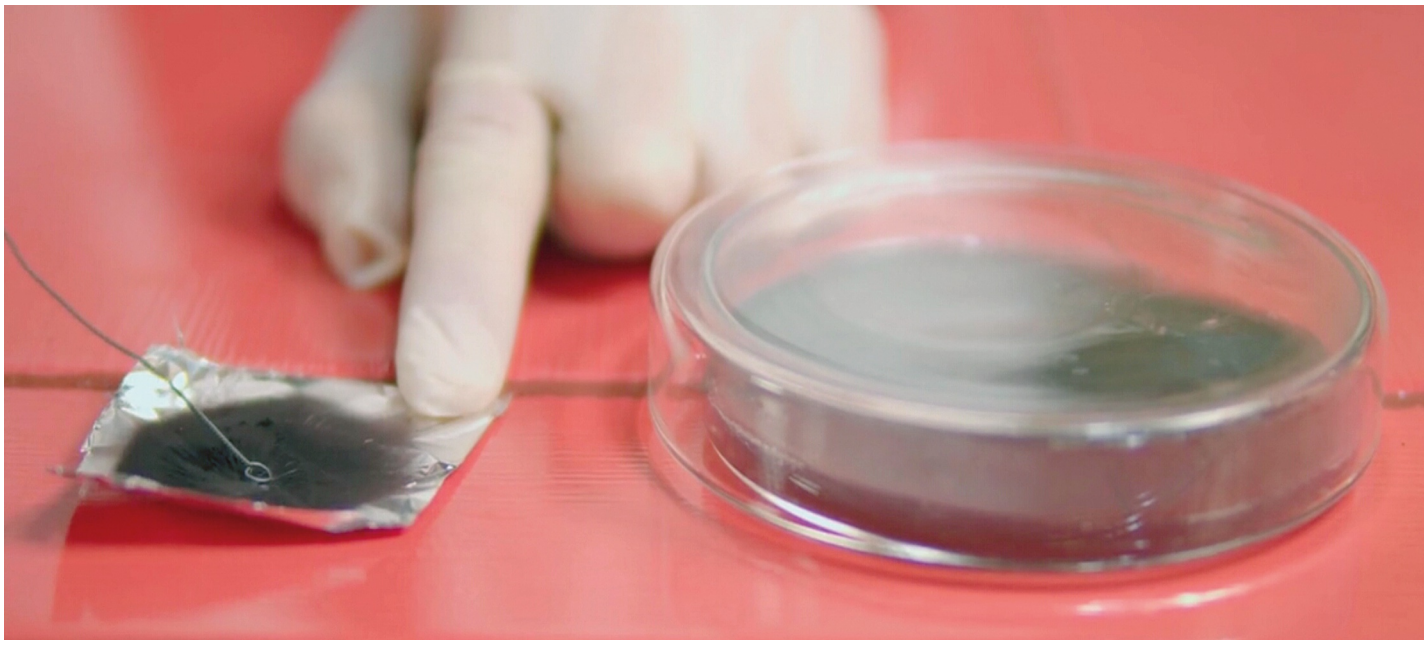
SPORE PRINT TO AGAR

EQUIPMENT CHECK-LIST

- Sterile, agar-filled petri dishes
- Scalpel
- Torch for flame sterilization
- Protective film (Parafilm, crafting tape or cling wrap)
- Spray bottle of 70% alcohol
- Gloves
- Mask
- Inoculation loop or similar tool (a scalpel is not ideal but will work)
- Spore print

STEPS

1. Make sure your workspace is prepared as explained in the Sterile Workflow lesson.
2. Spray mask with 70% alcohol, let dry, put on mask.
3. Put on gloves and spray hands and arms up to your elbows with 70% alcohol, let dry.
4. Spray your petri dishes and closed spore print with 70% alcohol, place into SAB.
5. Flame sterilize your tool, spray with 70% alcohol, place into the SAB.
6. Spray yourself with 70% alcohol once more, let dry.
7. Slowly put your arms into the SAB.



8. Remove the parafilm from your petri dishes.

9. Open your spore print.

10. Lift your tool with your dominant hand and scrape some spores from the print onto the tool.

11. Take the lid off the lowest petri dish.

12. Drag the spore-loaded part of your tool across the agar in a S or Z pattern.

13. Flame sterilize your tool.

14. Repeat steps 10 through 13, moving up the stack of petri dishes as you go.

15. When finished, wrap the petri dishes with parafilm.

16. Label the petri dishes with the pertinent information (culture, date, type of transfer, agar recipe, etc.).

17. Place into incubation.

TIPS

- Spores take a while to germinate before they begin to form mycelium. Give your plates at least 2 weeks to show signs of growth.

SPORE SYRINGE TO AGAR

EQUIPMENT CHECK-LIST

- ☑ Sterile, agar-filled petri dishes
- ☑ Scalpel
- ☑ Torch for flame sterilization
- ☑ Protective film (Parafilm, crafting tape or cling wrap)
- ☑ Spray bottle of 70% alcohol
- ☑ Gloves
- ☑ Mask
- ☑ Spore Syringe or Liquid Mycelium syringe

STEPS

1. Make sure your workspace is prepared as explained in the Sterile Workflow lesson.

2. Spray mask with 70% alcohol, let dry, put on mask.

3. Put on gloves and spray hands and arms up to your elbows with 70% alcohol, let dry.

4. Spray your petri dishes with 70% alcohol, place into SAB.

5. Flame sterilize your syringe needle, spray syringe with 70% alcohol, place into the SAB.

6. Spray yourself with 70% alcohol once more, let dry.

7. Slowly put your arms into the SAB.

8. Remove the parafilm from your dishes.

9. Lift the syringe with your dominant hand.

10. Take the lid off the lowest petri dish with your non-dominant hand.

11. Drop one to three droplets from the syringe needle onto the petri dish.

12. Repeat with other plates, moving up the stack of petri dishes as you go.

13. Once finished, wrap the petri dishes with parafilm.

14. Spray syringe with 70% alcohol, spray needle cap with 70% alcohol.

15. Place needle cap onto needle.

16. Label the petri dishes with the pertinent information (culture, date, type of transfer, agar recipe, etc.).

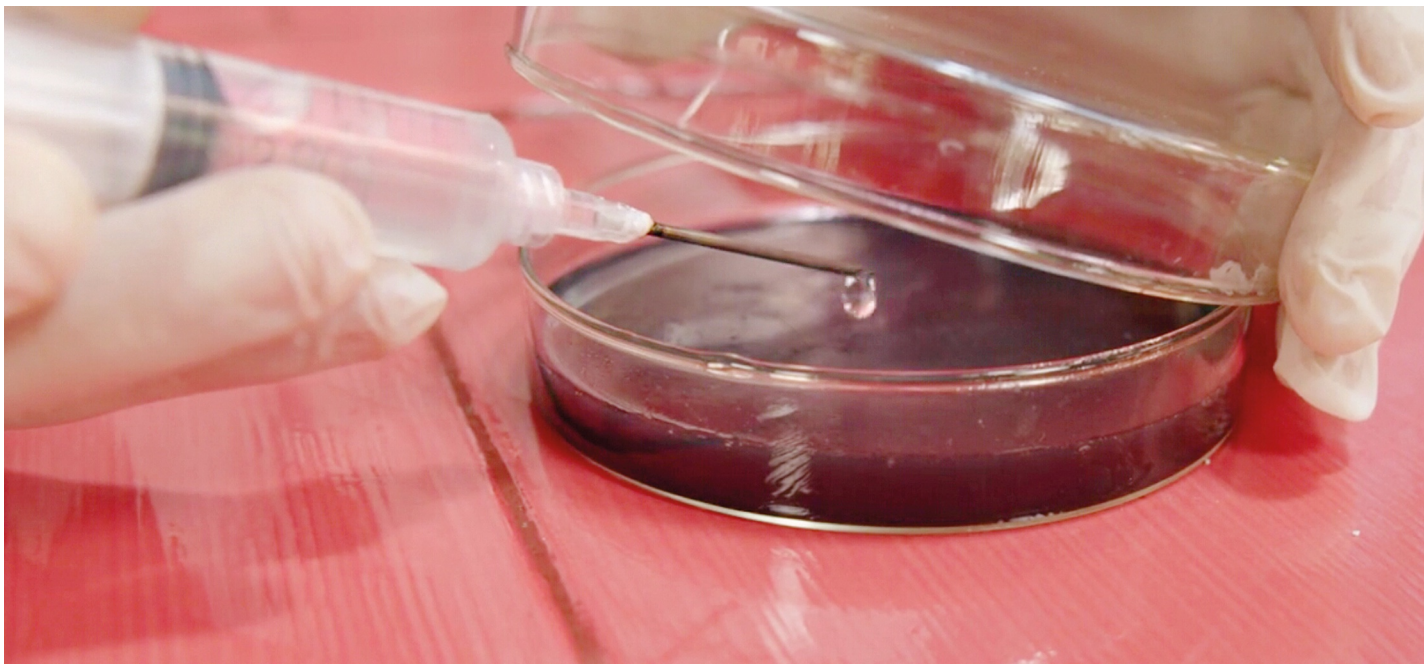
17. Place petri dishes into incubation.

18. Return syringe to culture fridge.

PRO TIPS!

Remember to flame sterilize the needle of your spore syringe and spray the spore syringe with alcohol before placing it in the SAB.

Try to drop 1 drop of the spore concoction onto the agar. 2 or 3 drops are fine, too. Just try to avoid a whole squirt/stream.



Cloning is one of the fastest and easiest ways to **select the best genes from your flush** and **cut down your gene pool to just the traits you want** (big fruiting body, fast growth, massive canopy).

EQUIPMENT CHECK-LIST

- Sterile, agar-filled petri dishes
- Scalpel
- Torch for flame sterilization
- Protective film (Parafilm, crafting tape or cling wrap)
- Spray bottle of 70% alcohol
- Spray bottle of H_20_2
- Gloves
- Mask
- Fresh, fat mushroom

STEPS

1. Make sure your workspace is prepared as explained in the Sterile Workflow lesson.
2. Spray mask with 70% alcohol, let dry, put on mask.
3. Put on gloves and spray hands and arms up to your elbows with 70% alcohol, let dry.
4. Spray your petri dishes and closed spore print with 70% alcohol, place into SAB.
5. Flame sterilize your scalpel, spray with 70% alcohol, place into the SAB.
6. **Spray mushroom with 70% alcohol, let dry.**
7. **Spray mushroom with H_20_2, let dry.**
8. Place mushroom into SAB onto an alcohol sanitized surface (empty petri dish, aluminum foil, etc.).
9. Spray yourself with 70% alcohol once more, let dry.
10. Slowly put your arms into the SAB.
11. Remove the parafilm from your petri dishes.
12. **Rip the mushroom open gently to expose the core of the cap/stem butt.**
13. Lift your scalpel with your dominant hand and **cut a small slice of mushroom from the core of the freshly exposed mushroom cap/stem butt.**
14. Take the lid off the lowest petri dish with your non-dominant hand.
15. Drop or scrape the fresh mushroom cutting onto the middle of the petri dish.
16. **Try not to let the scalpel blade touch the fresh agar!**
17. Return the top to the petri dish.
18. Flame sterilize scalpel.

19. Repeat steps **12** to **18** until you have finished inoculating your petri dishes, moving up the stack of petri dishes as you go.

20. Once finished, wrap the petri dishes with parafilm.

21. Label the petri dishes with the pertinent information (culture, date, type of transfer, agar recipe, etc.).

22. Place petri dishes into incubation.

23. Discard or dehydrate the mushroom for later use if it is salvageable (and you're desperate 😜).

PRO TIPS!

We cut from the inside of the mushroom because **it has not been exposed to the outside world before, meaning it is sterile.**

The fatter the mushroom, the better.

There are **three main reasons** we do Agar to Agar transfers:

- **Saving healthy mycelium** from a contaminated plate.
- Selecting the best part of the mycelium, **the rhizomorphic growth**, for further propagation.
- **Activating a culture** that has been in storage for more than 3 months.

EQUIPMENT CHECK-LIST

- Sterile, agar-filled petri dishes
- One healthy, colonized petri dish
- Scalpel
- Torch for flame sterilization
- Protective film (Parafilm, crafting tape or cling wrap)
- Spray bottle of 70% alcohol
- Spray bottle of H_20_2
- Gloves
- Mask

STEPS

1. Make sure your workspace is prepared as explained in the Sterile Workflow lesson.
2. Spray mask with 70% alcohol, let dry, put on mask.
3. Put on gloves and spray hands and arms up to your elbows with 70% alcohol, let dry.
4. Spray your sterile and colonized petri dishes with 70% alcohol, place into SAB.
5. Flame sterilize your scalpel, spray with 70% alcohol, place into the SAB.
6. Spray yourself with 70% alcohol once more, let dry.
7. Slowly put your arms into the SAB.
8. Remove the parafilm from your petri dishes, unwrapping the colonized petri dish LAST.
9. Take the lid off the colonized dish with your non-dominant hand.
10. Lift your scalpel with your dominant hand and **cut a roughly 1cm² piece of mycelium from the colonized dish**.
11. Repeat the cut as many times as the number of dishes you wish to inoculate.
12. Close the petri dish.
13. Flame sterilize the scalpel.
14. Wait for the air to settle in your SAB.
15. Take the lid off the colonized dish with your non-dominant hand.
16. **Use the scalpel in your dominant hand to scoop (not poke or stab!)** one cutting from the colonized dish, then return lid to dish.
17. Take the lid off the lowest sterile, agar-filled petri dish in your stack.
18. Drop or scrape the scalpel across the sterile, agar filled dish until the colonized agar cutting falls into the center of the sterile, agar-filled dish.
19. Return the lid to the top of the sterile, agar-filled petri dish.
20. Repeat steps 14 to 18 until you have

finished inoculating your petri dishes, **moving up the stack of petri dishes as you go**.

PRO TIP!

If your scalpel touches anything other than agar, flame sterilize it AND no matter what, flame sterilize the scalpel every 2 to 3 transfers

21. Once finished, wrap the petri dishes with parafilm, **beginning with the colonized petri dish first.**

22. Label the petri dishes with the pertinent information (culture, date, type of transfer, agar recipe, etc.).

23. Place the freshly inoculated petri dishes into incubation.

24. Place the colonized petri dish into your culture fridge for storage or, if completely used, discard.

PRO TIPS!

Gently lift the agar ON the scalpel. Try to avoid poking into the agar piece because it makes it more difficult to swiftly place it on the fresh agar plate.

Drag the culture slice into the middle of a fresh agar plate. It should fall onto the new plate easily.

In this lesson, you'll learn:

- How to spot different kinds of contamination often encountered during the mushroom cultivation process
- How to prevent contamination when working with agar

There are **two kinds of contamination** you encounter most often during the mushroom cultivation process.

1. Bacterial Contamination
2. Fungal Contamination

BACTERIAL CONTAMINATION

Bacterial contamination is typically encountered when working with agar, especially when cloning a mushroom or germinating spores. There are many different kinds of bacteria and they all look different.

Yet they all have one thing in common...they're slimy.

So, if you see some slime looking stuff on your agar, it's more than likely bacterial contamination. But that doesn't mean your agar culture can't be saved.

If there's mycelium that is not directly touching the bacteria, you can transfer the mycelium to a fresh agar dish and call it saved! And if you have a super strong culture, you can sometimes even let it battle the bacteria. Strong, healthy, developed cultures oftentimes overtake bacteria!

But for beginners, we don't recommend using a contaminated culture for further propagation.

Aside from improper sterilization, bacterial contamination is usually caused by contaminated:

1. Hands and arms
2. Working surface
3. Tools or inoculum (e.g. spores, mushroom, or myceliated agar)

Hands and Arms

Avoiding contamination caused by your hands and arms is as simple as wearing gloves, properly spraying your hands and arms up until your elbow creases with 70% isopropyl alcohol, and letting it dry before going to work!

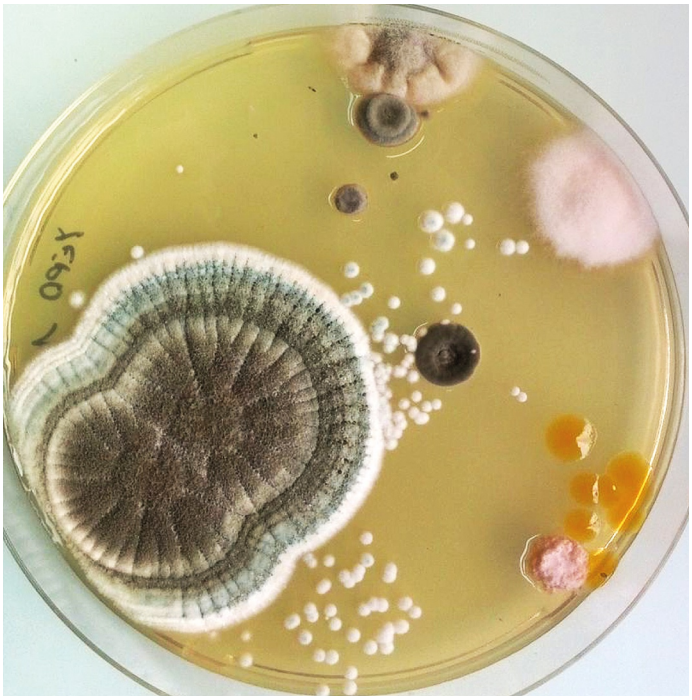
Working Surface

When you see contamination on the edge of your plate, it often times means that your hands/arms or working surface has been improperly sanitized or not sanitized frequently enough during your lab work!

Tools or Inoculum

Contamination caused by your tools or inoculum is easy to recognize because the contamination will start to grow from wherever you touched the tool to your substrate! Some people store their tools in 70% alcohol. Others throw their tools into the pressure cooker whenever cooking up some agar or grains. No matter what you do, just remember to properly and regularly flame sterilize the entire blade or needle as you work.

FUNGAL CONTAMINATION



Fungal contamination is usually fuzzy and looks like the mold you find on bread or fruit. Sometimes, they're quite beautiful, too!

As you can see, there are many different forms of fungi you may encounter. The little white dots are most likely yeast, while green molds can be a sign of a fungicidal fungus.

Any fungal growth besides yeast is probably the end of the line for your culture. Don't keep it around, or if you do, keep it far away from your healthy, non-contaminated cultures, and from any area where you do mushroom cultivation. Why? Because the fungus showing those beautiful colors actually means it is releasing its spores. And if those guys get out and about, you're going to have some real issues.

Aside from improper sterilization, fungal contamination is usually caused by contaminated:

1. The breath
2. Contaminated airflow like the air in your still air box
3. Working too close to your cultures/substrate

Fungal contamination can be prevented by practicing **quick, precise movement** in the laboratory. The less time your petri dish is open, the less chance there is that unwanted contaminants can sneak onto your petri dishes/substrates.

Which brings us to our last lesson for today:

To determine whether your contamination is due to the issues we've talked about in this lesson, or from something else, like improper sterilization or the actual act of pouring your agar plates, **we highly recommend leaving a couple of freshly poured agar dishes in your incubation area for a few days**. This way, if contamination shows up on these plates, you know it was your sterilization or pouring technique, and not something else, that caused the contamination.

5.11 THE EXTREMELY ANAL STILL AIR BOX TECHNIQUE

UIPMENT CHECK-LIST

- 1 Still Air Box
- 1 Old Towel/T-Shirt. Towels are best
- 1 big mixing bowl/bucket/or anything that can hold at least ½ gallon of water
- Bleach
- Water
- 70% Alcohol
- Paper Towels
- Plastic sheeting

STEPS

1. Make sure your workspace is prepared as explained in the Sterile Workflow lesson.
2. Mix 1 part bleach to 4 parts water in your bucket.
3. Put your towel/t-shirt into the water-bleach bucket.
4. Take out the towel and wring it out until it stops dripping water.
5. Place this damp bleach towel on the inside of the cover of your SAB. Make sure the towel is pulled tight so there are no wrinkles or bumps.
6. Put your SAB on top of the towel and cover. Lock the SAB into the cover.
7. Put down the plastic sheeting so it covers the SAB arm holes, if you have one.

Why do this technique?

The towel catches spores, bacteria, or any other things that could be floating around in the air inside your SAB. When these little particles hit the towel, they get soaked with bleach, are sanitized, and come to rest. Without the towel, these little particles would hit the surface you're working on and bounce right back up into your work area.

This technique is also great for beginners because if you make a mistake like dropping a jar lid, or a scalpel (don't do this), or even an agar slice, it's very likely everything will be fine because the towel is relatively free from contaminants.

PRO TIP!

Use plastic sheeting as a temporary cover for your SAB armholes. That way, if you've finished pouring plates but need them to cool off before wrapping them in parafilm, you can put the sheeting down, tape in secure, and be confident that nothing is getting into your SAB.

MODULE

6

GRAIN SPAWN

This module is all about grains!

There are a variety of grains mushrooms love to eat:

- Sorghum (milo)
- Millet
- Wheat
- Oats
- Rye
- Rice
- Corn
- Whole bird seed

It all works! We've even had success using cacao beans as a grain substrate! Feel free to use whatever is locally sourced, cheap, and easy to find in your area. Organic is best! Just **make sure it wasn't treated with any fungicides.**

Why do we work with grains?

- Almost all mushroom species will grow on grain
- Grains can be completely sterilized
- There's enough space between individual grains for the mycelium to move through
- Myceliated grains are easily broken apart for further expansion

In this Module you'll learn:

- What equipment you need to work with grains
- What kind of environments you can work in
- How to properly prepare your grain
- How to successfully transfer agar to grain
- How to successfully transfer grain to any other substrate

For more grain spawn fun, check out the fantastic article our friend Tony from Freshcap Mushrooms wrote on the different grains you can use.

Sorghum

When working with grains, there are **two stages and environmental conditions to consider:**

- Before Pressure Cooking
- After Pressure Cooking

BEFORE

In the **"Before"** stage, it doesn't really matter where you work. A kitchen is a great place, but you can work outside, too.

What does matter is how you prepare your grains!

If your grains are too dry, your mycelium culture won't have enough water to grow and will eventually die.

If your grains are too wet, you risk 'drowning' your mycelium Remember, mycelium needs oxygen to breathe. An overly hydrated substrate is also prone to contamination, typically from bacteria.

EQUIPMENT CHECK-LIST

- Tap water, preferably non-chlorinated. Chlorine slows down the expansion of your mycelium.
- A pot (the bigger, the better)
- A strainer (the bigger, the better)
- A grain of your choice
- Aluminum foil
- Pressure cooker with a rack
- Airtight glass jars (Mason or Kerr jars work great) with adapted lids

HOW TO MAKE ADAPTED LIDS

1. Drill two ¼" to ½" (0.5 to 1 cm) holes in the lids of your jars with each hole located about 1" (2.5 cm) from each other and from the edge of the lid.
2. Fill one hole with polyfill, which serves as an air filter so your mycelium can breathe but no contaminants can enter.
3. Fill the second hole with silicone **Let this dry for 12-24 hours before using it**. The silicone acts as a self-healing port for working with spore or liquid culture syringes (drilling this hole and doing this step is optional but highly recommended).

AFTER

In the **"After"** stage of our grain work, we require a much more controlled setting In this stage, an important rule for cutting your risk of contamination is to **never open your jars in a non-sterile setting after they have been pressure-cooked.** They are nutrient-dense, sterile, and very prone to contamination.

6.2 PREPARING YOUR GRAINS

This lesson is all about how to **prepare, hydrate, and pressure** cook **your grains!**

EQUIPMENT CHECK-LIST

- Pressure cooker
- Jars with adapted lids
- Grains
- A pot (the bigger, the better)
- A strainer (the bigger, the better)
- Stirring device
- Non-chlorinated water
- Gypsum (optional)

STEPS

1. Find out how many jars fit in your pressure cooker. Write this number down somewhere for next time.

2. If 10 jars fit in your pressure cooker, fill your pot with enough grains to fill 5 jars. Grains expand as they're cooked.

3. Cover your grains in water. Strain out anything that floats/is not grain. Rinse grains if the water is cloudy.

4. Cover pot and leave grains to **soak for 12-24 hours.**

5. After the soak, cook your grains. **Bring them to boil and simmer for 5-10 minutes, stirring frequently** (the simmer may not be necessary for softer grains like oats). The texture should be *'al dente'* after cooking. Try not to let your grains burst. This increases the risk of contamination.

6. Turn off stovetop heat and strain grains in a large colander.

PRO TIP!

Save this nutritious water for your agar or liquid culture recipes.

7. As grains dry, stir them to help hot steam vapors release from the grains.

Your grains are ready for the next step when they pass the tissue test. Place a grain on a paper tissue. Leave the grain on the tissue for 3-5 seconds. Remove grain. The paper should be completely dry.

8. Once your grains are dry, add a tablespoon of gypsum to them (optional). This adds vital minerals to the substrate and prevents grains from sticking together.

9. Fill jars with grains until about 2/3rds full.

10. Put lids on jars and close fully.

WARNING!

IF YOU ARE USING JARS WITHOUT ADAPTED LIDS MAKE, SURE TO LEAVE THE LIDS A TINY BIT OPEN/LOOSE. If you don't, they can explode

11. Place aluminum foil over lids to cover the gap between lid and jar. This prevents excess moisture from entering jars and potential spores from falling into the air filter.

12. Place the pressure cooker on the stove.

13. Fill the pressure cooker with about 2 inches (~5cm) of water.

14. Place jars in a pressure cooker. **Make sure no jars touch the side of the cooker or the glass may crack as it cools**. You can use a towel as a barrier between the inside of the pressure cooker and your jars to utilize all the space.

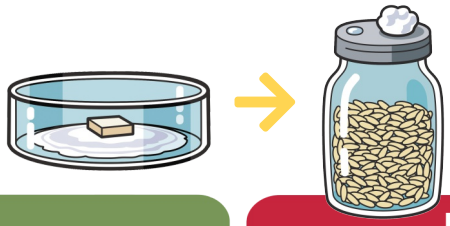
15. Pressure cook your grains for 70 minutes at 15psi.

16. Turn off the pressure cooker and let cool for at least 2 hours and/or preferably overnight before inoculating.

6.3 AGAR TO GRAIN

In this lesson, you'll learn why and how to **move Agar to Grain**.

AGAR TO GRAIN



UPSIDES

- You master all steps of the process
- You get the strongest, most healthy mycelium culture growing on grain

DOWNSIDES

- Risk of contamination
- Can take a long time for grain jar to become fully colonized

EQUIPMENT CHECK-LIST

- Mask
- Gloves
- One colonized petri dish
- Sterile grain jar(s)
- Scalpel
- Torch for flame sterilization
- Protective film (Parafilm, crafting tape, or cling wrap)
- Full spray bottle of 70% alcohol

STEPS

1. Shake grain jar so all the grains are loose.
2. Prepare workspace as explained in Sterile Workflow Lesson.
3. Spray mask with 70% alcohol, let dry, put on mask.
4. Put on gloves and spray hands and arms up to your elbows with 70% alcohol, let dry.
5. Spray all sides of colonized agar plate with 70% alcohol.
6. Spray all sides of grain jar with 70% alcohol.

7. Place plate and jar into SAB.

8. Flame sterilize scalpel, place in SAB, allow to cool.

9. Spray yourself with 70% alcohol once more, let dry.

10. **Slowly** put your arms into the SAB.

11. Remove tin foil from grain jar then unscrew the lid from grain jar so it will come off easily when lifted.

12. Using dominant hand, **cut 3 or more ½ inch (1cm²) pieces of mycelium from the colonized agar plate**.

13. Using your dominant hand, gently lift 1 piece of agar ONTO the scalpel. **Try not to poke the agar piece or it may become stuck to scalpel**.

14. Lift the lid off the grain jar with non-dominant hand.

15. Drop agar into grain jar with dominant hand.

16. Replace lid on grain jar with non-dominant hand.

17. Repeat steps 12 through 15 until all pre-cut agar pieces are inside the first jar.

PRO TIP!

Put 3 pieces of agar into each grain jar.

18. Flame sterilize scalpel and spray alcohol into your SAB between the inoculation of each grain jar.

19. Repeat steps **10** through **15** until you have inoculated all your grain jars.

20. Wrap the colonized agar plate with parafilm or some other protective film.

21. Spray the inside of your jar's aluminum foil cover with alcohol, then place back atop jar.

22. Shake your freshly inoculated jars **so agar is dispersed throughout the jar. You want at least one agar piece on the bottom of the jar**.

23. Label jar with masking tape (date, species, agar to grain/A2G).

24. Place jars into incubation.

25. Place colonized agar plate into fridge.

In this lesson, you'll learn why and how to **move Grain to more Grain!**
Grain to Grain (G2G) is the key to rapidly expanding your grain culture bank. One jar of colonized grain spawn can inoculate **10 more jars of the same size!**

GRAIN TO GRAIN

UPSIDES

- Rapidly expand your grain spawn culture bank
- Very easy technique
- The fastest colonization rate i.e. the jar becomes fully colonized with mycelium super quick!

DOWNSIDES

- You use a colonized jar of grains that could otherwise be used to make a grow bag/monotub/bulk substrate
- Once you open a colonized jar, you should use all of it

EQUIPMENT CHECK-LIST

- Mask
- Gloves
- Colonized grain jar (spawn)
- Sterile grain jar
- Spray bottle of 70% alcohol

STEPS

1. Shake colonized grain jar and sterile grain jar to loosen grains from each other.

PRO TIP!

Hit the colonized jar against a towel or bike tire to break apart the grains so they are easier to pour from the jar. Be mindful not to hit the jar too hard or you may break it.

2. Prepare workspace as explained in **Sterile Workflow Lesson**.
3. Spray mask with 70% alcohol, let dry, put on mask.
4. Put on gloves and spray hands and arms up to your elbows with 70% alcohol, let dry.
5. Remove aluminum foil covers and spray all sides of grain jars with 70% alcohol.
6. Place jars in SAB, making sure **colonized grain jar is on side of your dominant hand**.
7. Spray yourself with 70% alcohol once more, let dry.
8. **Slowly** put your arms into the SAB.
9. Unscrew the lids from the grain jars so they will come off easily when lifted.
10. Lift lid off the colonized grain jar.

11. **Place lid onto another sterile grain jar with the inside of lid (bottom) facing upwards**.

12. Lift lid off the sterile grain jar with non-dominant hand, keep in hand.

13. Use dominant hand to lift colonized grain jar.

14. **Pour about 10% of grains from colonized grain jar into sterile grain jar**.

15. Place lid back onto sterile grain jar (the one you just inoculated).

16. Repeat steps 10 through 14 with all other sterile grain jars until they are all inoculated/ the colonized grain jar is completely used.

17. Replace lid onto colonized grain jar or if completely used, set aside.

18. Twist the lids of the freshly inoculated grain jars until they are closed tightly.

⭐ If you're doing more transfers, empty the SAB of the grains jars you just inoculated, then repeat steps 3 through 17 until all transfers are complete

19. **Shake inoculated jars so mycelium grain spreads evenly throughout the jar.** Try to get at least several pieces of mycelium grain on the bottom of the inoculated jar.

20. Label jars with masking tape (date, species, grain to grain/G2G).

21. Place jars into incubation.

PRO TIPS!

Spray alcohol into your SAB after every 5 inoculations.

Spray inside of the aluminum foil jar covers with 70% alcohol before placing the foil back atop the inoculated jars.

In this lesson, you'll learn:

- **How to spot contamination early in the process** so you can protect the rest of your grain culture babies!
- **How to take care of your grain culture**

After inoculating your grain jars, you want to put them in a **dry, dark space, preferably around 25°C (77°F)**. It's a good idea to then check up on them every couple days.

What are you looking for? Healthy mycelial growth, or.....CONTAMINATION!

You want to spot and remove contaminated grains as early as possible so it doesn't spread to other jars. Grains are among the most nutrient dense food sources you'll be handling during your mushroom cultivation journey, so it's very likely you will encounter contamination at some point in this process.

There are two ways to spot contamination in your grains:

1. Visual test
2. Smell test

VISUAL TEST

Seeing contamination in your grains can be challenging, especially since bacterial contamination can sometimes be nearly invisible. Molds are usually much easier because of their color and their tendency to grow in one collective area.

The trickiest contamination to see? That's probably yeast. Yeast typically reveal themselves with the presence of tiny dots all over your grains, oftentimes colored light pink or white.

As for bacteria, just like when looking for it on agar plates, if you see anything slimy, it is most likely bacterial contamination.

SMELL TEST

Especially when trying to figure out if something in your grains is bacteria or yeast, your sense of smell is a great tool!

To do the smell test, take the aluminum foil cover off your grain jar top and smell the grains by putting your nose up to the air exchange port (the polyfill, if you made the adapted lids like we recommend).

If it smells sour, your culture is contaminated and it's better to throw it out! It may also be contaminated if it smells sweet, but some people describe the smell of mushrooms as sweet and earthy, so use your best discretion and **don't just assume something is contaminated just because it smells sweet.**

If you can't smell anything, giving your grain jars a shake is probably a good idea. If you still can't smell anything after the shake, it is probably still better to put it aside.

SHAKING YOUR GRAINS

Aside from placing your grain jars in an ideal incubation environment and regularly checking on them, there's another key ingredient to proper grain jar care:

shaking!

A lot of mushroom cultivators experience an increased colonization rate when they shake their grain jars to break up the mycelium. There's a lot of debate about when is the best time to shake your jars, but **we recommend shaking the jar once when it is between 15 and 30% colonized.**

Why does this work?

By breaking apart the mycelium, you spread it throughout the jar more, meaning **more contact points between the mycelium and the sterilized, unconsumed grains.** And since mycelium wants to grow toward itself, it will reach out in search of a mycelial friend and colonize your grain faster!

PRO TIP!

Do not shake your jars after it has colonized more than 30% of the grains! It can cause permanent harm to your mycelium and could cause your mycelium to cease growing altogether.

MODULE 7

LIQUID CULTURE

Welcome to this module all about Liquid Culture!

In this module you'll learn about:

- Liquid Culture Basics
- Equipment and Environment
- Starting Your Own Liquid Culture
- Liquid Culture Care and Common Mistakes to Avoid
- Working With Liquid Culture Transfers

Our goal for this module is that you come to fully understand the process of making and maintaining your very own liquid culture. Please note, **this module is optional and you can take this course and grow mushrooms without knowing anything about liquid culture**.

But liquid culture is an amazing tool in the arsenal of a mushroom cultivator and makes everything about your mushroom cultivation journey easier and faster.

In other words, do it for the culture! The liquid culture, that is.

What is a liquid culture?

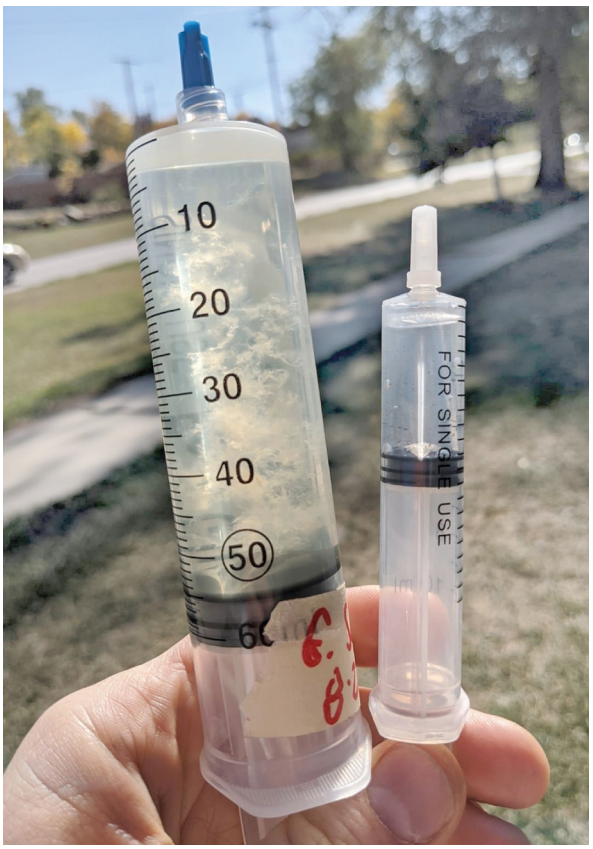
A liquid culture is a living mushroom culture (mycelium) inside lightly nutritious water.

LIQUID CULTURES VS. SPORE SYRINGES

A liquid culture is basically just mycelium growing in liquid. Once you inoculate a substrate with liquid culture, it starts growing mycelium immediately.

Spores and spore syringes are not mycelium. Spores must first germinate before they can begin to form mycelium. Once you inoculate a substrate with spores/spore syringe, it must first germinate before it begins to grow mycelium.

Spore syringes



UPSIDES

- Once you have a clean liquid culture to work with, **the risk of contamination is very low**. The only vector of contamination is the **needle of the syringe and the silicone self-healing port**. Not even your dirty self can screw this up!
- Due to the low contamination risk, you do not need a sterile environment like a SAB or flow hood once you have a healthy liquid culture
- You can expand your mycelium (inoculate a lot of substrate) very quickly
- Mycelium in liquid culture is in an expansive, hungry state and immediately begins to grow on a new substrate once it is transferred **(other than grain to grain transfers, liquid culture to almost any substrate has the quickest colonization rate!)**

DOWNSIDES

- It's difficult to see contamination inside the liquid culture
- When using a new liquid culture, you should first inoculate a small grain jar to test the liquid culture and make sure it is not contaminated
- Liquid cultures do not stay healthy and hungry for long

CONCLUSION:

Liquid cultures are amazing and make mushroom cultivation **easier, faster, and more fun!**

Here's what you'll need to make your very own liquid culture:

- Jars with adapted lids (ladies and gentlemen, prepare for takeoff)
- A mushroom food source like honey, high fructose corn syrup, glucose, fructose, or malt sugar
- Unchlorinated water
- Aluminum foil
- Torch for flame sterilization
- Pressure cooker
- A healthy living agar culture or liquid culture

If you don't have a healthy agar culture or liquid culture, you can't really move on to the practical part of making your liquid culture just yet. That's okay. **Take the time to make sure you have a healthy agar culture before moving forward with this lesson.**

WARNING!

DO NOT PUT A SPORE SYRINGE INSIDE A LIQUID CULTURE. It leads to inconsistent growth and/or contamination.

For the rest of your equipment, there are two options:

1. **Manual (cheap) method:** Place broken glass, coins, or marbles in your liquid culture jar before pressure cooking, then once inoculated, mix your liquid culture daily by grasping the jar by its top and swirling the jar in a circular motion. The glass/coin/etc. will spin and break apart the mycelium.

2. **Automated (expensive) method:** Place a stir bar in your liquid culture jar before pressure cooking, then once inoculated, mix your liquid culture daily by placing the jar atop a magnetic stirrer.

If you decide to go with the automated method, you then have the option to either **buy or build** a magnetic stirrer.

To buy a magnetic stirrer and stir bar, go to the Equipment List

To build one yourself, read this article

Looking ahead: To continue with this module, you'll need a healthy, colonized agar plate, or a liquid culture syringe. We do not recommend using spores or spore syringes for this.

In this lesson, we'll finally start making our own liquid cultures!

EQUIPMENT CHECK-LIST

- Jars with adapted lids
- A mushroom food source like honey, high fructose corn syrup, glucose, fructose, or malt sugar
- Unchlorinated water
- Pressure cooker

BASIC RECIPE

- 500ml (16.9 fl. oz) unchlorinated drinking water
- 10g honey or another sugar-based food source (e.g. Karo syrup, dextrose, glucose powder)

STEPS

1. Mix water and nutrition sources well. This is your liquid substrate mix.

PRO TIP!

Warming your water before adding the nutrients makes it easier to dissolve the sugars in the water.

2. Add liquid substrate mix to the jar(s) with adapted lids.
3. Make sure all jars have a stir bar or alternative (marbles, broken glass, coins) inside!
4. Make sure all jars are closed well
5. Put a layer of aluminum foil on top of the jars.
6. Place jars in the pressure cooker **UPRIGHT**.
7. **Pressure cook for A MAXIMUM OF 20 MINUTES at 15psi.** If they cook for any longer, the sugars will start caramelizing and your mycelium will struggle to eat the nutrients
8. Let the liquid substrate cool down to room temperature (0psi)

PRO TIPS!

Do not splash any of the liquid substrate onto the filter patch/polyfill on the inside of your jar top. If the filter/polyfill gets wet with your liquid substrate mix, it will create a bridge for outside contamination to enter, grow across, and move into your jar. **With contamination, we don't want to build bridges. WE WANT TO BURN THEM!**

Add a batch of agar and your tools (scalpels, syringes, needles, petri dishes) to your pressure cooker before you sterilize your liquid culture. This is a great way to stack functions and optimize your time (and energy).

Now, you have two options:

1. Inoculate your sterile liquid substrate with a liquid culture. You will do this if you already have a liquid culture and want to expand it to more liquid culture.
2. Inoculate your liquid substrate with one of your agar cultures, making a brand new liquid culture!

7.4 AGAR TO LIQUID CULTURE

In this lesson, we'll inoculate your liquid culture with a healthy agar culture!

EQUIPMENT CHECK-LIST

- Mask
- Gloves
- One colonized petri dish
- 3 jars of sterile, un-inoculated liquid substrate
- Scalpel
- Torch for flame sterilization
- Protective film (Parafilm, crafting tape or cling wrap)
- Spray bottle of 70% alcohol
- Spray bottle of Hydrogen Peroxide

STEPS

1. Prepare workspace as explained in Sterile Workflow lesson.
2. Spray mask with 70% alcohol, let dry, put on mask.
3. Put on gloves and spray hands and arms up to your elbows with 70% alcohol, let dry.
4. Spray all sides of colonized agar plate.
5. Spray all sides of sterile liquid substrate jars with 70% alcohol.
6. Place plate and jars into SAB, positioning plate on dominant hand side of SAB.
7. Flame sterilize scalpel, place in SAB, allow to cool.
8. Spray yourself with 70% alcohol once more, let dry.
9. **Slowly** put your arms into the SAB.
10. Remove tin foil from sterile liquid substrate jars then unscrew the lid so it will come off easily when lifted.
11. Unwrap colonized petri dish.
12. Open the dish with non-dominant hand.
13. Cut out **roughly 1cm²** piece of mycelium with dominant hand.
14. Gently lift freshly cut piece of agar ONTO the scalpel. Try to avoid poking into the agar piece.
15. Return top back onto colonized agar plate with non-dominant hand.
16. Lift the lid off the sterile liquid substrate jar with non-dominant hand.
17. Drop agar into sterile liquid substrate jar with dominant hand.
18. Put lid back on sterile liquid substrate jar with non-dominant hand, close lid tightly.
19. Flame sterilize scalpel.
20. Repeat steps 11 through 18 until you have finished all of your transfers.

PRO TIP!

To save time, effort, and lower your risk of contamination, **make all your agar cuts in one step. So, if you're inoculating 5 sterile liquid substrate jars, in Step 12 make 5 agar cuts.** Then repeat steps 13 through 18 until you have inoculated all your sterile liquid substrate jars.

21. Once finished, wrap your colonized agar plate with Parafilm or other.

22. Close the lids of your liquid substrate jars tightly

23. Spray the inside of the aluminum foil jar covers, then place atop jars.

24. Label jars with masking tape (date, species, agar to liquid/A2L).

25. Place jars into incubation.

26. Place colonized agar plate into fridge.

HOW TO CARE FOR YOUR LIQUID CULTURE

- Keep it in a dark, warm place.
- Make sure to stir your culture regularly. Do this manually (with your hand on the top of the jar, swirl it like it owes you money) or with a magnetic stirrer.

WHY DO WE STIR THE JAR?

- To break the mycelium apart, which stimulates further and faster growth.
- To oxygenate the liquid substrate.
- To ensure the mycelium is small enough to fit through a syringe needle.

COMMON MISTAKES WHEN WORKING WITH LIQUID CULTURE

- Inoculating a sterile liquid substrate mix with spores/spore syringe.
- Forgetting to stir the culture.
- Filling the jar with too much liquid substrate (it's impossible to adequately stir without hitting the bottom of the jar lid if there is too much liquid).
- Splashing the liquid culture into the lid of your jar.
- Not testing your liquid culture on a small grain jar before expanding it.

HOW TO STORE YOUR LIQUID CULTURE LONG-TERM

In the jar or inside a syringe. Once the liquid culture is ready and has been tested, store it cooled inside a fridge.

EQUIPMENT CHECK-LIST

- Torch for flame sterilization
- Magnetic stirrer or alternative
- Colonized liquid culture in a syringe with attached needle
- Sterile grain jar or liquid substrate
- Spray bottle of 70% alcohol

STEPS

1. **Break up the mycelium** in the liquid culture by stirring it with a magnetic stirrer for 10 to 15 minutes. If you don't have a magnetic stirrer, swirl the jar around until your broken glass or marbles start breaking up the mycelium.
2. Remove foil and spray or wipe the adapted lids of all the jars with 70% alcohol.
3. Flame sterilize your needle.
4. Insert the needle into the adapted lid of the colonized liquid culture jar.
5. Fill the syringe with mycelium-rich liquid culture.
6. Visually confirm mycelium is in the syringe.
7. **Flame sterilize your needle again!**
8. Insert the needle into the sterilized jar (Grain or LC), spray liquid culture onto the sterilized substrate.

PRO TIPS!

If you're **ioculating more liquid culture, spray roughly 2cc (2ml) of liquid culture** into the sterile jar. You can always spray more. Remember, more inoculum = faster inoculation.

For **inoculating grain, use between 5 and 7cc (5 to 7ml)**. Do not use too much liquid culture or you will create a pool of liquid at the bottom of the jar, increasing the risk of bacterial contamination.

9. Repeat steps 7 and 8 until finished with transfers. **Make sure to always flame sterilize the needle between transfers to avoid cross-contamination!**
10. Spray aluminum foil jar covers with 70% alcohol, then place foil back atop jars.
11. If you inoculated grains, shake the jar after inoculation!
12. Label jars with masking tape (date, species, liquid to liquid/L2L or liquid to grain/L2G).
13. Put the freshly inoculated jars into incubation.
14. Put your liquid culture into refrigeration.

MODULE

8

BULK SUBSTRATE

Welcome to this module all about Bulk Substrate!

Bulk Substrate, also known as the fruiting substrate, is the last meal your mycelial culture will eat before rewarding you for all your work (and love and care and food) with...

MUSHROOMS!!!

In this module, you'll learn about:

- Different Types of Bulk Substrates and Additives
- Pasteurization vs. Sterilization
- The Super-Easy Bucket TEK Pasteurization Technique
- Different Types of Fruiting Containers
- How to Make a Monotub!

By the end of this module, you'll know how to successfully make your own Monotub!

There are innumerable bulk substrate recipes to try. But for now, we think it's best to follow Kendrick Lamar's advice and be humble.

That's why **we recommend following our beginner's recipe**. It's practically foolproof (we're looking at you, fool!), reduces the risk of contamination, and increases your chance at sweet, sweet success! You'll find it **in lesson 8.4**!

PRO TIP!

The more nutrients you add to your recipe, the higher your chance of contamination but the bigger your yield of mushrooms will be!

The most common bulk substrates for Psilocybe Cubensis mushrooms are:

- Coconut coir
- Manure
- Straw

Coconut coir

Cheap, easy to find, and low in nutrients, coconut coir has a low chance of contamination.

Manure

Mushrooms can grow on cow, horse, elephant, and water buffalo manure. We've even heard of people experiencing success with sheep manure.

We don't endorse rhino poop, but any manure from a vegetarian mammal should, in theory, work. We prefer horse manure because it is easy to work with and doesn't smell too bad.

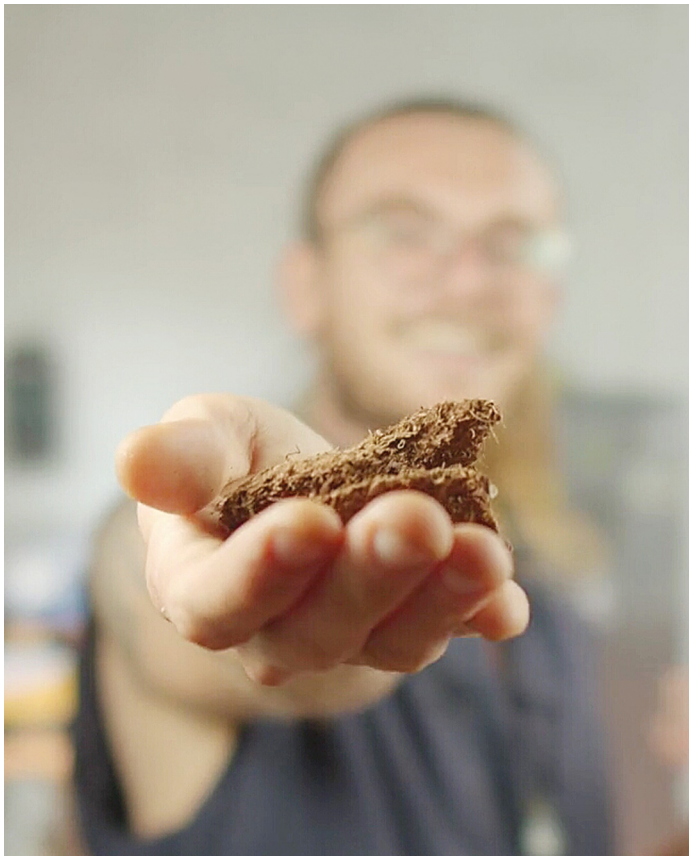
PRO TIP!

It's very important that your manure is properly leeched, cured, and dried before use. If it's been sitting outside in a field for more than a month and is relatively dry, you should be fine.

Straw

Great for creating a more consistent substrate when also working with manure, Oliver has even seen some people in Mexico use just straw as their bulk substrate for fruiting sacred mushrooms.

In theory, **you can grow your mushrooms on a bulk substrate composed of only one of these ingredients**. But, you should expect lower yields if you go that route.



Coco coir

Each bulk substrate supplement has different effects and uses in mushroom cultivation.

Some common supplements for growing sacred mushrooms include:

- Vermiculite
- Gypsum
- Coffee Grounds
- Worm Casings

Vermiculite

Able to soak up 3 to 4 times its volume in water (it also absorbs nutrients such as potassium, magnesium, calcium, and phosphorus), vermiculite helps your substrate retain moisture while also aerating it so mycelium can move through with ease. Coarse vermiculite works better than fine.

Gypsum
(Calcium Sulfate)

Also known as Plaster of Paris, gypsum is used to stabilize the pH in your substrate while simultaneously providing vital nutrients like calcium carbonate and sulfur to your mushroom's tummies.

Coffee Grounds

Coffee grounds provide carbon, nitrogen, potassium, and phosphorus to your substrate. There's also a theory out there that mushrooms enjoy a solid dose of caffeine But beware! With all these nutrients, **we've found higher rates of contamination when adding coffee grounds to our substrate.**

We recommend using coffee grounds only after you've already had some success fruiting mushrooms, and ideally only using grounds on the same day that they were used for brewing.

Worm Casing

Worm Poop! We find this to be too muddy for use as a bulk substrate and prefer using it as a supplement. **It seems to work well when mixed with coconut coir**, providing nutrients the coconut coir does not have.

As with coffee grounds, we recommend only working with worm casings after you've already had some success fruiting mushrooms.

Vermiculite

Gypsum

PASTEURIZATION VS. STERILIZATION

We often get asked, **why do we sterilize our grains but pasteurize our bulk substrate?**

We pasteurize bulk substrate when cultivating Psilocybe Cubensis for two reasons:

1. When we pasteurize, we kill about 80% of the microorganisms in the substrate. This leaves the remaining 20% to fend off any unwanted intruders, kind of like bouncers for your bulk substrate.

⭐ If we sterilized bulk substrate, **it would kill off all the micro-organisms and your bulk substrate would be ideal for contamination**, kind of like having an empty house full of expensive stuff with the doors wide open.

2. It is easier and way more energy efficient to pasteurize a large amount of substrate than to sterilize it. With one 5-gallon bucket of pasteurized substrate, you can make a lot of monotubs!

PASTEURIZATION

UPSIDES

- ☺ Easy to work with
- ☺ You can do big batches
- ☺ Energy efficient

DOWNSIDES

- ☹ Some organisms are still alive

STERILIIZATION

UPSIDES

- ☺ Completely void of all life

DOWNSIDES

- ☹ Not energy efficient
- ☹ You have to work with your substrate in a sterile environment
- ☹ Hard to sterilize big batches of substrate

When growing most **gourmet and medicinal mushroom species, you want a sterile substrate**. When working with **Psilocybe Cubensis and monotubs, pasteurization is the way!**

PASTEURIZING SUBSTRATE

There are a lot of different ways to pasteurize your substrate.

We keep it simple and use hot water, like the OG pasteurizer himself, Louis Pasteur, who developed the technique in 1880. Basically, all you do is **keep your substrate between 160F (71C) and 180F (82C) for ⏱ 2 hours.**

Go too high with your temperature and you will kill too many micro-organisms, making it more like sterilization and increasing your risk of contamination.

Go too low and you risk not pasteurizing your substrate enough, increasing your risk

of contamination.

What's the best way to perfectly pasteurize your Psilocybe Cubensis substrate?
The bucket pasteurization technique!
All you need is your substrate, a 5-gallon bucket, hot water, and a blanket or sleeping bag. We'll show you how in the next lesson!

8.4 BUCKET TEK

Welcome to this lesson on the Bucket Tek Pasteurization method!

This is an overnight process so we suggest starting it in the evening so you have time for the next step in the morning.

EQUIPMENT CHECK-LIST

- 5 gallon bucket
- 1-2 large cooking pots
- Tap water (Non-chlorinated is best but not necessary)
- Coco Coir
- Vermiculite
- Gypsum
- Spray bottle of H_2O_2
- Spray bottle of 70% alcohol
- Thick blanket or sleeping bag

STEPS

1. Fill your pot(s) with **3.5 quarts (3.3L) of water** and turn on the stove.
2. Spray and wipe down the inside of your bucket and the inside of the lid with H202, let air dry or towel dry.
3. Spray and wipe down the inside of your bucket and the inside of the lid with 70% alcohol, let air dry or towel dry.
4. Put the lid on your bucket.
5. Weigh out our beginner's substrate recipe.

BEGINNER'S SUBSTRATE RECIPE

2.20-QUART MONOTUB

- 360g of Coco Coir
- 200g of Vermiculite
- 60g of Gypsum
- The 3.5 quarts (3.3L) currently heating up in your pot

6. Break up the coco coir into small-ish pieces.
7. Once your bucket is dry, add the coco coir and vermiculite into it.
8. Measure the temperature of your water. **Once it hits between 175-180F (80-82C), turn off the heat.**
9. Add the gypsum to the water and stir until it dissolves.
10. Pour half the water into your bucket.
11. Stir the mixture.
12. Pour the second half of the water into the bucket.
13. Stir the mixture.
14. Measure the temperature of your substrate in the center and at the edges. **It should be above 160F (71C) throughout.**
15. If it is, put the top onto the bucket, seal tight, and wrap the bucket in a blanket or sleeping bag.

After a few hours, your substrate is completely pasteurized and ready to use. **We recommend letting it sit overnight to cool before using it.** You can take it out of the sleeping bag/blanket a few hours before use to ensure it cools to a safe temperature

and will not damage or kill the myceliated grains when you make your monotub.

Here's another recipe you can try after you've had some success with our beginner's recipe:

SUBSTRATE RECIPE
66-QUART MONOTUB

- 615g (1.35lb) coconut coir = 30%
- 615g (1.35lb) cow or horse manure = 30% PLUS 2-3 HANDFULS
- 615g (1.35lb) coarse vermiculite = 30%
- 185g (0.4lb) gypsum = 10%

There are tons of different ways to grow Psilocybe Cubensis. **Some options include:**

- Aluminum baking tray
- Shotgun fruiting chamber
- Dutch shelf growing racks
- Monotub

Aluminum baking tray

The most low-tek, small-scale option, you simply mix your pasteurized substrate with your grain spawn until the tray is filled, cover the tray with a closed plastic bag or saran wrap, wait for the substrate to become completely colonized, then poke holes in the bag/wrap and move it into indirect sunlight.

Shotgun fruiting chamber

This technique is **usually used by people growing their mushrooms via the PF Tek**. It's basically a clear plastic moving container with a lid and a lot of little holes along the side walls. It can be used the same way as a monotub, but that means you need to cover all the little holes with tape during incubation then fill all the little holes with polyfill when your substrate is ready to fruit. That, to us, is a lot of unnecessary work.

Dutch shelf growing racks

This technique is used to grow button mushrooms (Agaricus bisporus) and sacred mushrooms on a large scale. The challenge is that you need a climate-controlled room with consistent temperature and humidity, and you need to keep all the pests out of your substrate!

The Monotub

This amazing tool is called a monotub because **it's all you need to incubate and fruit your mushrooms**. In essence, a monotub is just a clear plastic tote with a lid. It can be as small or large as you want.

For **fresh air exchange**, you need to create **4 holes**, one on each side of your square or rectangular container. We've found that the easiest way to create these holes is to heat up the bottom of a used coffee or bean can, then press the hot metal on the plastic.

As for the positioning of your holes, you want **2 holes near the top of the monotub, and 2 holes about 3-4 inches (7.5-10cm) from the bottom.** This helps create a natural airflow during fruiting. Mushrooms exhale Carbon Dioxide (CO_2) and inhale Oxygen (O_2), and since O_2 is lighter than CO_2, the O_2 comes in from the top holes while the CO_2 exits the tub from the bottom ones.

Your tub needs to be transparent because as Psilocybe Cubensis mushrooms fruit, they grow toward light. **That's also why we black out the bottom third/bottom half of the tub** by filling the bottom of the tub with aluminum foil, a black garbage bag, or by spray painting the bottom black. We don't want our mushrooms trying to fruit from the bottom or side of the tub (that would make for a very difficult harvest). But, since light can enter from the top of the tub, our mushrooms will uniformly grow upwards.

As for humidity, by hydrating your substrate correctly and closing the monotub completely, it will retain humidity. In theory, **you should never need to mist your substrate during the fruiting process with a monotub**, and we've had plenty of success without ever misting.

If we haven't already made it extremely obvious, **we love the monotub more than any other fruiting container**. And in the next lesson, we'll finally make one!

We finally made it to the last transfer of the process. Yahoo!

Try to do this in a clean, still environment, or something as close to that as possible. **A small, clean bathroom works great.** You do not need a still air box.

To make one, 20 quart (19 liters) monotub, you'll need:

- Gloves
- Mask
- Pre-made monotub with holes
- Tape
- Spray bottle of 70% alcohol
- Spray bottle of Hydrogen Peroxide
- Pasteurized bulk substrate **at field capacity.** Field capacity means it is holding as much moisture as it can, but no more than that. To test this, **grab a handful of the substrate and gradually squeeze it tighter and tighter. No moisture should drip out except for when you squeeze it as hard as you can**.
- 2 half-quart (0.5 liters) jars of colonized Psilocybe Cubensis grain spawn **(you can definitely use more!!)**
- A blanket or sleeping bag

STEPS

1. Cover all the holes on your monotub with tape. This prevents fresh air exchange and pests from coming into the tub while it incubates.

2. Spray mask with 70% alcohol, let dry, put on mask.

3. Put on gloves and spray hands and arms up to your elbows with 70% alcohol, let dry.

4. Spray and wipe down the inside of your tub with H_20_2, let air dry or towel dry.

5. Spray and wipe down the inside of your tub with 70% alcohol, let air dry or towel dry.

6. Spray the outside of your jars with 70% alcohol, let air dry or towel dry.

7. Check your grain jars for any signs of contamination. If they're slimy or moldy, don't use them! Shake your grain jars to loosen the grains from each other. **If you see a bit of blue, that's fine**. It is typically the result of psilocybin reacting to oxygen. This is normal. More bruising will occur during the shaking!

8. Now do another contamination test. Exhale, open your jars slightly, and inhale through your nose to smell the grains. Close the jar. **If the grains smell SOUR, it means your culture is contaminated** Do not use them. **They should have a slightly sweet, slightly earthy aroma, just like fresh mushrooms smell.**

9. Spray yourself with 70% alcohol once more, let dry

10. Remove the lid from your bucket of pasteurized substrate

11. Remove the lid from the grain jars you're about to use

12. Scoop up the bulk substrate from your bucket using one hand and spread a thin layer of it over the bottom of your tub with the same hand. Make sure to get the corners!

PRO TIPS!

Try to only use one hand to spread the substrate and use your other hand for pouring the grains into the monotub. Don't switch these hands during the process.

During this process, **avoid leaning over the monotub or your substrate bucket!** We also like to tie our hair back/wear a hat. As you work, keep your body straight up and work about an arm's length away from the tub.

13. Lift the colonized grain jar with your **"jar hand"** and spread a layer of grain spawn over the bulk substrate. Make sure to get the corners! If you see any big clumps, feel free to break it apart with your 'substrate hand.'

14. Spray your hands and arms with alcohol, let air or towel dry.

15. Repeat septs 11 and 12 until your substrate/grain spawn mixture is about 3 inches (7.5cm) deep.

16. Once you're done, **we like to mix the substrate and grain spawn together, but you can also leave it as is in the "lasagna style".**

17. Whether you mix the substrate or leave it as is, **top off your mixture with a layer of grain spawn.**

18. Spray the inside of the monotub lid with H202, let air dry or towel dry.

19. Spray the inside of the monotub lid with 70% alcohol, let air dry or towel dry.

20. Make sure there is no substrate on the walls or top edges of your monotub.

21. Place lid on tub, secure in place.

22. Label your monotub with masking tape (date, species, substrate recipe, notes, etc.)

23. Put your monotub somewhere discreet, out of direct sunlight, and cover it with a sleeping bag or blanket, tucking it in completely

24. Don't touch, open, or peek inside the tub for 10 days! Really, no peeking!

And now, we wait....

MODULE 9

GROW MUSHROOMS

Finally, we're at the stage everyone has been waiting for.....

TO SHROOM OR NOT TO SHROOM!

That is not the question, because we're most definitely shrooming, baby!

Okay, time to think like a mushroom again with the help of the seasons.

Incubation, like summer, is a time when **humidity is low and temperatures are high.**

But it's **fruiting** time now, when, like the fall, **humidity rises, temperature drops**, and the rain washes away the topsoil, **exposing the mycelium to light and the chance at a deep, oxygenated breath!**

Then...**out pop our mushroom babies!**

In this module, you'll learn all about:

- Fresh Air Exchange
- Humidity & Light
- Preparing Your Monotub for Fruiting
- Harvesting & Storing Your Mushrooms
- How to Get Multiple Flushes from Your Monotub

Fresh air exchange is important because the levels of Oxygen (O_2) and Carbon Dioxide (CO_2) affect the way fungus behaves.

In other words, c**ontrolling your CO_2 levels is how you control your fungus' growth.**

INCUBATION

During the incubation/colonization stage, you want your **CO_2 levels to be high.**

That's because high CO_2 levels promote the expansion of mycelium onto the substrate as your mycelium stretches and grows as far as it can to find that Oh-So-Sweet Oxygen.

So during this stage, don't open monotub! Like ever!

FRUITING

Once all of your substrate is consumed by mycelium, it's time to change the O_2/CO_2 levels to make your mushrooms pin!

At this stage, you want to **drop your CO_2 levels and raise your O_2 levels.**

The way mushrooms grow depends on the CO_2 and O_2 levels in your fruiting environment:

- **Very Low CO_2** = lots of pins, lots of aborts
- **Moderately Low CO_2** = the sweet spot with low to no aborts, short and fat stems, and big caps
- **Moderately High CO_2** = little pinning, reduced total harvest, skinny and long stems with small caps
- **Very High CO_2** = little to no pinning, little to no harvest, slow growth, long and skinny stems, fuzzy feet

***Aborted mushrooms** (aka "aborts") are mushrooms that start to grow and pin but never grow to full maturity*

Ultimately, unless you have some fancy gadgetry, you won't know if your CO_2 and O_2 levels are right until you start fruiting and observing your mushrooms.

PRO TIPS!

Put your monotub in a room with **a natural flow of fresh air, or use a fan to circulate air** in the room. Just don't aim the fan directly toward your monotub or it may dry out the substrate.

If you think your CO_2 levels are too high, you can always aerate your tub by opening it and using the monotub lid as a fan to push old air out and new air in for a couple of minutes, repeating throughout the day as necessary. Just don't breathe into the tub as you do this! Since the substrate is fully colonized, it is pretty resistant to contamination. But it is better to be safe than sorry, dirty human

The Ultimate Fruiting Chamber

You can always take it to the next level and make yourself a dedicated mushroom fruiting environment like a Martha! **A Martha is a tiny greenhouse that pumps in O_2 and humidity from the top and pushes out CO_2 from the bottom.**

Our brother Sam the Mushroom Man has made a detailed guide on how to make one yourself and we have added a link in the text below!

HUMIDITY

For mushrooms to fruit, they need a lot of water Why? **Because a mushroom fruit body is about 90% water!** So, your mushroom fruiting environment needs a lot of humidity.

Ideally, your humidity level should be between 80% and 90%.

If you followed our bulk substrate recipe, the vermiculite in your tub will retain moisture so effectively that your tub should keep a high humidity level throughout incubation and fruiting.

But if you live in a dry climate, you may want to mist your substrate once your mushrooms begin to fruit. **Try not to mist the fruits directly.** Just mist the substrate and monotub inner walls.

LIGHT

Your mushroom mycelium will require some form of light to help guide them into the fruiting stage, but only a little.

So, we generally place our monotubs in indirect sunlight. Do not put your tub in direct sunlight! It will dry out your substrate and create intense temperature fluctuations in your tub that your mushrooms will not enjoy.

Light also serves as a guide to tell your mushrooms where light (and oxygen) are, causing them to fruit toward the light. **This is why we recommend making sure no light penetrates the side or the bottom of your tub.** You want your mushrooms to fruit straight upwards.

If indirect light is not an option, **LED or CFL lights set to turn on/off every 12 hours** seems to be the standard for a lot of growers. Blue light that is as close to natural light as possible is preferred. **We recommend an LED light between 6,000 and 7,000 Kelvin.**

How to Know Your Monotub Is Ready to Fruit

It's the moment you've all been waiting for. Your monotub is ready to fruit! But wait, how do you know it's ready?

Some people wait until pins, or baby mushrooms, start to form on top of the substrate

Others wait until the entire top substrate layer is covered in thick, fluffy white mycelium mounds, known as hyphal knots (the precursor to pins)

Whatever you choose, don't put your tub into fruiting conditions before one of these two growth patterns occur. You'll end up with fewer mushrooms or, shriek, no mushrooms at all!

PRO TIP!

You want to wait at least two weeks after making your monotub before putting it into fruiting conditions. The time it takes for your culture to fully colonize the substrate is dependent on the strength of your culture, the size of your tub, the amount of grain spawn you used to inoculate your tub, and the temperature during incubation. But two weeks is a good baseline minimum incubation period.

WARNING!

If you don't practice patience, your tub can end up looking like this:

If you're patient, it should look more like this:

How to Prepare Your Monotub for Fruiting

Once you've determined that your monotub is ready to fruit, it is time to give it air and light!

AIR

STEPS

1. Remove the tape from your monotub's holes

2. Fill the holes with polyfill. Note that there is a balance to be had here. **You want your polyfill to be tight enough to keep out insects and contaminants, but loose enough so that air can pass through the polyfill freely and create the fresh air exchange your mushrooms need.** If you're uncertain, we recommend siding on the tighter end of the spectrum and then adjusting the polyfill to a looser fitting if you notice your mushrooms are becoming stemmy (a sign that your CO_2 levels are too high).

3. Place your monotub in a room where there is fresh airflow.

LIGHT

Indirect sunlight is perfectly fine. If indirect sunlight is not an option, **LED or CFL lights at 6,000 to 7,000 Kelvin set to a 12-hour on/off cycle** works great, too.

HUMIDITY

Ideally, you want your humidity to be between 80% and 90%. The vermiculite in your bulk substrate (if you followed our recipe) should retain enough moisture to keep the humidity level high enough **without the need for misting your tub**. But if you live in a dry climate, you may want to mist your substrate and the inner walls of your monotub once your mushrooms begin to fruit. **Do not mist your mushroom fruits directly, and do not over mist.** Too much water will attract contaminants and cause your mushrooms to spoil.

And now the last waiting stage begins!!!!

Your mushrooms should be ready to harvest in 7 to 14 days.

In the meantime, [this is what your monotub will probably see every hour]

9.4 HARVESTING AND STORING YOUR MUSHROOMS

In this lesson, you'll learn all about:

- How to know when to harvest your mushrooms
- How to correctly harvest your mushrooms
- How to store your mushrooms so they stay viable for a long time

Once your mushrooms begin to fruit, it's a good idea to check them daily. You'll be surprised by how quickly they grow, you'll enjoy watching them grow, and you'll be able to catch them at the perfect time for harvesting.

WHEN TO HARVEST

You want to harvest your mushrooms just before or just after the veil breaks from the stem and the cap

The main reason you harvest mushrooms at this stage is because right after the veil breaks, the mushrooms begin to release spores. Once this release begins, your cake will become covered in spores. We don't want this. **A massive load of spores on your substrate can create contamination and cause your next flush of mushrooms to be less abundant.**

HOW TO HARVEST

Once you've determined your mushrooms are ready to harvest, **it's time to begin!**

STEPS

1. Spray your mask with 70% alcohol, let air dry.
2. Put on your gloves, spray your hands and arms up to your elbow creases with 70% alcohol, let air dry.
3. Put on mask.
4. Open your monotub.
5. To correctly harvest your mushroom, **grab them at the stem bottom, slightly twist, and pull. The goal is to remove the mushroom without removing or damaging the substrate and mycelium.** It is important you remove the entire fruiting body. Any mushroom part that is left behind will be a vector of contamination.
6. Close your monotub.
7. Clean your mushrooms by brushing or slicing away any substrate still attached to the stem butt.

PRO TIP!

We recommend harvesting all of your mushrooms in one go, even the really tiny ones. This will reduce the risk of contamination when we prepare our substrate for a second flush.

HOW TO STORE

Once you've harvested all your mushrooms, it's time to prepare them for storage!

First, make sure to remove any substrate from the bottom of the mushroom (known as the stem butt). We like to use a knife to clean off the stem butt.

Once your mushrooms are clean, they're ready for storing!

9.4 HARVESTING AND STORING YOUR MUSHROOMS

There are a few ways to do this:

- Dehydrate your mushrooms using a food dehydrator set to its lowest setting. 95°F/35°C is best. Don't go any higher than 115°F/45°C. This, in our opinion, is the best way of preparing your mushrooms for long term storage.

- Dehydrate your mushrooms in the sun or on dry paper in front of a fan. If you live in a humid climate (like us!) or in a situation where having a bunch of mushrooms laying around isn't an option, this won't work.

- Store your fresh mushrooms in a paper bag in the fridge. They should last about a week if stored like this.

- Pour honey over your fresh mushrooms, making sure the honey completely covers the mushrooms. You can also do this technique with dried mushrooms and we actually recommend storing them with honey when they're dry.

Now that you've harvested your first flush, what do you do with your monotub to get even more mushies? You go to the next lesson, that's what!

PRO TIPS!

Your mushrooms are properly dehydrated when they're "cracker dry," meaning they snap like a cracker when you break them. Keep in mind that once your mushrooms reach this dried stage, if you let them sit in the dehydrator any longer, the psilocybin will degrade and your mushrooms will become less potent.

Once your mushrooms are fully dried, **store them in an airtight container with a desiccant like a packet of food-grade silica or a thin layer of rice at the bottom of the container**. Stored this way, your mushrooms should be good for at least two years.

If you want your mushrooms to last even longer, **you can store your dried mushrooms in a bag in the freezer, or add them to honey.** Stored either way, your mushrooms can stay good practically indefinitely! **If you freeze them, make sure your mushrooms are absolutely dry** or the remaining moisture will destroy the active compounds and the mushrooms itself!

GETTING MULTIPLE FLUSHES FROM YOUR MONOTUB

Disclaimer: This lesson is based on what has worked best in our decade-plus of mushroom cultivation experience. These techniques have no scientific backing. We understand that almost all cultivators do something a little different. **We encourage you to experiment and find what works for you!**

So you've successfully harvested your first flush of Psilocybe Cubensis mushrooms! Woohoo! But we're just getting started baby! If done right, you have four more flushes to enjoy!

To accomplish this, we'll outline three methods:

- The Dunk
- The Flip
- The Bed

THE DUNK

Did you notice that your monotub cake shrunk? That's because it lost a lot of water. Where did that water go? **Hint: mushrooms are 90% water.**

To get more mushrooms, you need to give your tub (and thus your mycelium) more water!

The process is simple:

1. Pour water into your tub until the substrate cake begins to float.
2. Place an alcohol sanitized bowl or jar on top of your cake.
3. Pour water into the bowl/jar until the substrate cake is completely submerged with water.
4. Let soak for 12 hours.
5. Drain, then put monotub back into its fruiting environment.

This 'dunk technique works wonders for getting more flushes from your monotub, but some people run into contamination issues when completely submerging their substrate cakes. **This often happens if you do not completely remove all the tiny new pins (baby mushrooms)** on the top of your substrate before submerging it in water.

Some people submerge about 90% of their cake in water but leave the top of the cake above water. Others heavily mist their cake with water in between flushes. All these techniques work, though we still prefer fully dunking our cakes.

By the time you get done with your third or fourth flush, you probably need to try another technique to get another harvest or two...

THE FLIP

After the third or fourth flush, the top of your substrate cake is probably going to be damaged from harvesting and depleted from fruiting.

So, to ensure a hearty fourth and fifth flush, we recommend flipping the cake upside down before dunking it. We do this to expose parts of the mycelium that have not yet fruited mushrooms, which leads to more abundant fourth and fifth flushes.

Make sure that when you do this, you are very delicate Though your cake may feel solid, it can break easily if handled without the utmost care!

THE BED

One final option to get more mushrooms is to put your cake outside! If the temperature goes below 50F (10C), this won't work.

But if you're in a warm area, here's what you can do:

1. Find a shady spot in your yard.
2. Scratch off the top layer of soil in the shady area.
3. Place the cake in the little hole you dug.
4. Cover the cake with mulch, plant potting soil, straw, manure, or some excess bulk substrate.
5. Keep the spot moist by watering it regularly.
6. Wait, check on it daily, and keep your fingers crossed for more mushrooms.

PRO TIP!

This technique also works well if you have a contaminated monotub that you need to separate from the others. Put it outside and it will oftentimes still fruit for you!

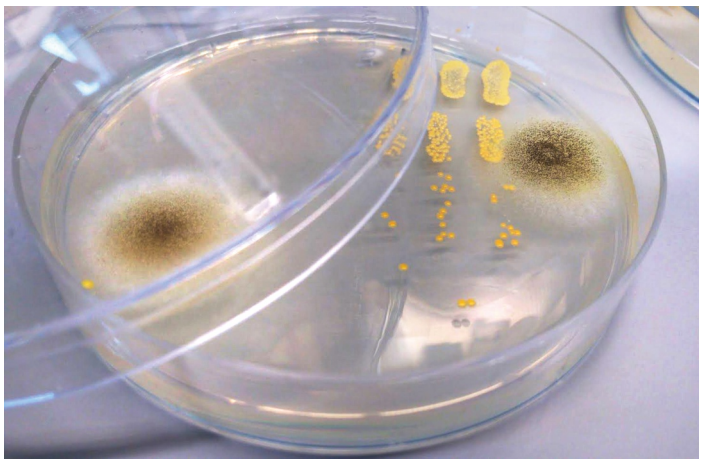
At this point in the growing process, your two main adversaries are:

- Trichoderma
- Cobweb mold

TRICHODERMA

Trichoderma is a **fungicidal fungus that lives everywhere,** meaning its spores are floating around everywhere, too.

It preys on other mycelium and is easily distinguished by its vibrant green color during sporulation. Trichoderma is spread by the breath, your hair, your hands, and the natural environment.



Trichoderma is the green circular growth at both edges of this petri dish. The yellow is a bacterial culture.

COBWEB MOLD

Cobweb mold is not one species of mold but more like a closely related group of mold species that tend to cause cobweb disease in mushrooms. This mold can be difficult to spot as it can be grey, white, and fluffy. Usually, it grows three-dimensionally, levitating above your mycelium in wispy, white tufts. Cobweb mold spreads fast and causes aborts or prevents pinning altogether.

Cobweb mold growing atop a monotub substrate. Note the dense, white mushroom mycelium growing along the edges of the tub.

PRO TIP!

For an amazing photo series on mycelium in all the growing stages, as well as photos on common contaminants (e.g. cobweb mold, trichoderma, bacteria, yeast), **check out this link!!!**

AVOIDING CONTAMINATION

As the saying goes, “An ounce of prevention is worth a pound of cure.” This applies to mushroom cultivation, too.

To prevent contamination:

- Wear gloves and a mask and generously use 70% alcohol spray when working with your bulk substrate, especially during inoculation but also when harvesting, dunking, and flipping.
- Minimize the time your monotub is open

- Avoid breathing into your monotub.
- Only open your tub in a clean room with little air movement.
- If you encounter contamination, move the monotub away from the rest of your monotubs immediately!

DEALING WITH CONTAMINATION

Just because your tub is contaminated does not mean it will not fruit.

Here are some techniques to combat contamination:

- **Hydrogen peroxide (H2O2) spray is a great weapon in the battle against mold.** It will not harm your mycelium but will kill any spores trying to take over your monotub. Spray, spray, spray away
- **Scoop out the contaminated substrate with an alcohol sanitized spoon and dump salt on the affected area** to prevent the spread of contamination.
- Scoop out the contaminated substrate, then soak a paper towel with H_2O_2 and place it on the area in your tub where the contamination was. This prevents more spores from flying around in your monotub.

MODULE
10

STORING YOUR CULTURES AND SPORES

If you've gone through our course from the beginning to now, you should have a monotub patiently sitting somewhere as your culture takes the final bites of its delicious last supper!

Remember, patience is a virtue.

Resist the temptation to open your tub!
Don't do it!
Seriously, we're watching you!

While you wait for your tub to fruit, we have some lessons and tips to keep you busy:

1. **We highly recommend making a liquid culture.** Once you have one, you can basically say goodbye to your SAB for a while and work exclusively with your liquid culture wherever, whenever. Only once that culture is exhausted will you need to return to your SAB or flow hood to create a new, healthy culture.

2. **Back up and prepare your cultures for long-term storage.** At this point, you probably have at least one and perhaps a bunch of healthy cultures you want to keep healthy for as long as possible. Remember, move it or lose it is still the best practice! Yet this can get tedious and sometimes, you know, life gets in the way. That's why proper culture storage is so important!

Wy store your cultures?

- Proper storage of cultures can **keep them active, stable, and healthy for years!**
- Mushroom mycelium typically grows until all the nutrients in its substrate is consumed. Afterward, its vitality quickly degrades. **Proper storage helps prevent this cellular and genetic degradation**, also known as senescence.
- Cultures are expensive. You either pay for them with your time or money!

What you will learn in this module:

- The 3 Parameters for Storing Your Cultures
- Different Storage Techniques
- Making Culture Slants
- Making Spore Prints
- Storing Cultures in Sterile Water

10.1 THE 3 PARAMETERS FOR STORING YOUR CULTURES

As you wait for your mushroom babies to come to life we figured you might like to learn what you're supposed to do with all your amazing cultures other than make more mushroom babies?

You store them! Here are the 3 main parameters you need to keep in mind when storing cultures:

- Temperature
- Darkness
- Cleanliness

Temperature

You want your mushroom cultures to stay cool, but not cold When mushroom cultures are stored between **39°F to 45°F (4°C to 7°C)**, they enter a resting stage of dormancy.

Keep in mind that some hot weather species like Pink Oysters and Reishi don't like being stored at temperatures less than 60°F (15°C), and you should never store your cultures at temperatures below around 40°F (~4°C). Frozen mycelium is dead mycelium.

Darkness

Light acts as a trigger to your culture, yelling at it to start fruiting (also known as pinning). A pinning culture is using energy, water, and nutrients to form its mushroom baby, which means less of those vital ingredients when it comes to actually trying to fruit your mushrooms.

You don't want that!

Plus, your culture will likely be in a lazy, digestive stage at this point, meaning that the mushrooms growing from the culture are weakened and prone to contamination. You don't want that, either.

So, keep your cultures in the dark! Again, a fridge works great for this but any container that is completely dark and will not be opened on a daily basis will work just fine.

Cleanliness

Mushroom cultures are precious. And sometimes, they can be quite delicate. You want your storage space to be as clean as possible to prevent all your hard work from going into the dumpster.

Routinely clean your culture storage area with 70% alcohol to make sure it is as clean and contaminant-free as possible. And **if you ever find a contaminated culture in storage, TAKE IT OUT IMMEDIATELY** and never open it in your storage space, laboratory, or fruiting space.

THE IDEAL MUSHROOM CULTURE STORAGE SPACE

You know what's dark, cool, easy to clean, and won't be opened 53 times a day by your hungry husband, wife, kid, mother-in-law, etc.?

A refrigerator completely dedicated to your ever-expanding mushroom culture library!

But if that's just simply not an option, a dark plastic box, closet, or drawer in your kitchen fridge will work. Just make sure to wrap the cultures in a plastic bag and put them on the top shelf of your fridge if you store them with your food.

10.2 DIFFERENT WAYS TO STORE YOUR CULTURES

In this lesson we'll discuss:

- Petri Dishes
- Grain Jars
- Spore Prints
- Slants
- Vacuum Tubes
- Sterile Water Storage

PETRI DISHES

This is the easiest method for storing your agar culture. Simply put, you **wait until your culture has grown to a centimeter or two from the edge of the plate, then you put the culture in your fridge!** Voila, you're done.

Petri dish cultures last at least three months but tend to dry out quickly. Contamination also can oftentimes sneak into your dish. Sneaky trichoderma, get out of here!

UPSIDES

- ☺ Easy to store and use

DOWNSIDES

- ☹ Can dry out fast
- ☹ Prone to contamination
- ☹ Short shelf life

SLANTS

Agar slants are typically small, cylindrical vessels (like a test tube) where the agar is allowed to set at an angle, hence the name "agar slants." **Slanting the surface of the agar gives the mycelium a larger surface area on which to grow in the tube.** Using a test tube with a cap minimizes water loss and the risk of contamination. Agar has a high water content, so reducing water loss is essential for long term storage.

UPSIDES

- ☺ Can effectively store cultures for **years!**
- ☺ Small and easy to store
- ☺ Very resistant to contamination (esp. when capped)

DOWNSIDES

- ☹ Can be difficult to pour, set at a good angle, and inoculate
- ☹ Can be difficult to take cultures from a slant and transfer to a fresh plate

GRAIN JARS

You can put a colonized grain jar in a dark closet, or in your culture fridge. **In a closet, they last about two or three months. In the fridge, they can last two times as long.**

DIFFERENT WAYS TO STORE YOUR CULTURES

UPSIDES

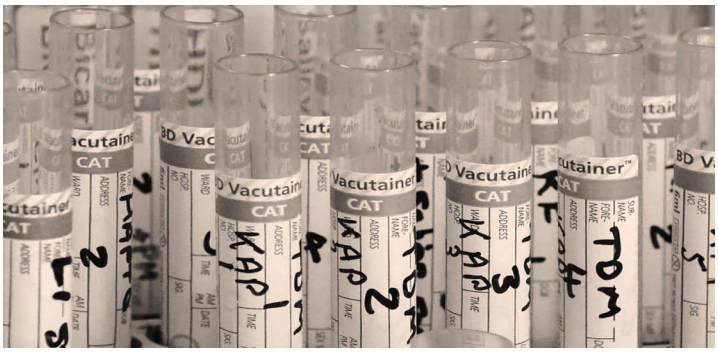
- Easy to store and use
- Convenient to have grain spawn ready for use when you want to make a new monotub

DOWNSIDES

- When exposed to light, the jars can begin to fruit, prematurely exhausting the mycelium of its energy and nutrients
- Takes up a lot of space
- Short shelf life

VACUUM TUBES

Typically used to transport blood and other liquid samples, [vacuum tubes are completely sterile] In our experience, they are fantastic for transferring and storing liquid culture! Liquid culture jars can also stay viable for up to a year before they start losing their vitality.



UPSIDES

- Easy to transfer
- Stay viable for a long time
- Small and easy to store
- Resistant to contamination

DOWNSIDES

- Single-use
- Can be expensive

SPORE PRINTS

[Spore prints] are not only absolutely amazing to see and make. **When made correctly, they can remain viable for years!** They're also easy to store, meaning there's no reason why you shouldn't have spore prints as a backup in case your culture ends up weakening, becoming contaminated, or worse.

UPSIDES

- Easy to make, store, and use
- Spores represent fresh genetics, meaning you have a new culture to work with
- **Legal to possess and ship in most countries and states**

DOWNSIDES

- You only know if it is contaminated once you transfer the spores to a fresh agar plate
- You are starting all over again at step 1

STERILE DISTILLED WATER

In our opinion, **this is the BEST way to store cultures for a very long time**. Some studies even claim you can awaken a culture from sterile, distilled water storage after more than a decade without any degradation. That's because when you move mycelium into sterile water without any nutrients, **the culture enters stasis** and remains that way until it's exposed to oxygen and/or food.

All you need to do is obtain dram vials from a laboratory supplier, fill them about half-full with distilled water, loosely cap the vials, then sterilize them in a pressure cooker for 30 minutes @ 15psi.

UPSIDES

- ☺ Easy to make
- ☺ Space efficient
- ☺ Cultures can be stored at room temperature
- ☺ Cultures can maintain their viability for years

DOWNSIDES

- ☹ You only know if it is contaminated after taking it out of storage

EQUIPMENT CHECK-LIST

- A sterilized agar mix of your choice, preferably less nutritious than your normal agar recipe
- Sterilized glass containers like test tubes or dram vials
- A rack to allow your containers to rest at an angle (easy to make yourself out of wiring, chicken fence, etc.)
- Spray bottle of 70% alcohol
- Gloves
- Mask
- Masking tape
- Protective film (Parafilm, crafting tape, or cling wrap)
- **Optional**: One sterile syringe

STEPS

1. Make your agar mix, put into pressure cooker with your vials/test tubes (wrapped in aluminum foil) and pressure cook at 15psi for 30 minutes.

2. Prepare workspace as explained in Sterile Workflow lesson

3. Spray mask with 70% alcohol, let dry, put on mask.

4. Put on gloves and spray hands and arms up to your elbows with 70% alcohol, let dry.

5. Spray rack with 70% alcohol, put into SAB.

6. Take agar mix and glass containers out of pressure cooker.

7. Spray agar and glass containers with 70% alcohol on all sides, let air or towel dry.

8. Put agar and glass containers into SAB.

9. Spray inside of SAB with 70% alcohol one more time, let air dry.

10. Spray hands and arms with 70% alcohol up to elbows one more time, let air or towel dry.

11. Slowly put your arms into SAB.

12. Unwrap slant containers, place onto rack.

13. Uncap agar container and slowly **pour agar into slant with dominant hand until slant is between one-third and one-half**

full with agar.

⭐ **Optional**: You can use a sterilized syringe for this step by sucking the agar out of its vessel then squirting the agar into the slant container.

14. Cap the slant with non dominant and then place it onto the rack at an angle to dry.

15. Repeat steps 13 and 14 until complete.

16. Make sure each vial/test tube rests at an angle.

17. Spray inside of the SAB with 70% alcohol.

18. Wait until the agar solidifies (this typically takes between 10 and 20 minutes).

19. Inoculate your new agar slants or wrap them in parafilm for storage.

PRO TIP!

When inoculating an agar slant, you cut a slice of mycelium from a colonized agar plate then **use a pair of tweezers to remove the slice from the plate before dropping it precisely** into the agar slant.

Learning how to make spore sprints is powerful because o**nce you have this skill down and fruit your first monotub**, you [never have to buy a cubensis culture again!]

EQUIPMENT CHECK-LIST

- A freshly harvested mushroom with the gills fully opened
- Aluminum foil
- Scalpel or sharp knife
- Spray bottle of 70% alcohol
- Gloves

STEPS

1. Choose the **largest, most robust mushroom** from your harvest.
2. Put on gloves and spray hands and arms up to your elbows with 70% alcohol, let dry.
3. Spray the aluminum foil with 70% alcohol and let air dry.
4. Spray your knife/scalpel with 70% alcohol and let air dry.
5. **Cut the stem off the mushroom just below where it attaches to the cap** so that when the cap is placed on the foil face down, it will be raised a millimeter or two above the foil.

PRO TIP!

Try to avoid touching the gills directly.

6. **Place the cap face down** on the alcohol sanitized foil.
7. Cover the cap with a clean, 70% alcohol sanitized container like a jar or drinking glass.
8. Within 4 hours, the cap should deposit enough spores onto the foil. **You can let the mushroom drop its spores overnight but do not let it sit for more than 12 hours**.
9. Remove the container covering your cap and foil, then immediately fold the foil in a way so that the print is completely sealed twice and the foil does not fold where the spore print is.
10. Store the foil in a dry place out of direct sunlight, preferably in a sealed plastic bag.

PRO TIP!

The mushroom is completely safe to consume or dehydrate for later use.

EQUIPMENT CHECK-LIST

- Sterilized glass containers (e.g. dram vial, test tube, or small airtight jar without an adapted lid) with sterile, distilled water inside
- One healthy colonized petri dish
- A rack to allow your containers to stand upright (easy to make yourself out of wiring, chicken fence, etc.)
- Spray bottle of 70% alcohol
- Torch for flame sterilization
- Scalpel
- Gloves
- Mask
- Masking tape
- Protective film (Parafilm, crafting tape, or cling wrap)
- **Optional**: Tweezers. We highly recommend tweezers since they make the transfer a lot smoother and more secure.

STEPS

1. Fill your glass containers about two-thirds full with distilled water, then close the lid loosely. Cover the tops with aluminum foil.

WARNING!

Do not close the lid completely or the air will expand and cause your container to explode. And no, it won't be a pretty mushroom cloud explosion

2. Pressure cook the containers at 15psi for 20 minutes.
3. Prepare workspace as explained in Sterile Workflow.
4. Spray mask with 70% alcohol, let dry, put on mask.
5. Put on gloves and spray hands and arms up to your elbows with 70% alcohol, let dry.
6. Take the sterilized glass containers and tools out of the pressure cooker.
7. Spray the containers and the colonized agar plate with 70% alcohol on all sides.
8. Slowly put containers and plate into the SAB.
9. Flame sterilize scalpel and tweezers, put into SAB, let cool.
10. Spray the inside of your still air box with 70% alcohol one more time, let air dry.
11. Spray your hands and arms with 70% alcohol up to your elbows, let air dry.
12. Slowly put your arms into the SAB.
13. Remove the aluminum foil from the glass container tops.
14. Loosen the tops so they can be easily removed with one hand.
15. Wait one minute to allow the air to settle
16. Unwrap the colonized agar plate, remove lid.
17. Cut piece(s) of agar with dominant hand, return lid to plate, set down scalpel.

18. Remove lid from colonized agar plate with non dominant hand.

19. Pick up cut piece(s) of agar with tweezers in dominant hand.

20. Return lid to colonized agar plate.

21. Open glass container with non dominant hand.

22. Drop agar slice from tweezer into glass container with dominant hand. Transfer one piece of agar per glass container.

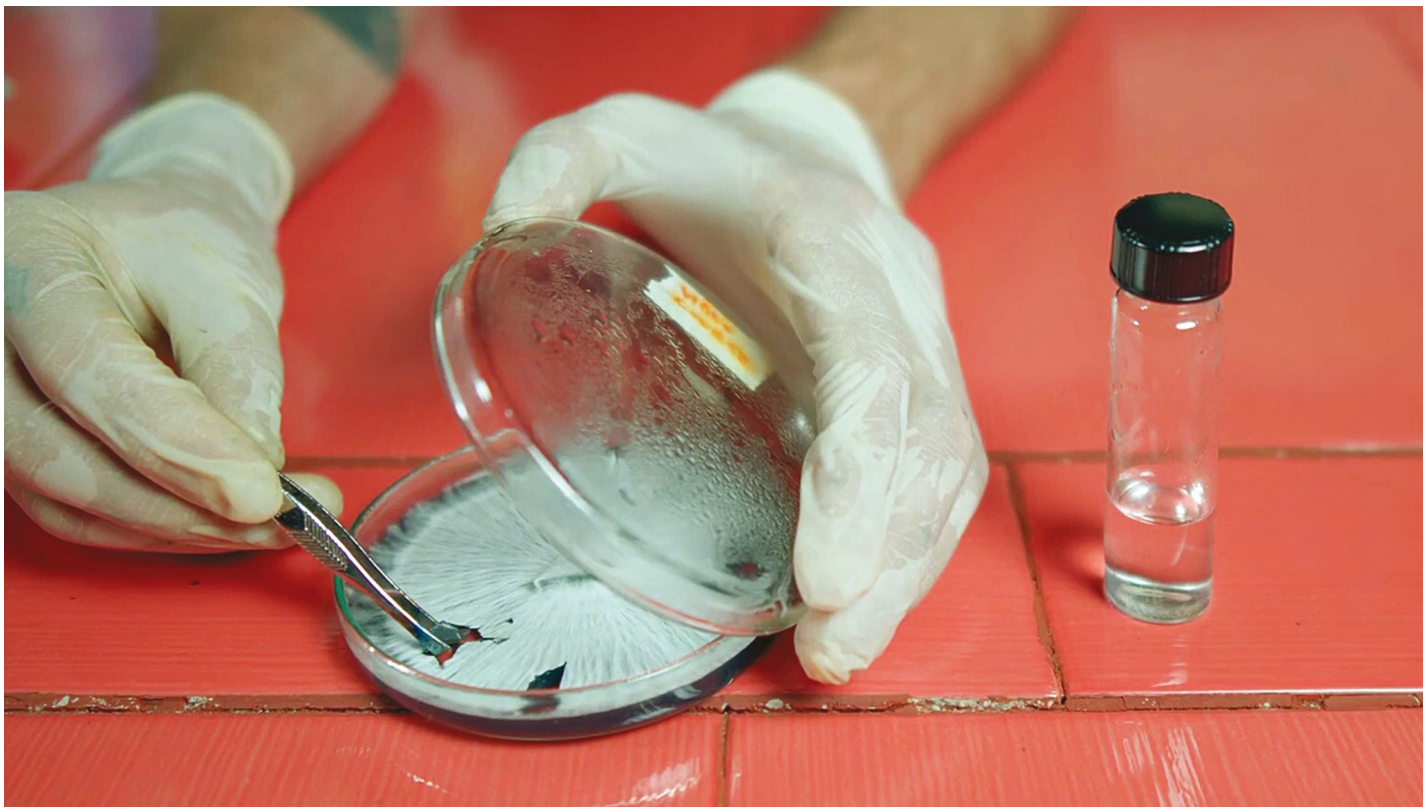
23. Repeat steps 18 through 22 until finished.

24. Close the glass containers and colonized agar plate completely, wrap with parafilm.

25. Put glass containers into storage (Remember, it does not need to go into the fridge).

26. Return colonized agar plate to refrigerator for storage.

In the final module, we'll learn **all about how to know when your monotub is ready to fruit and what to do when it is!**



MODULE

11

GRADUATION!

YOU MADE IT!

You have made it to the Graduation!

YAHOO!

We are so proud of you!

If you've finished all of the lessons and quizzes, you should have a couple messages from us in your email, like, say, **a fancy-looking certificate with your name on it!**

And if you're part of the mastermind community, please send **@Jasperiuss** a message with a screenshot of your certificate and he'll promote you to the prestiguous title of Graduated Mushroom!

You should also have a **handy PDF version of our workbook!** We've sent you 2 versions: one is digital and the other is for printing.

So, what's waiting for you in this module?

- A brief explainer on what you can do with your new collection of mushrooms
- A bonus lesson on how to flow with a flow hood

And we have a graduation party!

11.1 WHAT TO DO WITH YOUR MUSHROOMS

Welcome to this lesson on what to do with your mushrooms! We've made a little list of our favorite things to do in union with Sacred Mushrooms!

1. Microdose
2. Connect with Nature
3. Celebrate
4. Explore the Depths of Consciousness

MICRODOSE

Microdosing is increasingly making its way into the mainstream. To be clear, a microdose is a dose that doesn't alter your state of being. In other words, it's sub-perceptual. A recommended dosage is between 0.05 and 0.15 grams.

With this dosage, a lot of people report improved cognitive functioning and improved/more stable moods, among a bunch of other benefits.

And we're going to show you how to make microdoses in this module! Weee!

To learn more about microdosing, we highly recommend the microdosing course from our friends over at the Third Wave!

CELEBRATION!

There is a lot of discussion regarding using psychedelics to party. Personally, we've had some incredible, life-changing experiences celebrating with psychedelics.

But there are definitely some risks with taking psychedelics in a party setting. In our opinion, the ideal setting for a sacred mushroom party is an intimate, secluded house setting with people you know well and without any alcohol involved.

Also, we recommend ensuring that the mushrooms are dosed correctly, consistently, and served to people instead of having a bowl of mushrooms just sitting around. Someone might get a little overzealous and turn a celebration into a full-fledged seeing God, transformative, challenging experience.

Making sacred mushroom tea is a great method of ingestion at such events! Our recommended dosage in such a setting? 0.5 grams to 2 grams per person.

PRO TIPS!

While cannabis is fantastic for the end of the celebration, **it can induce anxiety and paranoia when taken before or during a sacred mushroom journey**. So beware!

Also, set up a place for arts and crafts! Have fun and stay safe!

CONNECTING WITH NATURE

Connecting with Mother Earth is an extremely powerful, energizing, and healing experience that, when combined with Sacred Mushrooms, can be life-changing.

We like to go on hikes or hang out in a secluded spot near a body of water with loved ones when combining sacred mushrooms with nature.

Just please, please, please make sure to bring enough water, a phone with maps, and tell somebody where you are going before setting off on your journey. And like the celebration setting, we recommended a dosage between 0.5 grams and 2.5 grams.

EXPLORING THE DEPTHS OF CONSCIOUSNESS

If you've joined our Mastermind course, our brother Julian Vayne will give you an in-depth overview on why and how to navigate the psychedelic space in the **Psychedelic Journeywork Course**.

But before we go, we'd like to finish this lesson with a personal story, courtesy of Jasper.

Sacred Mushrooms helped me relieve the depression I was fighting for most of my adolescence, gave me the insight to quit my job and travel the world, and helped me be free of my addiction to smoking tobacco and cannabis. I am eternally grateful for the grace of these amazing beings. Without these experiences, you wouldn't be watching me right now.

For such transformative work, we recommended a dosage between 2.5 grams and 5 grams.

Thanks for checking out this lesson! We'll see you in the next one!

Welcome to this lesson on making your own microdoses!

FOR THIS LESSON YOU WILL NEED

- Completely dried Sacred Mushrooms
- A blender of some sort
- A bowl
- Scales that are accurate to the hundredth gram, or 0.01 grams
- Capsules
- Optional: A capsule maker

STEPS

1. Make sure your blender is completely dry
2. Blend your mushrooms until they are completely powdered. **Let sit for a minute before opening** or you'll get a cloud of mushroom dust puffing up in your face (though there are worse things, right?)
3. Put the mushroom powder in the bowl
4. Weigh an empty capsule (normally they're 0.1 grams)
5. Add in your desired dosage **(we recommend starting at 0.05 grams and never going above 0.15 grams)** by pushing the powder into the capsule
6. Close the capsule and voila, you have a microdose.

Remember to have fun while making your microdoses! In essence, **you're making medicine** by yourself, for yourself (and your friends, family, community)! What a gift!

WRAPPING IT ALL UP!

We would love to know what you think about our **very first online course!**
Click here to help us out!

Sacred mushrooms are here to help us heal ourselves, our communities, and our environment. Unfortunately, education about mushroom cultivation and the use of psychedelics is not yet accessible to everyone.

If you want to become an active participant in the radical change that's happening all over the world. Reach out to your local decriminalize nature chapter or Psychedelic Society!

To honestly communicate and educate, we first need to relate to each other. There are no "us and them" in this movement. It's all one, a global family of humans.

Mushrooms and mycelium are the archetypes of connection, so use what you have learned here to weave the network of relationships wherever you go.
We hope to one day see you here, at Fungi Academy!

Thanks you so mush for tuning into the entirety of this course! 🙏 We had so much fun making it and although you have mostly gotten to know **Oliver** & **Jasper**. We couldn't do it without this team of Mycophiles! ❤

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SO MUSH LOVE ❤ 🍄

THEORY

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4.2 The Four Elements of Fungal needs
4.3 Four Principles of Mushroom Cultivation
4.4 The Mindset of a Mushroom Cultivator
4.6 Beginner Mistakes to Avoid
7.1 Liquid Culture Basics
8.1 Bulk Substrate
8.2 Bulk Substrate Supplements
9.1 Parameters of Storing your Culture
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10.2 Humidity & Light

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5.2 Sterile Workflow
5.3 Agar Recipes
5.4 How to use your Pressure Cooker
5.5 Pouring Agar
5.6 Working With Agar
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7.3 Preparing your Liquid Culture
8.4 Bucket Tek Pasteurization

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5.8 Clone To Agar
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6.3 Agar to Grain
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7.4 Agar to Liquid Culture
7.6 Liquid Culture Transfers
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9.3 Making Culture Slants
9.4 Making spore prints
9.5 Sterile Distilled Water Storage

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4.5 Vectors of Contamination
5.1 Spotting Contamination
6.5 Loving your Grain
7.5 Nurture your Liquid Culture
9.6 Contamination troubleshooting

WHERE TO FIND MUSHROOM SPORES AND CULTURES

1. SACRED MUSHROOMS

UNITED STATES

Spore Works

Spore Works has been in the **rare and exotic mushroom business since 1998** and is a reputable dealer of spore syringes, spore prints, and liquid cultures.

They also process orders via phone, mail, money order, and accept payments via cryptocurrency. **Per state law, spore syringes and spore prints cannot be shipped to California, Idaho, or Georgia.**

Micro Supply

Micro Supply accepts payments via cryptocurrency and Zelle, and offers reliable, reasonably priced 12cc spore syringes for $10 per syringe. As a bonus, if you buy 2 spore syringes, you get a third for free. Not a bad dealer and not a bad deal, we think.

Spore Depot

With options to pay via mail order, cryptocurrency, or Zelle, a free spore syringe with any order paid via cryptocurrency, and 30 psilocybe strains to choose from, Spore Depot is a great resource for people in the United States.

Check shipping restrictions to see if they ship to your country! Spore prints and spore syringes are legal in 47 states and many European countries, meaning you can use these sites for international shipments.

WORLDWIDE

Reddit:
r/Spore Traders and r/SporeSwap

These two subreddits contain individual vendors of spore syringes and spore prints and a rating system that helps vet the good vendors from the bad. Just as helpful is the Spore Traders' vendor page where reputable, highly reviewed vendors are listed.

Shroomery Vendor Board

Shroomery is an amazing resource for mushroom cultivation and their vendor board is a fantastic source of established liquid culture, spore print and spore syringe vendors.

The site also has coupon codes and oftentimes offers deals to anyone who mentions Shroomery at the point of purchase.

Many of the vendors ship worldwide, making this a great resource for mushroom growing hobbyists from all over the world.

Azarius
Zamnesia
Magic mushroom shop
De Sjamaan

These sites are Dutch owned shops that ship spore prints, syringes and grow kits, as they are legal in the Netherlands.

De Sjamaan sell Liquid Mycelium to a list of countries mentioned here

2. GOURMET AND MEDICINAL MUSHROOMS

UNITED STATES

Aloha Medicinals

With **over 1,000 unique species** in their culture bank, Aloha Medicinals has the largest privately owned culture collection of medicinal mushroom species in the world.

Their prices are high ($125 to $350 per culture) but the cultures are guaranteed for life, shipped worldwide, and come with two separate culture slants. That means even if you contaminate a plate, Aloha will replace it for the cost of shipping. We think that's a really sweet guarantee.

North Spore

This Maine-based mushroom business has everything from cultures to spawn to grow kits to instructional videos and courses. The petri dish culture prices are steep (~$75) but the spawn and grow bag prices are fair and a great place to start for the novice grower.

Fungi Perfecti

Founded by the **Godfather of citizen mycology, Paul Stamets**, Fungi Perfecti has an exhaustive menu of cultures, laboratory equipment, and grow supplies to satisfy every mycology need.

Mycelium Emporium

This site has a long list of cultures at cheap prices, though we advise to steer clear of some species (Morels, Chaga, Cordyceps), as they are for more intermediate to expert growers and the cultures are likely not effective. But if you're looking for a budget, simple oyster culture, this is a good site to use.

Lion's Mane: MycTyson

At the moment, MycTyson — the best name in mushroom cultivation, we think — is the go-to-guy for Lion's Mane fruiting bags. He's so popular, you need to pre-order them or run the risk of missing out. But he'll soon begin offering Lion's Mane cultures.

And in the meantime, you could always buy a bag, enjoy the massive fruit it produces, clone the rest, and create your own culture.

Cordyceps/Reishi: Terrestrial Fungi

Cordyceps is notoriously finicky when it comes to fruiting and preserving a fruiting culture. As a result, culture isolation is best left to the experts, like Ryan Paul Gates of Terrestrial Fungi.

Gates is also a Reishi master, so if you're in need of either culture (~$35), he's definitely the best source for a strong, fast-growing strain you can keep in your culture library for years.

WORLDWIDE

Mycelia

This Belgium-based company has a number of professionally-made cultures on petri dishes and grain spawn bags that ship worldwide. The website is also a great resource for finding the incubation and fruiting conditions for each species it sells.

Out Grow

Based in Illinois, Outgrow has more than 100 cultures, all priced for about $25, and able to ship internationally.

Oak and Spore

The only New Zealand-based culture company on this list, Oak and Spore has a somewhat limited culture bank (Shiitake, Phoenix Oyster, Turkey Tail, Shaggy Mane, Yellow Morel) but is able to serve budding mycologists in an area of the world where ordering and receiving a viable culture may be a challenge.

WHERE TO FIND MUSHROOM SPORES AND CULTURES

PRO TIP!

If you live in an area where there is one or more mushroom growers, we recommend contacting them and asking about their culture library.
At best, they'll have a local culture that is already adapted to your area's climate. At worst, they'll have some other cultures that you can buy directly from them, saving yourself and your culture the cost and stress that shipping can wreak, and supporting a local small business to boot.

Who knows, you may even gain a new mushroom-loving friend!

CLONE YOUR WAY TO A CULTURE

Another way to source any kind of culture, from a grocery store Shiitake to a Golden Teacher, is to clone a mushroom onto a Petri dish of agar.

Though we'll cover this in your class, the basic idea is to take a freshly fruited mushroom, split the stem or cap with your thumbs, slice and remove a piece of the mushroom that was previously unexposed to the air (a slim piece from the widest part of the stem or a chunk from the fattest part of the cap works well), and then place it onto a Petri dish of clean agar. In a few days, mycelium should start growing on the plate. **Viola, you just made yourself a culture.**

LINKS SUMMARY

SACRED MUSHROOMS

UNITED STATES	WORLDWIDE
Spore Works	r/Spore Traders, r/SporeSwap
Micro Supply	Shroomery Vendor Board
Spore Depot	Azarius, Zamnesia, Magic mushroom shop

GOURMET & MEDICINAL MUSHROOMS

UNITED STATES		WORLDWIDE
Aloha Medicinals	Mycelium Emporium	Mycelia
North Spore	Lion's Mane: MycTyson	Out Grow
Fungi Perfecti	Cordyceps/Reishi: Terrestrial Fungi	Oak and Spore

MUSHROOM CULTIVATION EQUIPMENT LIST

CONTENTS

LAB EQUIPMENT

	EQUIPMENT	QTY
1	Pressure Cooker	1
2	Mason Jars	12
3	Transparent storage container, *90 Quart*	1
4	Latex or Nitrile Gloves	12
5	Luer lock Syringe Needles, *14 to 18 gauge, 1-4" (2.5cm-10cm) long*	1 pack
6	70% Isopropyl alcohol, *64 fl.oz (2 liter)*	1
7	Hydrogen Peroxide (H_20_2) *3% concentration, 32 fl.oz*	1
8	Spray Bottle, *32 fl.oz (1 liter)*	2
9	Polyfill or an old, synthetic pillow	1 pack or 1 pillow
10	All-Purpose Silicone Caulk *10.1 oz*	1
11	Glass/plastic/polypropylene (PP5) Petri Dishes	18 to 24
12	Pocket-sized scale	1
13	Scalpel/Exacto Knife	1 or 2
14	Scalpel Blades	4
15	Torch	1
16	Parafilm *125" by 4' (38m by 10cm)*	1 roll
17	Glass Bottle, *17 to 34 fl. oz (500ml to 1000ml)*	1 or 2
18	Funnel	1
19	Masking tape	1 roll
20	Aluminum Foil	1 roll
21	Bucket, *5 Gallon*	1
22	Magnetic Stirrer	1 (optional)
23	Stir Bars	6 (optional)

FUNGI FOOD

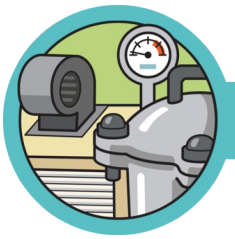
	EQUIPMENT	QTY
1	Grains	40lb (18kg)
2	Agar-Agar powder	100 grams
3	Light malt extract	100 grams
4	Gypsum (Calcium Sulfate)	1lb (0.5kg)

INCUBATION

	EQUIPMENT	QTY
1	Non-transparent storage containers, *27-gallon (102L)*	1
2	Reptile/Fish Tank/ Seedling Heating Mat	1
3	Thermometer	1

FRUITING

	EQUIPMENT	QTY
1	Clear Storage Container, *15 (14L) Quart to 66 Quart (62L)*	1
2	Coconut Coir	5lb (2.25kg)
3	Vermiculite	8 dry quarts
4	Hygrometer	1



LAB EQUIPMENT

Pressure Cooker (PC)

This is the most important and heavily used piece of mushroom cultivation equipment you'll buy so we really believe it's worth investing some money here.

As for size, we say *"the bigger, the better!"* We recommend buying a PC that can hold at least seven quart (~950ml) jars.

If you can't find a PC that reaches 15 pounds per square inch (psi) (you'll learn what this means in the course), you can purchase one that reaches 10psi and just multiply your cooking time by 1.75 with the same result.

Hobbyist:
23 Quart Presto Pressure Canner
Serious Grower:
All American 30 Quart PC
European:
Kuhn Rikon or WMF

Pint (0.5L) or Quart (1L) jars

Mason Jars, Kerr Jars, or anything airtight with a metal or polypropylene lid that locks into place works fine.

Transparent storage container, ~88 Quart (83L)

This container will be your Still Air Box (SAB). Inside it, you'll be doing the bulk of your lab work. Ours is 88 quarts, which works great. If you can't find one that large, you will be okay. But again, "the bigger, the better."

Here's an example

Latex or Nitrile Gloves

Cheap, single-use latex gloves work fine.

Syringes, 10ml and 60ml

We use reusable glass and polypropylene (PP5) syringes that can be pressure-cooked multiple times without deterioration.

Luer lock Syringe Needles, 14 to 18 gauge, 1-4 inches (2.5cm-10cm) long

Sharp needles can be hard to source in the United States but we found one seller on Amazon and have included them in the shopping list.

Needles like these can also be found at many veterinary and livestock supply stores.

Most needles can be pressure-cooked multiple times and reused.

Blunt tip needles will wear out your injection ports quicker, but work fine, too.

MUSHROOM CULTIVATION EQUIPMENT LIST

70% Isopropyl alcohol

If you can only find 90%, we recommend diluting it with water to 70%.

Spray Bottles, 28 to 32oz (0.8–1L)

For spraying surfaces, tools, hands, etc. in the lab with 70% Isopropyl alcohol, and/or for misting your mushroom bags/tubs as they fruit.

Hydrogen Peroxide (H_20_2), 25% concentration

H_20_2 kills fungi and mold, so don't use this when working with spore prints or spore syringes, but do use it as you would alcohol if you have mold contamination issues.

Polyfill or an old, synthetic pillow

This stuff is breathable, non-organic, and will serve as a filter to put in the holes in your jars/tubs to allow your mushrooms and mycelium to breathe.

Silicone tube or port

This is used to create self-healing entry ports for your mushroom substrate jars. You will also need a gun to dispense the silicone.
A tube of sealant is cheap but you can also save a step and just buy pre-made silicone ports

Glass/plastic/polypropylene (PP5) Petri Dishes OR Plastic deli/sauce containers/extra small jars

These are for culture transfers, isolations, maintenance, and generally just for keeping your mushroom cultures clean and strong. They also work great for the long-term storage of cultures.
Reusable dishes and small jars are the best for your pocket and the environment.
Glass dishes like this, polypropylene dishes like that or jars like these
Single-use, plastic containers like this and that work well, too.

Pocket-sized scale

The accuracy should get down to at least the 0.1g measurement, though one like this that is accurate to the 0.01 works even better.

Scalpel/Exacto Knife

This is for cutting your mushroom agar cultures, so it doesn't need to be super sharp, but it's important to buy one that will fit comfortably into your hand.
A #10 or #11 Exacto knife works great. Scalpels with replaceable blades are nice, too.

Scalpel Blades

If you're using an Exacto knife, go for the #10 or #11 blades.

Torch

This is for flame sterilizing your scalpel, so a bunsen burner, butane torch, or alcohol lamp will work just fine. Or, if you're feeling real fancy, Google a Bacti-Cinerator.

Parafilm

This stuff is gold, but if you want to go cheap, cling wrap can work as a budget option.

Flask, 17-34oz (500ml to 1000ml)

This is for pressure cooking your agar so any glass bottle will work fine, but a Pyrex glass bottle made for labwork and pouring is nice.

Funnel

For pouring things into your agar bottles, any plastic cheap funnel will work.

Masking tape

For labeling your mushroom cultures, strains, dates, etc :)

Aluminum Foil

For wrapping jars/dishes, etc.

NON-ESSENTIAL EXTRAS

Magnetic Stirrer

This is for agitating and stirring your liquid cultures, so if you don't plan to work with liquid cultures (you should, they're great!), it's unnecessary. Even if you do, you can make a homemade stir plate with a little time and effort. Heck, some people prefer to stir their liquid cultures by hand, twirling the jar gently. They say it's a good relationship-building exercise. Whatever works!

Stir Bars

This is only necessary if you are buying/making a magnetic stirrer. If you are choosing to stir by hand, you can use broken glass, marbles, or even coins.

MUSHROOM CULTIVATION EQUIPMENT LIST

FUNGI FOOD

Grains

Rye grain is one of mushrooms' favorite foods, but they're still happy to eat Millet (sorghum), Corn, Oats, Rice, or Wild Bird Seed.

Agar-Agar powder

Made from sea-weed, this powder is what makes the liquid you pour into your Petri dishes turn into a gel. There are pre-made and mixed types, like this Potato Dextrose agar powder, but they're more expensive and limit the recipes you can use, so we prefer regular agar-agar powder, which is non-nutritive and can be combined with nutrients to make your own recipe.

Light Malt extract

This is just one of the possible nutrition sources for your agar mix and can be found at any brewing supply store. Other possible nutrient powders/mixes include dextrose, dog food (woof), honey, boiled potato water, to name just a few.

Gypsum (Calcium Sulfate)

A fantastic supplement to your mushroom growing, gypsum provides essential minerals and a chemical balance to your substrate, helping your mycelium grow faster and your mushrooms fruit bigger.

INCUBATION

Non-transparent storage containers, 27-gallon (102L)

Something like this works great as a makeshift incubator. Find a wire shelf that fits inside it. This is where you'll put your jars/petri dishes.

Reptile/Fish Tank Seedling Heating Mat

This piece of equipment goes on the top or bottom of your incubator and will raise the temperature in your incubator to the sweet spot for mycelial growth.

Thermometer

To ensure the temperature in your incubator is in the right range (~75F/24C is perfect).

FRUITING

Clear Storage Container, 15 (14L) Quart to 66 Quart (62L)

This'll be your main fruiting chamber, or as the mycology community calls it, a Monotub. Learning the ways of the Monotub is part science, part art, and a major feature of our class. We recommend starting small and buying a bigger one as you gain experience. We also recommend buying one with a latch that will keep the top securely closed, and if you can find it, one with gaskets that seals the top closed.

Coconut Coir

A great bulk substrate for growing mushrooms, it's basically just the brown, fibrous, husk of coconuts

You can find it at any pet store in the reptile section.

Coarse Vermiculite

For keeping your substrate aerated and hydrated! Fine is okay, coarse is better
Any hardware or gardening store will have this.

Hygrometer

A hygrometer measures relative humidity, which is important as mushrooms fruit their best when they're in humid environments. If you plan to build a Martha fruiting chamber someday soon, an Inkbird Hygrometer is the way to go.

SHOPPING LIST

We have put together for you an

Online shopping list

You can easily just order everything you need from Amazon or use it just as a reference if you have better sources available locally.