Ecovative Mycelium Material

Instruction Manual Please Read

www.ecovative-design.com
WELCOME TO THE FUTURE OF MATERIALS!

At Ecovative we are excited to see and hear about the projects you come up with using mycelium material, whether you are designing world changing solutions for fashion, architecture and product innovation, or growing beautiful toxic-chemical free planters and lamps. Our dream is to live in a world where biomaterial products are grown in new manufacturing processes using living materials - and you just helped Ecovative take the important first step towards turning this dream into reality.

There is a lot to learn about growing your own products, and this manual will get you started. But, before you get your hands dirty, make sure to pay close attention to The Essentials below because your hands definitely shouldn’t be dirty!

Warnings:
• Not for children under 13 years of age, except under adult supervision
• Choking Hazard — contains small parts, including agricultural particles that may be harmful if ingested or inhaled
• Not intended for human or animal consumption
• The process requires the use of flour, and may not be advisable for those with severe gluten allergies. Maltodextrin may be used as a substitute
• This material is not rated or recommended for structural applications

* Full Material Safety Data Sheet available at www.ecovativedesign.com

There are no mushroom spores or fruiting bodies in this process, just Mycelium - the vegetative root structure of a mushroom!
THE ESSENTIALS:
What you need to know before your grow

Keep it clean
To get your project growing you’ll be creating a nutrient-filled, moist environment that is great for all types of organisms. That’s why it’s super important to keep everything extremely clean, and don’t contaminate it with bacteria that could ruin your project. Make sure to thoroughly wash your hands, wear gloves, never touch or breathe (or smell!) inside the bag - you might contaminate the material before it starts growing.

Just generally be careful and cleanly.

AVOID
- Bacteria
- Yeast
- Molds

Timeline

1. Day 1
   Shake It

2. Day 5
   Make It

3. Day 10
   Bake It

Check your schedule
Working with mycelium material is simple but will require a bit of attention.

There’s a 4-6 day gap between the three crucial steps, so make sure to check your calendar before getting started, or risk having to cancel all your plans to take care of much more pressing business - your mycelium project!
While you may find other items like measuring spoons and kitchen scales useful, these tools are absolutely vital to your success.

**The Essentials: Tools of the Trade**

- Flour (any kind will do!)*
- Water*
- Clips or Tape to Seal Bag of Activated Mushroom Materials
- Disposable Gloves (Latex or Vinyl)
- Mixing Bowl
- Isopropyl (rubbing) Alcohol for Sterilization
- Oven or fan to dry finished project
- Baking Sheet

* Measurements for flour and water are different for each blend. Consult the label on the front of your bag for quantities.

**What Comes in the kit**
- Instructions
- Stickers
- Mycelium material in Filter Patch Bag
- Optional Growth Form

**The materials you will need**
Now that you have the essentials down, time to start growing

1. **Shake It** — Activate your bag of material and watch the mycelium begin to grow.

2. **Make It** — Fabricate a product, using a growth form, into any shape or design.

3. **Bake It** — Desiccate your finished product by baking in an oven (the fast way), or with a house fan (the slow way).

Working with mycelium material is as easy as...
Day 1

Thoroughly clean your hands, tools, and your work environment before opening the bag of dry mycelium material just below the seal.

• Mix x tablespoons of flour with x cups of tap water, and pour into the bag of dry material. (Use the flour/water quantities written on your bag’s label)

• Fold over the opening and make sure the bag is closed - Now shake it for at least one minute, to get everything covered in the flour/water mixture.

• While the opening is still folded over, make sure to leave the white filter patch uncovered to allow air exchange, and seal the bag using tape or clips.

Step 1 Shake
Add water & flour and re-animate your bag of material.

Thanks to your vigorous shaking & mixing, the dormant mycelium will begin to grow, absorbing nutrients from the flour and spreading root-like hyphae. As these individual white strands grow from the moist particles, they’ll begin to intertwine, binding the particles together loosely — this is a totally appropriate time to let out a maniacal laugh and exclaim, “it’s ALIVE!” As the days pass, you’ll notice the particles in the bag will grow increasingly white as the mycelium grows to cover the surface and colonizes the bag. You’ll also notice condensation in the bag as the mycelium respires, converting glucose and oxygen into carbon dioxide, water, and ATP, just like humans! When all of the particles have turned completely white after 4-5 days, your material is ready for the next step.
Day 5

When you break apart your material, it damages and stresses the mycelium so it’s important to give it some extra food by adding flour in this step. Those nutrients will be essential to the strong bonds you need to grow. Breaking the weak bonds that formed during the first step allows stronger bonds to form as the mycelium grows in tighter formation. Over 5-6 days, the mycelium will grow exponentially to fill in all of the gaps, binding the loose particles like nature’s glue. When everything in the growing container has turned completely white, fire up the oven because you’re ready for the final step!

What’s Really Happening Here?

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*Not sure what to use for a growing container? Check out www.ecovativedesign.com/community for growth forms
Because most people don’t want household objects to grow of their own accord, it’s important to halt any further growth of the mycelium by drying it out and then heating it. The combo of heating and drying removes all moisture from your project and eliminates the mycelium’s ability to continue to grow, creating a stable and inert materials. Yes, this is essentially killing the mycelium.

If you decide to desiccate by air drying with just a fan and no heat, this only places the material in stasis, and it could reanimate, but it is not likely without the right environmental conditions.
CONGRATULATIONS!

You just grew your own product from mycelium!
Now share your project and let everyone know how awesome this was!

Share your project on social media using #ecovative. Email us at contact@ecovativedesign.com with a link to your post and we will send you a discount for your next order!

For Grow It Yourself kits, materials, and tutorials visit www.ecovativedesign.com/community

Also check out shop.ecovativedesign.com for furniture, packaging, and more - there are plenty of ways to get your hands on the future with products GROWN from mushroom mycelium.
TIPS FROM THE LAB:

Want to see mycoremediation in action? Try mixing in your favorite shade of food coloring during the Make It step, giving you a colorful blend of agricultural material in your grow form.

As the mycelium grows, you’ll notice that the color is muted over time. That’s because the mycelium is actually ingesting some of the food coloring, much like it removes harmful chemicals from soil!

Refrigerating the material will help it last longer both after it arrives to you and after re-hydration. ‘

After you’ve completed the first stage of growth, you can store your re-hydrated material in the fridge for up to two weeks. The cold will halt the growth of the mycelium, essentially putting it into temporary stasis.

Removing your project from the mold on the fourth day of the Make It step and allowing it to finish growing in the open air will give your project an overgrown appearance and a more spongy feel.

For more advice on advanced grow techniques for your project, go to the Education section on www.ecovative.com or contact us at contact@ecovative.com
**FUN FACTS**

**INDIVIDUAL STRANDS OF MYCELIUM ARE CALLED HYPHAE**
These vein-like fibers grow by adding new cells to their tips, excrete enzymes to aid in decomposition, and absorb nutrients from the decomposed material in the substrate.

**MYCELIUM CAN ACT AS A POWERFUL, BIOLOGICAL CLEAN-UP CREW**
A natural decomposer, mycelium breaks down organic material and even rocks to sustain itself, in the process removing chemicals and toxins from the substrate. This is also referred to as Mycoremediation.

**MYCELIUM COLONIES CAN BE TRULY HUGE**
Thought to be the largest living organism ever found, a Honey Mushroom colony was discovered in Oregon in 2000 that is estimated to be around 2,400 years old and measured more than 3.5 miles in length. That’s longer than 188 Blue Whales combined!

**MYCELIUM INVENTED THE INTERNET**
Scientists have discovered that plants and trees can use underground networks of mycelium as a sort of biological internet to communicate and sound the alarm when something dangerous is approaching! When a plant is attacked by insects, it emits a warning signal that allows nearby plants to trigger their chemical defense systems before the destructive little buggers arrive. Even if they are super close by, plants that aren’t connected to the same colony of mycelium are not able to receive the signal, leaving them defenseless!

**MYCELIUM GROWTH IS ONLY PART OF THE MUSHROOM LIFE-CYCLE**
When we typically think of a mushroom lifecyle, spores and mushroom fruiting bodies come to mind. Before those stages a matrix of mycelium grows in a suitable substrate and then turns into primordia, which eventually become mushroom fruiting bodies which then produce spores. This process is much more complex but these main stages are what might be recognizable to you in the forest or with your Ecovative mycelium material if you don’t follow the instructions. If you do follow them, you will only be dealing with the mycelium stage - growing mushroom roots as a natural glue for the agricultural substrate.
TEACHERS & EDUCATORS!
Are you a forward-thinking educator who would love to inspire your students with the endless possibilities of biomaterials, circular economies, composting, and homegrown product solutions? For discounted classroom-size packs, lesson plan suggestions, and a whole lot more, go to www.ecovativedesign.com/community or contact us at contact@ecovativedesign.com

ABOUT ECOVATIVE
One of Ecovative’s core missions is to teach, inspire, and support people who want to grow with biomaterials.

We believe the future will be grown, and we want you to be a part of it, so we created Ecovative’s Grow It Yourself Community as an accessible, first hand experience with mycelium biomaterials.

Check out our site for the materials, resources, and tools that you need to grow with biomaterials.

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