The Purhyphae project

Use of mycelium for the biodegradation of textile waste and exploration of a repurposition into a composite flexible material.
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Project Information (EN)

Context

The fashion industry produces over 100 billion garments per year, of which 60% are plastic based and 85% will end up in a dump before the end of the year. Considering that various micro and macro-organisms, such as fungi and more specifically their mycelium, are capable of biodegrading the main components of textile (cellulose and more complex plastic molecules) an opportunity to rethink the linearity of the textile industry emerges. Beyond breaking down the waste products, the mycelium hyphae network can produce mycelium-based materials, including leather-like materials, adoptable in the fashion industry.

Research

This project investigates ways to biodegrade various combinations of denim textile waste, synthetic textile waste, food waste and spent coffee grounds. The mycelium used was from the Pleurotus ostreatus (oyster) fungi. The results show that P. ostreatus (oyster) mycelium grows on all the combinations of food waste (vegetable peels and coffee grounds) with textile waste (synthetic textile and denim textile), and even grows on denim textile waste only. However, the mycelium did not entirely degrade the fibers but only partially digested it, leading to a leather-like composite made of the mycelium and remainder of its substrate. Provided the soft nature of the substrate, the textile waste and food waste mycelium composite is also malleable, and therefore interesting for further textile applications. A protocol for post processing of the flexible composite material using low energy and natural components (heat, water, glycerol, and beeswax) was created to make a composite flexible fungal material. The whole process thus enables a circular way of treating textiles by closing the loop of the current linear model.

Image List

Filename	Caption	Credit
dsc07047_1662063856.jpg	Pure and composite flexible mycelium materials.	Annah-Ololade Sangosanya
oyden2d7_1661991848.JPG	P. ostreatus mycelium growing on denim waste	Annah-Ololade Sangosanya
dsc07052-1_1661991872.jpg	Pure mycelium leather (Reishi mycelium)	Annah-Ololade Sangosanya
dencof2d14_1661991918.JPG	P. ostreatus mycelium on denim and coffee waste	

The images above are included in the ZIP under `/images`.