

# Mushrooms trained to 'eat' cigarette butts to tackle one of world's biggest litter woes

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Oyster mushrooms put out a thin white fibre called mycelium, which covers a cigarette butt and breaks it down while drawing nutrients from it. (Flickr: Tim Sheerman-Chase)

Scientists around the world are discovering many environmental uses for fungi, and now Australian researchers are hoping oyster mushrooms will solve one of the world's biggest litter problems — what to do with the 4.5 trillion cigarette butts tossed away every year.

The key, according to fungi researcher Amanda Morgan, is convincing oyster mushrooms that cigarette butts are edible.

Fortunately, training a mushroom to digest a cigarette butt is "like training a baby to eat," Ms Morgan, founder and head of research and development at Fungi Solutions, says.

Once the mushroom begins the digestive process, it is able to break down the butts, including the microplastics in them, to create a reusable material, Ms Morgan says.

"It's a fascinating process to see, and most of our stuff is grown in glass so you can see the process," she said.

"Mushrooms put out fine webs of mycelium and the roots spread through the cigarette butt.

"It will branch out like a web and, over time, you'll see the dirty butts become white mycelium as it expands through the material and starts digesting that material."

## Key points:

- Oyster mushrooms are being trained to feast on cigarette butts to break down their microplastics and create a reusable product
- In an Australian first, Wollongong City Council will partner with researchers to address the waste issue
- Cigarette butts are one of the world's biggest litter problems, with 4.5 trillion butts discarded into the environment every year

Fungi Solutions founder Amanda Morgan grew up in Wollongong and is partnering with her home town's council for the cigarette butt trial. (Supplied: Fungi Solutions)

At the end of the process, the mushrooms will have eaten the microplastics in the cigarette butts' filters, leaving behind a material that can be used to create other products, such as boxes to collect cigarette butts.

"Mushrooms excrete digestive enzymes as they move through places and break down food sources externally before bringing the nutrients into their systems," Ms Morgan said.

## Council collaboration 'a first'

Fungi Solutions, based in Melbourne, specialises in rescuing waste from landfill and using fungi to break down materials so they can be recycled or composted.

In an Australian-first collaboration with a council, Wollongong City Council in New South Wales will partner with Fungi Solutions researchers to collect cigarette butts and use the trained fungi to detoxify their plastic components.

"Council has invested in a number of new cigarette butt bins at key locations around our community," Wollongong City Council spokesperson Joanne Page said.

"We're now collecting some of these cigarette butts and instead of sending them to landfill, we're sending them to be used in this trial."

Cigarette butts contain cellulose acetate, which mushrooms can feed on while breaking down microplastics. (Flickr: Rosewoman)

## Trillions of butts littered every year

According to environmental organisation No More Butts, about 4.5 trillion cigarette butts are tossed away as litter worldwide every year.

The group says that in Australia, each year 8 billion butts are discarded into the environment — about a third of the total number of cigarettes consumed.

"It's the biggest issue we've got when it comes to litter," the group's spokesperson, Shannon Mead, said.

"Even for those who do the right thing [and put butts in the bin], it ends up in landfill and it sits there for a long time with emissions happening as a result.

"It's the first time in Australia that we're working with a council to divert the butts we collect from landfill and it's fantastic to partner with Wollongong on this."

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## Making a meal of a cigarette

Oyster mushrooms send out long thin strands of white mycelium to explore their surroundings and gather nutrients — but eating a cigarette butt will be a new dining experience for them.

During the trial, the mushrooms will slowly recognise a food called cellulose acetate in the filter of the cigarette butt and begin to eat it.

That process also breaks down the plastics that are used to make the filters more durable.

"They [the mushrooms] are used to the cellulose, but we need to introduce the other elements, just like training a baby to eat," Ms Morgan said.

"It takes about a week to colonise something like a jar we test in, so it's a rapid turnaround.

"From there you can take the culture and grow the next one."

Ms Morgan, who grew up in Wollongong, says her goal is to set up a remediation facility in her home city where butts can be transported to, treated, and turned into usable materials.

The trial is expected to take up to two years.