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Is fungus the answer to climate change? Student who grew a mushroom canoe says yes.

“Mushrooms are here to help us – they’re a gift,” college student Katy Ayers said. “They’re our biggest ally for helping the environment.”



Katy Ayers paddles her canoe on a Nebraska lake. Courtesy Katy Ayers

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By Sarah Kuta

Catch a glimpse of Katy Ayers paddling her canoe on a Nebraska lake this summer and you might do a double take.

At first glance, her 8-foot vessel looks much like any other canoe – same oblong shape, same

pointed ends, same ability to float on water.

But upon closer inspection, it's clearly anything but ordinary: Ayers' canoe is made out of mushrooms.

More specifically, her boat is made from mycelium, the dense, fibrous roots of the mushroom that typically live beneath the soil. Ayers, 28, a student at Central Community College in Columbus, Nebraska, even gave her creation a fitting name: "Myconoe."

Though Ayers has taken the canoe out for several quasi-recreational excursions – and plans to do so again as soon as the weather warms up in the rural part of Nebraska where she lives – her real goal with the eye-catching project is to raise broader awareness about mushrooms. She is part of a growing movement of mushroom advocates, people who believe these squishy, sometimes edible fungi can help solve some of our most pressing environmental problems.



Katy Ayers' 8-foot vessel is made from mycelium, the dense, fibrous roots of mushroom that typically live beneath the soil. Courtesy Katy Ayers

In addition to their ability to break down harmful pollutants and chemicals, Ayers pointed out that mushrooms can be used for everything from household insulation to furniture to packaging, replacing plastics, Styrofoam and other materials that are hard to recycle and harmful to the environment.

“Mushrooms are here to help us – they’re a gift,” Ayers said. “There’s so much we can do with them beyond just food; it’s so limitless. They’re our biggest ally for helping the environment.”

Mushrooms aren't exactly mainstream, though citizen scientists like Ayers and some private companies hope to someday change that. The New York-based biotech company [Ecovative Design](#), for instance, has made headlines for its mushroom-based packaging material, which has been deployed by companies such as Ikea and Dell. Mushrooms are being used at the local level to help clean up toxic debris and contaminated soil – a process known as mycoremediation – but so far have [not been adopted on a larger scale](#).

Ayers never paid much attention to mushrooms until she enrolled in 2018 at the college in Columbus, a small city with around 23,000 residents. During her first semester, an English instructor challenged students to find and study a potential solution to climate change.

During her research, Ayers came across a 2013 documentary called “Super Fungi,” which made the case for mushrooms as an environmental ally and highlighted some of their innovative uses.

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Ayers was sold on the power of mushrooms instantly. Having learned that mycelium is buoyant and waterproof, she decided to try using it to create a boat.

“I always have very big ideas,” she said. “So I see something and it’s small and I just want to make it bigger and better. Since I’m from Nebraska, I love to fish. I’ve always wanted a boat. Why not just grow it?”

With a mini-grant from the college, Ayers got to work. She reached out to a mushroom company in nearby Grand Island for help, sharing her idea with owner Ash Gordon. He agreed to help immediately and offered her a summer internship so she could learn the ins and outs of fungi.

During the day, Ayers worked alongside Gordon at Nebraska Mushroom, doing lab work, creating spawn and harvesting, packaging and processing mushrooms.

After finishing their work for the day, the two turned their attention to the canoe project. They first built a wooden skeleton and a hammock-like structure to suspend the boat-shaped form in the air.



Katy Ayers and Ash Gordon sandwiched the boat's skeleton with mushroom spawn and let nature take over. Courtesy Katy Ayers

They next sandwiched the boat's skeleton with mushroom spawn and let nature take over.

For two weeks, the fledgling canoe hung inside a special growing room in Gordon's facility, where temperatures ranged between 80 and 90 degrees and the humidity hovered between 90 to 100 percent. The last step in the process was to let the 100-pound boat dry in the Nebraska sun.

All told, Ayers said she spent \$500 on spawn, tools and equipment to build the canoe.

Ayers, who displayed her “Myconoe” at the 2019 Nebraska State Fair, has taken the canoe out for three test floats, including one in which two people comfortably sat inside. The boat is still alive, which means it fruits – grows mushrooms – each time they take it out for a paddle.

The successful mycelium canoe inspired Ayers and Gordon to experiment with making chairs, landscaping bricks and other items.

Though it started as a hands-on learning opportunity for Ayers in the course of her collegiate studies, the canoe has also served as a quirky conduit for conversations about mushrooms.

“It’s not just a piece of art, this is a functioning boat that works,” Gordon, 39, said. “It really helps bridge that gap between people who didn’t have an interest in mushrooms – maybe they don’t like to eat mushrooms and really haven’t thought about other potential uses for them. The boat gave them something to look at and think about.”

Now Ayers is sharing her newfound fungi fabrication knowledge with other students at the community college. She’s part of Growing Pathways to STEM, a full-ride scholarship program funded by the National Science Foundation that aims to help low-income and underserved undergraduates studying science, technology, engineering and math.

Ayers is leading one of the cohort’s main research projects: building bee hotels, small structures also called nests or homes, from mycelium.

Inspired by [research from Washington State University](#), which found that honeybees who consumed mycelium extract had lower levels of a harmful virus, Ayers and her classmates hope to better understand the effects of mycelium on Nebraska’s solitary bees.

Though the community college [closed all campus buildings in early April](#) to prevent the spread of the coronavirus, Ayers is keeping the project alive in her basement while taking online classes.

In addition to her full-time course load, Ayers works as the community college’s sustainability intern, keeping tabs on energy use across the community college system’s seven campuses and centers.

The internship, which Ayers has also been able to continue remotely, and self-led mushroom research projects are just the start: After graduating with an associate’s degree in science, Ayers plans to earn a bachelor’s degree in biology and, later, a doctorate in mycology.

And after that? Save the planet.

“She has an innate desire to change the world,” said [Lauren Gillespie](#), a biological sciences instructor at Central Community College and Ayers’ adviser. “She believes that she can do it, and I believe that she can do it.”

Sarah Kuta

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