

Mycelium Casting using Oyster Mushrooms and Household Waste
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Oyster mushrooms are a rapidly growing edible mushroom variety that can thrive on a variety of common organic waste materials, making them ideal for student experiments.

In this protocol, we will use two household waste substrates to grow mycelium castings.

These are:

- 1) Used coffee filters containing brewed grounds
- 2) Shredded scrap paper with additional wheat bran

NB: It is also possible to grow edible oyster mushrooms using these substrates, although caution is advised when using shredded paper. Make sure it is only sourced from paper printed with non-toxic, soy-based inks.

Ready to Grow Mushroom Kits

There are numerous 'ready to grow' oyster mushroom kits on the market that usually include a sealed spawn bag of live mycelium cultured on an organic substrate. The mycelium can be used to inoculate other materials which can then be cast in a mold to create decorative or functional mycelium forms. The finished mycelium material is similar to styrofoam and can be used for packaging, all sorts of containers, thermal insulation, acoustic dampening tiles, planters or sculptural forms. When completed this protocol produces similar results to the Ecovative GIY mycelium kits but it is important to note there are a few extra steps required as the waste material to be used as a substrate needs to be sterilized (or pasteurized) to avoid contamination by competing organisms.

As with other biomaterials protocols, it is important to remind students that good hygiene is vital to a successful outcome, particularly during the early stages of the process. Hands should be thoroughly washed before handling the mycelium or (better yet) disposable gloves worn. Molds should be sanitized with isopropyl alcohol before being filled with mycelium/substrate mixture and work surfaces should also be sanitized. Students should be made aware that any molds need to be made moisture resistant, for example cardboard molds would need to be lined in Saran Wrap or plastic bags so they don't deform from moisture absorption.

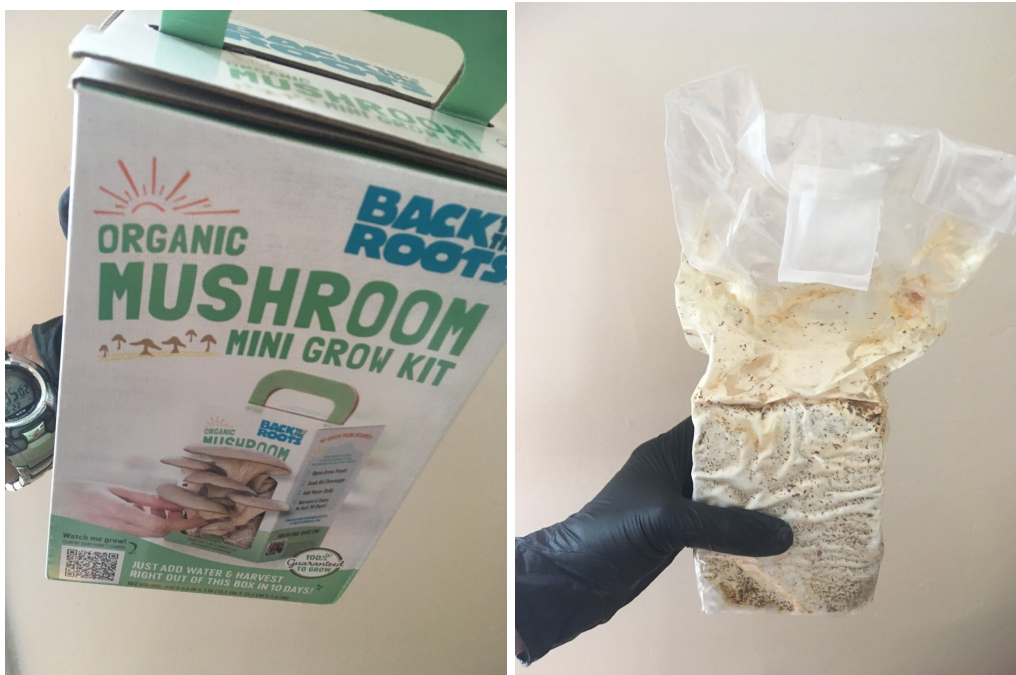
Oyster Mushroom Casting Protocol

Materials required:

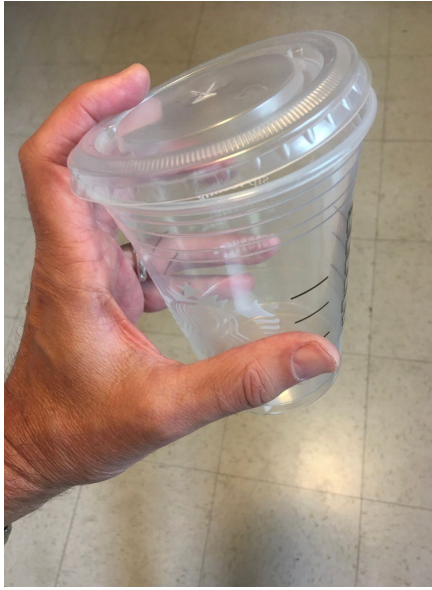
- 'Back to the Roots' (or equivalent) Mini grow kit for oyster mushrooms,
- Polypropylene (#5) transparent hot drink cup with lid (Starbucks or equivalent),
- piece of aluminum foil,

- disposable gloves, (or super clean hands!)
- isopropyl alcohol (preferably in a spray bottle),
- shredded paper + tablespoon of wheat bran (or) used coffee filters containing brewed grounds,
- a small pot in which to boil water or better yet an Instant Pot or other pressure cooker for substrate sterilization,
- some sort of a mold (ready made or constructed for second stage of protocol)
- clear plastic bag with some sort of a tie or tape,

1) Purchase a 'Back to the Roots' Mini grow kit or equivalent. (see image below)



(back to the roots kit with mycelium bag)



- 2) **SUBSTRATE:** Select the substrate you want to use: For coffee filters with brewed grounds, make sure the mixture is damp before packing into a Starbucks type #5PP transparent hot drink cup with the clear lid (usually non-heat stable HDPE) set aside for later. It is very important that the cup is #5 PP (polypropylene) usually indicated on the bottom as this ensures the plastic is heat resistant. Replace lid with a piece of aluminum foil for sterilizing. For shredded paper, mix in a sprinkling of wheat bran and wet thoroughly and squeeze out excess water before packing into the cup.
- 3) **STERILIZATION/PASTEURIZATION:** If you have an Instant Pot (or pressure cooker) put at least a cup of water in the bottom of the Instant Pot and place the substrate-filled, foil covered #5PP cups on the metal trivet. Pressure cook for 10 minutes to sterilize and allow natural release. If you have a normal cooking pot, boil the substrate-filled, foil covered #5PP cups in a water bath for approximately 30 minutes. This will pasteurize (but not sterilize) the substrate, but this will work well enough for the protocol. Allow substrate to cool to room temperature.
- 4) **INOCULATION:** With clean hands or disposable gloves carefully cut open the mycelium bag and remove a few chunks of the myceliated substrate. Layer these into the sterilized/pasteurized shredded paper or coffee grounds in the cup and put on the original (clear plastic) lid. To help avoid contamination, place an adhesive bandage or some micropore (surgical) tape over the straw hole in the lid or stuff in some polyester fibrefill to serve as a filter. Watch for white growth through the substrate over the next few days (or weeks) depending on temperature. When the contents of the cup is covered in white growth, the mycelium is 'trained' to digest the specific waste material and can now be 'fed' more of it and introduced into a suitable mold for casting.



(LEFT: ready for sterilization) (RIGHT: shredded paper and bran with mycelium growth)



(LEFT: used coffee filters showing mycelium growth)(RIGHT: filled mold made from styrofoam containers)

- 5) CASTING: Choose a suitable mold. Remember the mold has to come apart to release the casting when finished so plan out how that will work. 2 part molds can often be made from ready made consumer items such as discarded containers or assembled from cardboard lined with plastic film. Other options are silicone molding compound and plaster molds. (contact Derek Haffar haffar@newschool.edu). Sanitize the mold

thoroughly by spraying or wiping with isopropyl alcohol and let dry. If you are planning a small casting, there might be enough material in the Starbucks cup to fill the mold but if you want to do a larger one, sterilize/pasteurize some more shredded paper/bran mix or coffee filters / grounds and mix the contents of the cup into it when cool. The mycelium will spread into this material over time after being placed in the mold. In order to maintain the optimal humidity for mycelium growth, place the mold in a clear plastic bag with the opening tied loosely to let in a bit of air. Alternately cover the mold with plastic wrap and make a few pinholes to allow air exchange.



(LEFT freshly packed mold with coffee filters) (RIGHT mycelium filling mold and also fruiting)



(maintaining humidity with plastic bag)

- 6) After about a week (or possibly longer), when the mold has been fully myceliated (the white material has come to the surface), remove the mold from the plastic bag and allow it to air dry for a day or two. This will shrink the casting slightly inside the mold and make it easier to remove. Separate the mold from the casting and dry casting in ordinary room air, or (to speed it up) bake in an oven at low heat, or place next to a radiator.



(a finished casting from myceliated coffee filters)

The finished castings will have the consistency of dense styrofoam and are fairly robust even though they are biodegradable. Students can experiment with any carbon-based waste product such as sawdust, cardboard etc. Adding bran speeds up the growth of the mycelium.



If left long enough, mycelium will often fruit into edible mushrooms.

