Mush N' Pack: Mycelium-Based Composite for Greener Packaging

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The excessive use of polystyrene (PS) in packaging has led to severe environmental concerns due to its non-biodegradability, large contribution to microplastic pollution, and harmful chemical leaching. This project explores the development of a Mycelium-Based Composite (MBC) as a sustainable alternative to polystyrene packaging, utilizing agricultural waste and natural coatings to enhance durability and water resistance. The Mush N' Pack prototype was formulated by incubating mycelium substrate with wheat flour and later coated with different ratios of beeswax and coconut oil to evaluate their impact on water absorption, density, fungal resistance, and biodegradability. Key experimental findings indicate that 60BW (60% beeswax, 40% coconut oil) is the most optimal formulation, providing a balance between structural integrity, water resistance, and fungal inhibition. Water absorption tests demonstrated that coated samples exhibited significantly lower moisture retention compared to uncoated ones, while microbial tests confirmed that the coating effectively prevent fungal growth. Additionally, soil burial tests showed that 60BW-coated MBCs degraded at a controlled rate, making them both durable and environmentally friendly. Overall, this research supports the viability of MBCs as a biodegradable and renewable alternative to PS, offering a sustainable, cost-effective, and functional packaging for a greener future. Further studies may explore advanced coating techniques like ultrasonic baths to refine MBC's properties and enhance real-world applicability.

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