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Fungi + Fabrics – Research on mycelium-cotton composite materials

The research project focused on investigating fungal mycelium-textile composites as a sustainable building material of the future. The mounting accumulation of textile waste, primarily cotton-based materials such as denim, highlights the requirement for alternative strategies for waste minimization and sustainable material production. Mycelium, the vegetative network of filamentous fungi, has gained traction for its ability to propagate on organic substrates and form a biodegradable composite material. This study explores the potential of denim waste fabrics as a substrate for the growth of *Pleurotus ostreatus* mycelium through two sequential experiments. The central question was how fungal mycelium interacts with natural textiles, such as cotton, and to what extent these textiles influence the properties of the resulting composite material. The project focused on the experimental and iterative investigation of the composites, with particular focus on observation of the growth process and qualitative comparison between different samples.

The preliminary experiment investigated fungal colonisation on four denim morphologies (shredded, striped, spiral, uncut) in two batches under varying water supply, showing strong growth on shredded threads under high-moisture conditions on the one hand, and increased colonisation on uncut and striped denim under reduced moisture on the other hand. The second experiment observed changes in mycelial growth under three nutrient supplementations (distilled water, malt, coffee) on two selected denim structures (striped, shredded), revealing enhanced growth under coffee supplementation on both morphologies. Three batches were inoculated with different mycelial strains of *Pleurotus ostreatus* within these two experiments and all were colonised successfully. The results suggest that both substrate structure and nutrition modulate mycelia growth on denim, while prior culturing conditions can affect subsequent colonization performance. These findings contribute to ongoing research on mycelium-based-materials and highlight the potential of textile scraps as a resource for developing sustainable bio-based material systems while mitigating the growth of waste landfills.