PROGRAM ON THE ENVIRONMENT
UNIVERSITY of WASHINGTON

MYCO-FILTRATION FOR CLIMATE RESILIENCE AND CIRCULARITY

Session Day 2, In-Person

Keya Roy, @KeyaRRoy

Program on the Environment, University of Washington

Site Supervisor: Tatiana Brown, University of Washington Campus Sustainability Fund

Faculty Advisor(s): Ken Yocom, Landscape Architecture, University of Washington

As climate change intensifies wildfire smoke seasons in Western Washington, HEPA (High-Efficiency Particulate Air) filtration becomes crucial to protect humans, plants, wildlife, and ecosystems from hazardous smoke particles. However, the production of conventional synthetic HEPA filters generates toxic environmental pollution and drives climate change, thus creating the conditions for further wildfires. Furthermore, these synthetic HEPA filters cannot operate outdoors, leaving those without the privilege of indoor access vulnerable. Therefore, this project explores an alternative HEPA filter material that is inexpensive, sustainable, and outdoor-compatible: mycelium composites upcycled from regional mycocultural wastes. A study aimed to evaluate the optimal fungal species of upcycled mycelium composites for smoke particle filtration. First, interviews were conducted to ascertain the most frequently discarded fungal species of spent mycelium blocks by Western Washington mushroom farms. Next, mycelium composites of those fungal species and a synthetic storebought HEPA filter (control) were exposed to simulated wildfire smoke. Finally, microscope imaging was used to compare their smoke particle filtration performances. Results indicate that of the fungal species of spent mycelium blocks most frequently discarded by regional mushroom farms, Hericium americanum mycelium composites exhibit the highest smoke particle filtration efficiency, roughly twice that of the synthetic HEPA filter. An outdoor air filtration structure prototype utilizing H. americanum mycelium composites was then developed and integrated into the landscape design produced during my capstone internship. This prototype will establish a precedent for this novel air filtration technology that holds the power to simultaneously promote climate resilience and repair waste relations within our region.