

## Lesson 1: Mycelium and its possibilities

### Objectives:

1. Explore the creativity and resourcefulness of sustainable inventions today.
2. Get to know the various uses for mycelium-based materials.
3. Understand how growth forms contribute to the design of mycelium-based materials.

### Introduction:

There are a number of ways in which innovators today are trying to reduce our environmental footprints as humans. We are made aware of the climate change crisis everytime there is a new climate disaster, and scientists around the world are working to reduce global CO<sub>2</sub> emissions in various innovative ways. We are also aware of the overwhelming amount of plastic waste laying in landfills, in the oceans, and moving through the food chain in the form of microplastics. Scientists, students, designers, artists and more are taking creative strides towards recycling plastic waste, upcycling into new products, and looking for alternative solutions altogether. In 2012, a 19-year old Dutch student at the Delft University of Technology named Boyan Slat designed a floating platform that could clean the plastic out of oceans. Today, he is the [founder and CEO of Ocean Cleanup](#), and runs the platform in oceans and rivers. Ocean Cleanup's goal is to 'remove 90% of floating ocean plastic by 2040'. 16-year old Turkish student [Elif Bilgin](#) won the 2013 Science in Action Award of the Google Science Fair. She designed a bioplastic made from the starch and cellulose of banana peels. [Incredible Eats](#) featured on Shark Tank, is a company that produces edible straws, spoons and forks in different flavors. The company is both carbon and plastic negative, and all products are completely biodegradable.

...And the creativity continues! In recent years, scientists, designers, and artists have been experimenting with growing fully sustainable materials using mycelium, the vegetative state of fungi (for more information on mycelium see [Grow.Bio's Biology lesson plans](#)). Mycelium are living organisms which feed on a plant-based substrate, just like fungi grow and feed on trees and logs in the forest. When you allow the mycelium to grow, you can direct its shape and form based on your needs. Companies are taking advantage of this technology to produce furniture, faux leather, household products, exterior design, and even vegan meat. Below are several examples of mycelium designs:

1. *Local Bee* creates bee hives out of mycelium to help bees return to their natural habitat.

[A closer look](#): Why would this start up be interested in providing artificial hives for honey bees?





2. Rachel Rosenkrantz makes guitar bodies out of mycelium, as well as explores the use of all natural and sustainable strings, varnishes, etc.

[A closer look:](#) What are some other biomaterials Rosenkrantz works with?

3. Catriona Brown creates plastic-free tree shelters for growing saplings.

[A closer look:](#) What might be a benefit of having a fully compostable protection for a young tree?



4. The Guilad Office of Design makes a meditation seat out of mycelium.

[A closer look:](#) How do science and art come together to create products such as the ones made by this design studio?

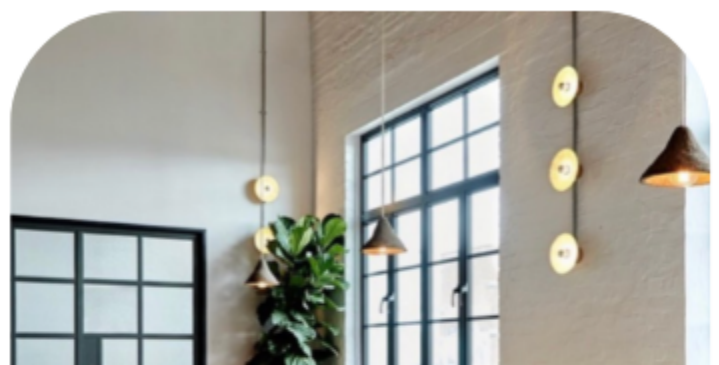
5. Scientist and architect Dr. Mae-ling Lokko uses Mycelium as a building material.

*A closer look:* What criteria do you think the mycelium would have to meet to be a reliable building material for a house?



6. Jonathan Dessi-Olive is the director of MYCO MATTERS Lab, which has produced a pavilion made of mycelium.

*A closer look:* How is the mycelium aesthetically different from a traditional wood or cement structure?



7. The interior design studio Nina and Co. creates furniture out of mycelium.

*A closer look:* Would you use mycelium furniture in your own house or bedroom? Why or why not?

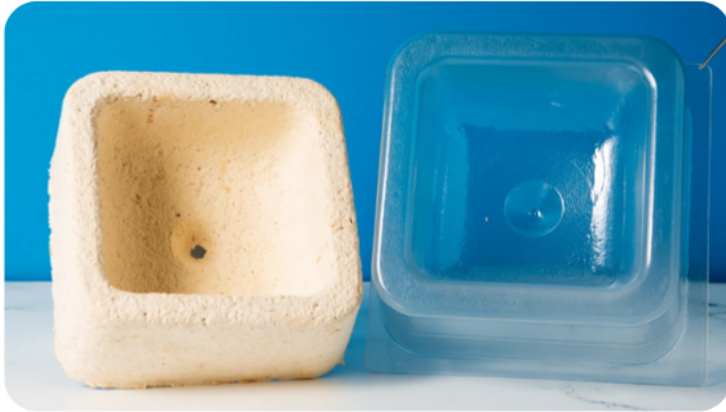


8. Artist and sculptor Nora Chavooshian creates mycelium sculptures as set design in a production.

*A closer look:* Did you know you can also sculpt mycelium? How do you guess Chavooshian created the intricate designs on the outside of the sculpture?

### **The role of growth forms in shaping mycelium**

In all examples above, the mycelium must be formed into a particular shape. Remember that mycelium is a living organism, so it must be coaxed into a growth form along with a food source for it to digest and grow on. For example, if you want to make a mycelium planter, you may grow the mycelium in this form. Notice that the form is made so that when the mycelium grows, it becomes the desired shape. This is similar to gelatin growing into a growth form to create a gummy bear.



### Create your own mycelium product in a growth form

- a. Your teacher will provide you with living mycelium material and [instructions](#) for growing it into the form.
- b. After you have finished this process and you have successfully dried and popped out your mycelium form, summarize what you learned below:
  - i. What was the purpose of the form?
  - ii. How did the mycelium material change throughout the process? What do you think may have been happening?
  - iii. What is your final product made of?